



BUILD UP SKILLS - LITHUANIA STATUS QUO ANALYSIS

REPORT



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Further information

More details on BUILD UP Skills can be found at www.buildupskills.eu

More details on the IEE programme can be found at <http://ec.europa.eu/intelligentenergy>

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Abbreviations

AIKOS	<i>Atvira informavimo, konsultavimo, orientavimo sistema</i> (Open Vocational Information, Counselling, and Guidance System)
CITE	Centre of Information Technologies in Education
CPC	Central professional committee
EACI	Executive Agency for Competitiveness and Innovation
ECVET	European Credit System for Vocational Education and Training
EDC	Education Development Centre
EPBD	Energy Performance of Buildings Directive
EQF	European Qualifications Framework
GDP	Gross Domestic Product
IEE	Intelligent Energy Europe
KTU	Kaunas University of Technology
LHE	Law on Higher Education of the Republic of Lithuania
LEC	Lithuanian Education Council
LSA	<i>Lietuvos statybininkų asociacija</i> (Lithuanian Builders Association)
LTQF	Lithuanian Qualifications Framework
LVET	Law on Vocational Education and Training
LVT	Law on Vocational Training of the Republic of Lithuania
QVTDC	Qualifications and Vocational Training Development Centre (<i>Kvalifikacijų ir profesinio mokymo plėtros centras - KPMPC</i>)
RES	Renewable energy sources
RIVC	<i>Regioninis inovacijų vadybos centras</i> (Regional Innovation Management Centre)
SKVC	Centre for Quality Assessment in Higher Education (<i>Studijų kokybės vertinimo centras – SKVC</i>)
SPTC	Sectorial practical training centres (<i>Sektorinis praktinio mokymo centras – SPMC</i>).
SPSC	<i>VĮ Statybos produkcijos sertifikavimo centras</i> (Certification Center of Building Products)
VET	Vocational and Educational Training
VETCL	Vocational Education and Training Council of Lithuania
VG TU	Vilnius Gediminas Technical University

1. Introduction

Project information

Lithuania, in implementing the provisions of the Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings, like other Member States must ensure that:

- no later than by 31 December 2020 all new buildings are nearly zero-energy buildings;
- after 31 December 2018 public authorities, occupying, owning and managing new buildings must ensure that the buildings are nearly zero-energy buildings.

The Directive requires the Member States to draw up national plans to increase the number of nearly zero energy buildings and to ensure the promotion of the conversion of buildings into nearly zero-energy buildings.

The Lithuanian National Energy Strategy indicates that by 2020, the following strategic initiatives will be implemented in developing sustainable energy:

- implementation of renewable energy resource development strategy that aim is to increase the share of final energy consumption from renewable energy resources by at least 23 per cent to the year 2020;
- energy efficiency will increase by 1.5 per cent each year;
- till 2020 in Lithuania thermal energy consumption in buildings, after the renovation of most of them, will reduce by 30-40 per cent.
- reduction of CO₂ emissions.

BUILD UP Skills is a new strategic initiative under the Intelligent Energy Europe (IEE) programme to improve the qualification and skills of Europe's building workers, which are essential to build, equip and renovate buildings of high energy performance. The Initiative focuses on continuing education of **craftsmen and other on-site construction workers and systems installers in the building sector**. The final aim is to increase the number of qualified workers across Europe to deliver renovations offering a high energy performance as well as new, nearly zero-energy buildings. The initiative addresses skills in relation to energy efficiency and renewables in all types of buildings.

General objectives of the “BUILD UP Skills” are:

- To initiate national processes to bring together all stakeholders specialising in construction work force training and qualification, and energy efficiency and renewable energy resources;
- To identify and quantify the demand for labour force, specializing in energy efficiency and renewable energy resources, for all relevant professions and skill levels in each Member State by 2020 (and later) and discuss the necessary changes to the current system, as well as specific training measures in order to meet the demand;
- To identify and coordinate the national qualification roadmap for the achievement of sustainable energy policy objectives by 2020;
- To support specific qualification schemes established in the national qualification roadmap till 2020 with the identified demands and priorities.

The first phase of the implementation of the initiative includes the development of the national qualification roadmap and the plan for 2020. Bringing together the country's stakeholders, this should result in the development of the roadmap for quantitative demands and measures.

Based on the roadmap, the funds of Intelligent Energy Europe program will be allocated for the financing of the second stage – implementation of new training programs, and/or upgrade of existing ones. The European Commission-funded project in Lithuania BUILD UP Skills – Lithuania (Training and development initiative of Lithuanian built environment sector specialists to increase energy efficiency of buildings and structures at the national level) is implemented by the State Enterprise Statybos Produkcijos Sertifikavimo Centras (Building Products Certification Centre), Lithuanian Builders Association, Vilnius Gediminas Technical University, Kaunas University of Technology and Regional Innovation Management Centre. The main objective of the project is to ensure the proper training and qualifications of blue collar workforce in construction required for the construction of energy efficient buildings and efficient use of renewable energy sources' technology. The project should develop the qualification training roadmap with the action plan to the year 2020, with quantitative identification of the demand for skilled workforce of corresponding qualifications, qualification training measures, priorities and funding needs, certification procedures, etc. The project duration is 18 months. Implementation of the project began in June 2012.

Information on work packages

The project activities are divided into five groups. Their contents are briefly presented below:

Group of activities 1

Project management, including decision-making, quality control and risk management. The establishment of a project management committee foreseen, with the participation of one representative of the consortium member. This group of activities includes the project web site creation and support, presentations for stakeholders, press releases and articles about the project in specialized construction sector-related publications.

Group of activities 2

The current status quo analysis at the national level according to the identified sections. This group of activities includes: the analysis of blue collar workforce training system in national construction sector, the analysis of construction sector (including the statistics on energy efficiency in buildings, and the quantitative research of the use of renewable resource systems) and the qualifications of skilled workforce (by area and by the level of competence), the skills' gap analysis, the survey of vocational training institution, survey of construction companies and equipment manufacturers and distributors, final report on the current status quo analysis, based on the data collected during the project and the analysis of results. As a result, it is expected to identify the barriers and gaps between the current status quo in the sector and the needs of the sector, achieving the goals of 2020 so far as they concern the necessary training, teacher qualifications, and quantitative assessment of staffing demand. It is expected that this part of analysis is to initiate a discussion among stakeholders. This phase should be completed during the first 6 months of the project implementation.

Group of activities 3

According to the results of analysis of the current situation of the national level, the qualification roadmap will be developed. It is planned to carry out the external online survey, interviews or telephone interviews of experts and the stakeholders interested in the project results. The qualification guidelines should include: data, that will be received during the analysis of the current status quo on the contribution of the built environment sector to the reduction of energy consumption and renewable resource development, identified demand for qualifications in the built environment sector, staff training strategy, required curriculum structure, certification and selection procedures for the course providers, training quality control methods, certification procedure and requirements for construction companies and professionals. It is expected to set the priority areas, to develop an action plan, to carry out the financial analysis of implementation, to determine additional resources necessary to carry out the progress monitoring of the proposed measures. The outcome of this activity group will be presented in the publication of the roadmap.

Group of activities 4

At this stage these activities aim to formalise the qualification roadmap, i.e. the aim is to receive the support of employers and other stakeholders for the national roadmap. Planned actions: to prepare the plan of measures for the approval and acceptance of the prepared roadmap, to hold a final conference, which will present the qualification training guidelines, the qualification training guidelines will be placed on the project website and officially presented for approval to the key stakeholders, including the government authorities.

Group of activities 5

The coordination of actions and the result of the platform with the initiatives of other EU countries. There will be meetings on the territory of the EU, to present the project progress and achievements, to share best practices, and highlight the project performance results.

Brief information about the construction sector

The construction sector is one of the most important in the European Union. It creates about 10 per cent of the GDP and positively affects the growth of employment in other related economic areas. The sector features a specific cyclical nature of work, a relatively low productivity and a dominant number of small companies compared to other industries.

The construction sector contains about 5 thousands of companies, of which 39 per cent specialise in the construction of buildings and parts thereof. The sector is dominated by small companies (with less than 49 employees). From 2002 to 2006, the number of enterprises in the construction sector has more than doubled. The construction sector employs approximately 107 thousand employees, of which a large part work in the subsector of building and their parts (about 68 per cent of all construction industry blue collar workforce).

Due to the variety of the construction sector activities, the sociological and economic, organizational, cultural and technological challenges are addressed differently, there is different adaptation to the new rules and in taking advantage of the market opportunities. The targets of the Energy Performance of Buildings Directive¹ indicate that the built environment sector will face some of the biggest challenges – to start the construction of nearly zero-energy buildings². The market still has several years to prepare. The built environment sector will have to adapt to these changes and provide the personnel with required skills and abilities. This is especially important in the training of employees for the construction of nearly zero-energy buildings, regardless of whether the work will be related to new or renovated buildings. In order to implement new technologies and organise the work flexibly, blue collar workforce in construction will need new skills and qualifications.

Now the construction industry faces with a variety of structural problems: many companies lack skilled workforce, young people are not particularly attracted to the working conditions in this sector, as it offers poor opportunities for innovations, and is infested with extensive undeclared work. The built environment sector which grew at a staggering rate before the crisis, after the collapse of the real estate bubble in the country and the shrinkage of the investment, within two years experienced the largest downfall among all sectors of the economy in 2009. The number of unemployed in the sector has increased, labour rates and earnings shrunk significantly, and investment rates fell. Analysts say that in 2012, in the most optimistic case, low growth can be expected – the prevailing uncertainty about the European debt crisis discourages enterprises from investing, and public sector contracts are scarce. The crisis in the built environment sector forced market participants to re-orient, giving more focus on the modernization of buildings, construction of non-residential and engineering, utility buildings and EU-funded projects.

¹ The Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010 on the energy efficiency of buildings.

² More information on the relevant provisions can be found In paragraph 2 of article 2 and in article 9 of the Directive 2010/31/EC.

2. Objectives and methodology of the study

2.1. Purpose of the report

This report presents the status quo analysis of the workforce of the Lithuanian construction sector: overview of current skills and qualifications, training services offered and the insights of skills demands.

2.2. Research objectives

The research consists of the following two parts:

1. Analysis of national continuing vocational training system:

This part covers the analysis of the national continuing vocational training in the construction sector, analysis of the legal framework, policies and implementation strategies in the areas of energy and vocational education and training, and the quantitative analysis of workforce and skills.

2. Construction sector analysis:

This part covers the analysis of energy efficiency in buildings, analysis of the demand for the up-skill training of the construction sector workforce (by areas and levels of competence), a quantitative study on the use of renewable systems in buildings and energy consumption in the construction sector.

Research objectives:

- The construction sector analysis (construction market, energy consumption, renewable resources, etc.) including statistics on energy-efficient and renewable resource-efficient buildings (energy consumption, use of renewable resources in them), quantitative information regarding the workforce qualifications (by area and by level of competence).
- Analysis of current and planned policies and strategies in energy and vocational education and training areas.
- To perform the analysis of national training system of blue collar workforce in construction (institutions, number/duration of training curricula, number of employees in the construction training sector, contents of training curricula, attestation system, certification system), evaluation of how the current system provides the required knowledge, skills in training of highly qualified blue collar workforce able to use energy-efficient construction methods, techniques, materials and work with renewable resource-efficient buildings.
- Analysis of current trainings and training programs on the use of energy efficiency and renewable resources that are currently being taught, but are not part of the continuous training.
- To determine the extent to which the current system meets the requirements for skills in implementing measures of the energy efficiency and renewable energy sources in buildings. Analysis of gaps in skills and qualifications.
- To identify barriers and gaps between the current status quo and the needs of the sector, achieving the targets of 2020 in regard to the required training, teacher qualifications, quantitative assessment of staffing needs.

2.3. Scope of research

The project of Build Up Skills Initiative is focused on a specific target group: blue-collar workforce occupations in construction sector. While the European Commission recognizes the strategic

importance of other professions, such as energy experts and consultants, architects and engineers, however, these professions are not included in the scope of this research, as the European Commission considers that there is a greater demand for skilled workforce who must have skills related to the concept of energy-efficient buildings and installation and maintenance of renewable energy systems.

2.4. Methods of research

With the purpose of obtaining reliable and comprehensive information the data was collected and analyzed using a variety of quantitative and qualitative methods. Basically, the fundamental and applied research was used.

The fundamental research was carried out in the phase of the initial status quo analysis and was aimed at expanding the boundaries of knowledge, with less emphasis on solutions of specific practical problems.

Applied research was carried out in particular in addressing specific problems in order to know better the environment in the construction sector, to identify the specific continuing professional education indicators and their development trends. This research aimed to eliminate the uncertainty of proposed decisions, to clarify what tactics and strategy might be appropriate.

At an early stage of the research, before it was entirely clear how much and what further investigation may be needed, the *exploratory survey* was carried out. The exploratory survey included 1) formulation of the problem, with a clear definition of it, 2) clarification of potential problem solution alternatives, 3) determination of the factors affecting the problem, 4) definition of the subsequent tasks.

The *descriptive-evaluative study* covered the identification of events, facts, situations, clarification, their comparison, identification of and assessment trends, without going deeper into their causes.

Many secondary sources of information were analyzed during the *desk research*. The research helped to clarify the characteristics of the construction sector, analyse national policies and strategies, to select statistical data of construction and energy industry, the current vocational education and training system, existing training programs and other data relevant for the status quo analysis.

The *search-foresight studies* were carried out to forecast the labour demand in the construction sector and the sector indicators.

After the *stratified random survey* of construction companies and educational institutions the initial data was collected about the shortage of professions in the construction sector, contents of non-formal education curricula, preparedness of teaching institutions to teach according to training programs prepared to train blue collar workforce for the construction of energy efficient buildings and installation of equipment for renewable energy technologies.

In order to ensure the consistency of the survey results, as well as assess the reliability of obtained the information, to identify earlier in research uncovered problems, to collect of proposals and recommendations from market, to identify opportunities and barriers, meetings with representatives of educational institutions (*focus groups*), *telephone and direct interviews* were held. The main assumptions for the application of these methods are such that employers should summarize the approach to the specific training needs.

2.5. Research experts, consultants and the respondents of the survey

The report and the analysis on status quo in an area of blue collar workers continuing vocational training in the construction sector in Lithuania were accomplished by project experts: chapters 1, 2, 3.1, 3.2, 5.5, 5.6, 6.1, 7.2, 7.3, 8.2 and 8.3 of the overall report were prepared by T.Vilutienė, chapters 3.3, 6.3, 6.6, 8.1 were prepared by V.Šarka and T. Vilutienė, chapters 4.1, 4.1.1, 4.1.2, 5.4, 6.4 were prepared by J.Ramanauskas, chapter 4.2 was prepared by G.Laurynaitienė, chapters 5.1, 5.3 were prepared by G.Ambrasas, chapters 5.2 and 6.2 were prepared by K.Pesliakas ir R.Encius, chapter 6.5 was prepared by V.Šarka, J.Bureikis and K.Pesliakas, the authors of chapter 7.1 – A.Vaitkevičius and V.Podvezko. The experts of the Regional Innovation Management Centre have prepared electronic questionnaires of the survey completed by educational institutions and employers and have performed processing of the survey results.

The analysis on status quo in blue collar workers continuing vocational training was fulfilled by regular consulting with the representatives from vocational education institutions and enterprises, Qualifications and Vocational Education and Training Development Centre, Centre of Information Technologies in Education and with other legal entities, implementing the development policy of the Lithuanian state vocational training system.

The surveys of educational institutions and construction sector’s enterprises were made trying to collect the indispensable for the research primary data about the lack of the blue-collar professions in a construction sector, the content of informal learning programs and educational institution’s preparation to train in accordance with training programs designed to train the workers to build energetically effective buildings and to assemble equipment of the renewable sources technologies.

100 respondents were invited to participate in a survey of vocational education providers. The filled electronic questionnaires were sent back by 46 respondents.

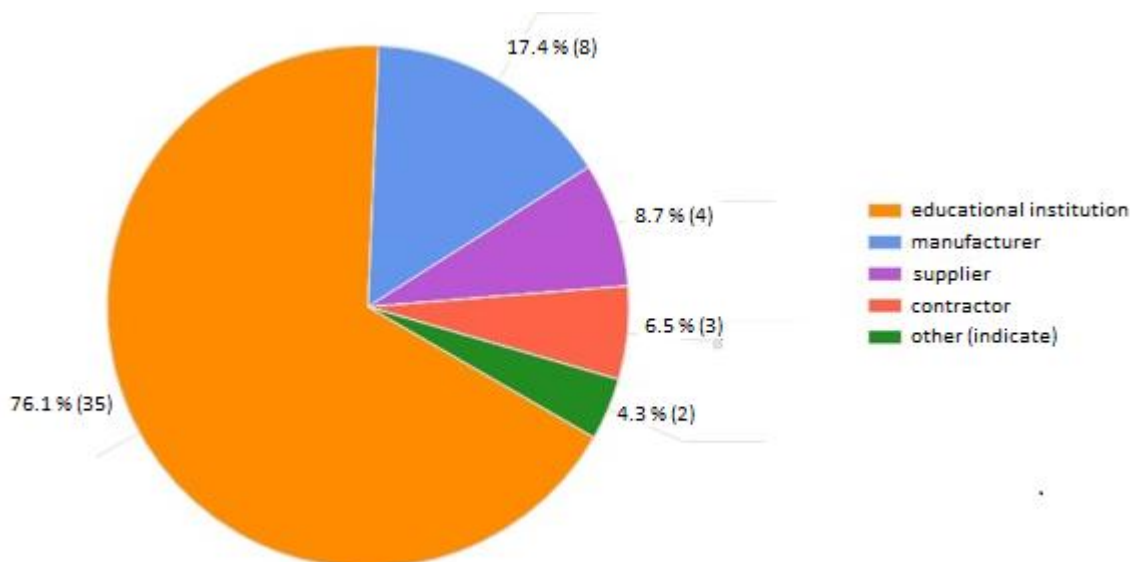


Fig. 2.1. Questioned training providers (distribution by a type of activity)

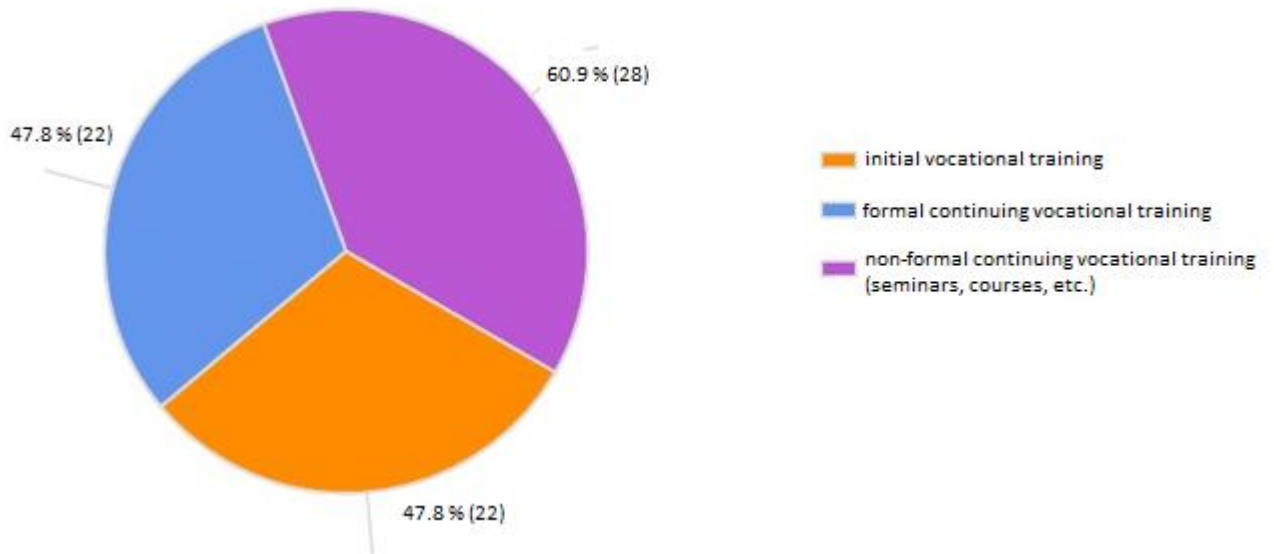


Fig. 2.2. Questioned training providers (distribution by type of the vocational training)

1312 respondents were invited to participate in an employers survey (construction sector). The filled electronic questionnaires were sent back by 95 enterprises.

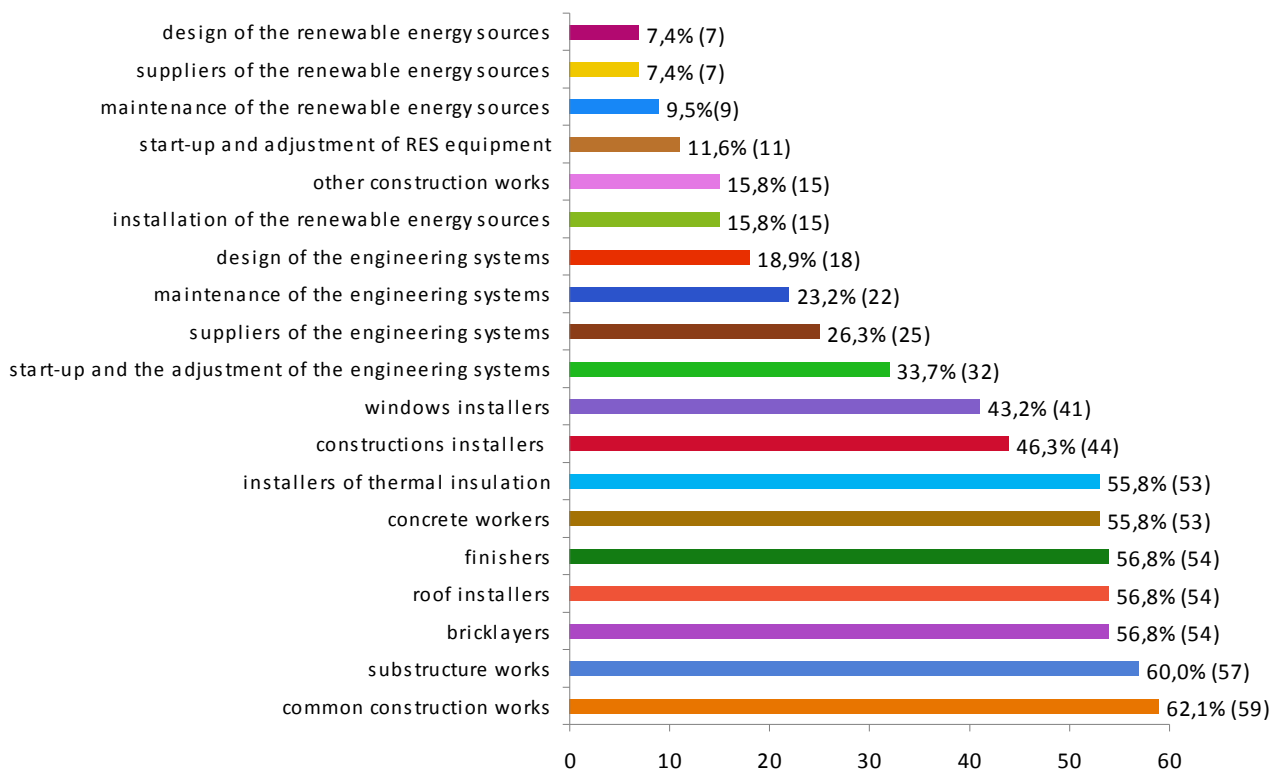


Fig. 2.3. Questioned employers by a type of activity

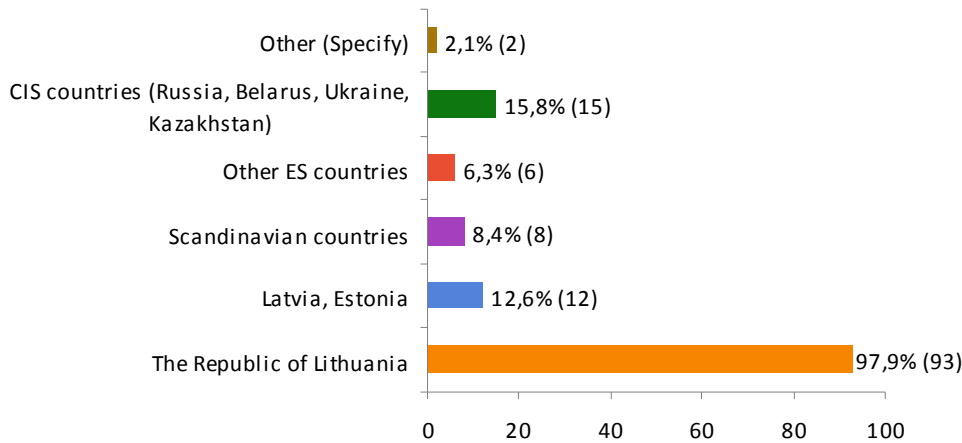


Fig. 2.4. Questioned employers (distribution by geographical market)

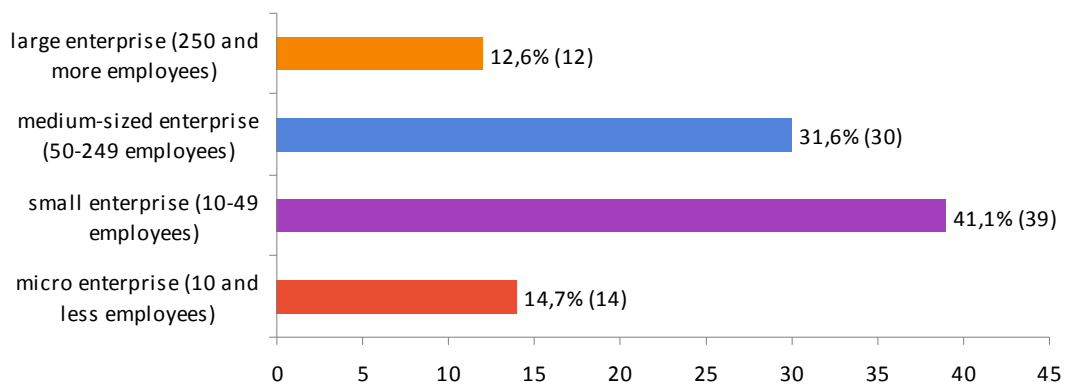


Fig. 2.5. Questioned employers (distribution by the size of the organisation)

Direct interviews and interviews via telephone were made with the selected construction enterprises. 50 enterprises were selected from those participated in questionnaire form filling to take part in a telephone interview. Their representatives were asked extra questions to specify their answers from the written questionnaire. The questions embraced the information about the trainings of the employees, the experience from the participation in an energy efficient building construction and engineering equipment installation projects, preparation to equip the energy efficient building and other information. The aim of the interview with the 10 selected enterprises was to clarify the topicality of the theme and significance of the untouched questions in the questionnaire. During the interviews the understanding of the existing employees competence and the choice of the training base and tools were discussed. The question was raised about how the leaders of the enterprises estimate the knowledge and skills of their employees. In an interview participants were asked about the assumptions for the new technology development.

Table 2.1. Interview with 10 representatives from the enterprises participated in survey

No.	Title of an enterprise	Date of an interview	Position	Name Surname
1.	Valkor enterprise, JSC	2012.10.18	CEO	Vytenis Staugautis
2.	Siemtecha, JSC	2012.10.19	CEO	Rimvydas Žilinskas
3.	YIT Technika, JSC	2012.10.19	CEO	Egidijus Šideikis
4.	Yglė, JSC	2012.10.24	CEO	Tomas Ustinavičius
5.	Veikmė, JSC	2012.10.25	CEO	Eugenijus Zaremba
6.	Tecos, JSC	2012.11.08	CEO	Dmitrij Balan
7.	Meleksas, JSC	2012.11.08	Energy Engineer	Jurgis Trimonis
8.	PA Group, JSC	2012.11.09	CEO	Audrius Butkus
9.	Dringsta, JSC	2012.11.08	CEO	Jonas Bukauskas
10.	ENSO ranga, JSC	2012.11.09	CEO	Albertas Bieliauskas

3. Lithuanian construction sector

3.1. Common indicators of construction sector

As already mentioned, the crisis in the construction sector forced market participants to re-focus, placing more emphasis on the modernization of buildings, construction of non-residential and engineering buildings and EU-funded projects.

According to the information from the Lithuanian Department of Statistics, the construction work accounted for 977 million litas³ in the first quarter of 2012. Compared with the first quarter in 2011, the volume of construction work at comparative prices increased by 11.7 per cent. The construction works were carried out mostly on non-residential buildings - 437 million litas, or 48 per cent of the total work carried out in the country, civil engineering works were carried out for 375 million litas. In the first quarter of this year the construction of 268 non-residential buildings was completed in Lithuania with a total floor area of 95 thousand square meters, i.e., 46 thousand square meters less than in the first quarter of last year. In terms of total floor area, the majority of work was in manufacturing, industrial buildings, warehouses, and other objects of transport and communication facilities.

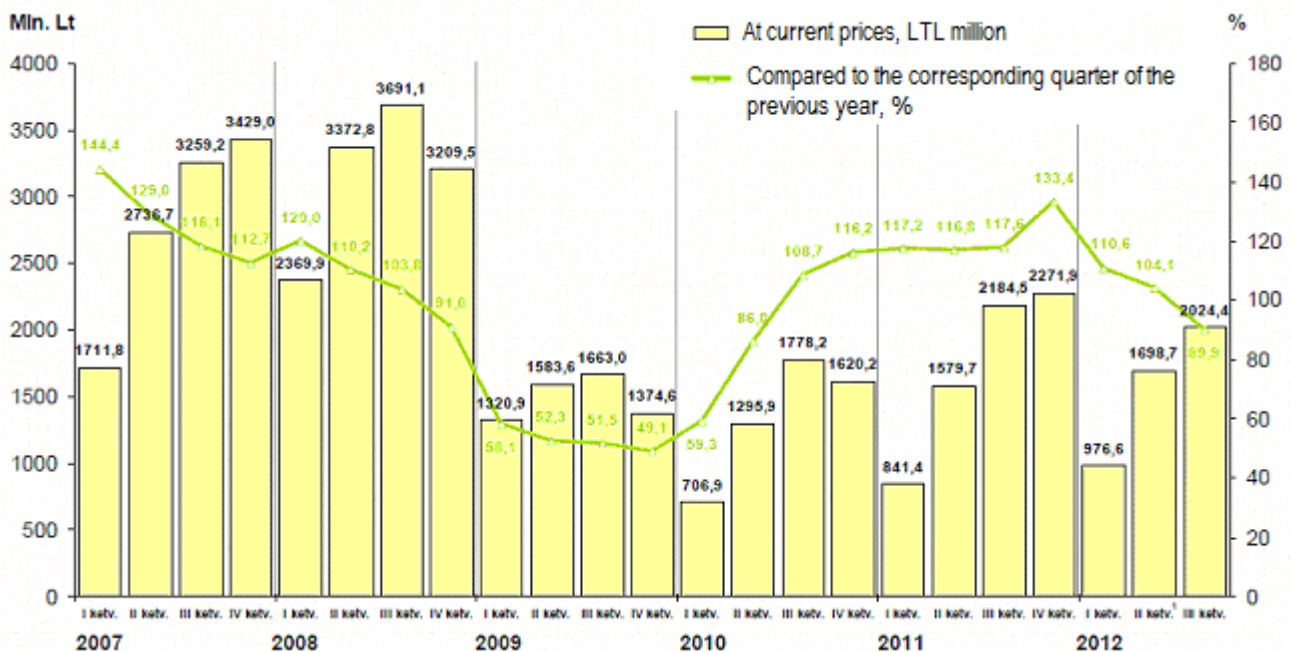


Fig. 3.1. Construction work carried out in 2007–2012 period (quarterly)

Source: Lietuvos ekonomikos raida 2012 (Lithuanian Economy 2012). Statistics Lithuania

The share of residential construction was only 100 million litas. In the first quarter of 2012, 992 building permit documents were issued to build 1046 residential houses (of which 19 for the construction of apartment blocks), i.e. 5 per cent more than in the same period of 2011. In the first quarter of 2012, the majority (98 per cent) of all permits were issued for the construction of private residential houses. In the first quarter of 2012 the construction of 713 new residential buildings was completed. A total of 1370 apartments were equipped in residential houses, i.e., only 8 apartments more than a year ago. The construction of individual houses dominated – 745 apartments were built,

³ 1 euro=3.4528 litas - the official fixed exchange rate effective as of 2 February 2002, was set by the Resolution of the Government of the Republic of Lithuania (the official gazette "Valstybes zinios", 2002 No. 12-417) and the Resolution of the Board of the Bank of Lithuania (the official gazette "Valstybes zinios", 2002 No. 12-453).

apartment blocks accounted for 625 apartments, or 46 per cent. The average useful floor area in individual one-flat houses was 108.2 square meters, while the apartments in multi-family dwellings were smaller by almost in half – 59.5 square meters.

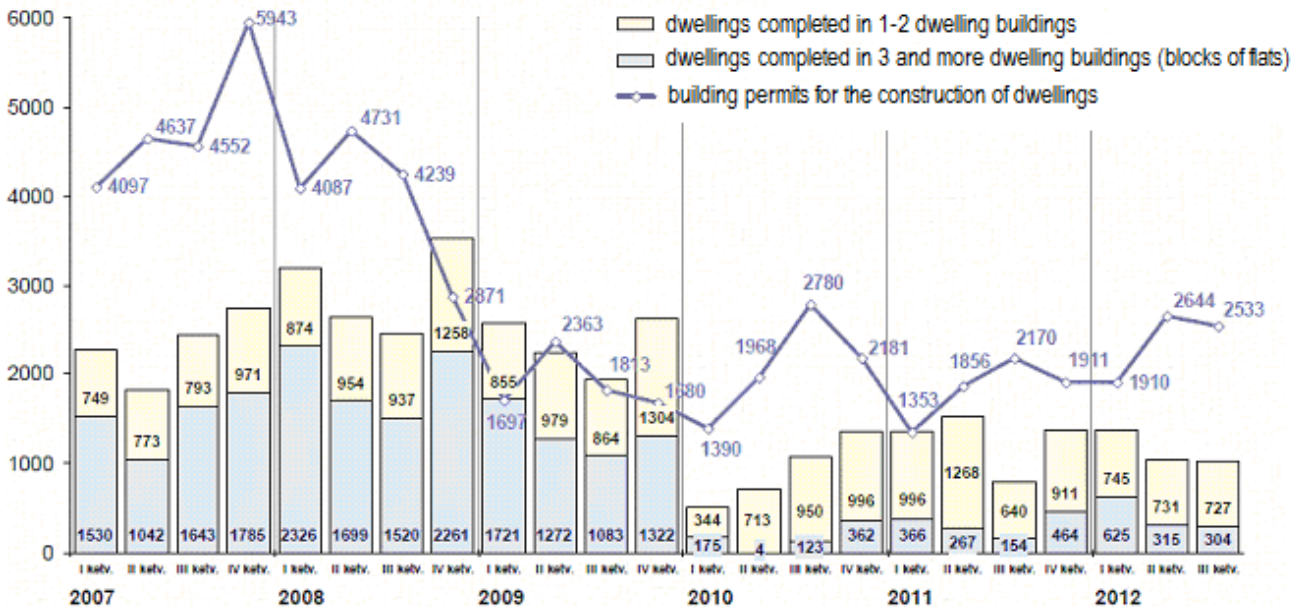


Fig. 3.2. Building permits for the construction of dwellings and dwellings completed in 2007–2012 period (quarterly)

Source: Lietuvos ekonomikos raida 2012 (Lithuanian Economy 2012). Statistics Lithuania

Given the most recent development trends of Lithuanian economic sectors and the forecasts, based on the assumption that the euro area will not suffer a deep systemic crisis, the price of which could be a long-term renewal of a recession in the region, analysts increase this year’s country’s GDP growth forecast from 2 per cent to 3.5 per cent, and for the next year – from 3 per cent to 4 per cent. They state that in 2014, the economy is expected to maintain a similar pace of development – about 4 per cent.

The following diagram illustrates the comparison of value created by construction companies with a real GDP annual change, total industrial output sold and retail trade turnover rates (source: Department of Statistics).

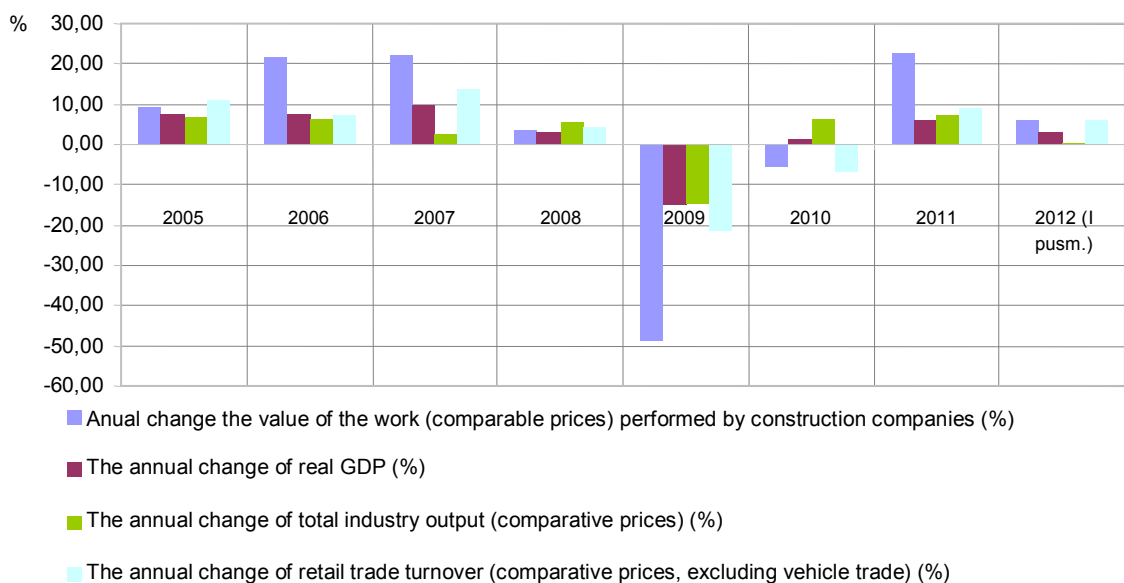


Fig. 3.3. The annual change of the work carried out by construction companies

(drawn according to data of Statistics Lithuania)

Gross domestic product trends are important indicators for the forecasts of indicators in the construction sector. According to the revised data, in the second quarter of 2012, the GDP at current prices amounted to 28 640 million litas. Compared to the same quarter of 2011, the real GDP growth was 2.2 per cent, and 8.6 per cent compared to the first quarter of 2012.

In the second quarter of 2012, compared to the respectively quarter of 2011, the fastest growing added value was in the areas of information and communication (7.6 per cent), agriculture, forestry and fishing (6.7 per cent), real estate operations (4.8 per cent), construction (3.8 per cent), trade, hotels and restaurants transport and storage (3.2 per cent) companies. In other types of businesses the value added grew rather slowly compared to the whole economy. The value added slightly (0.2 per cent) decreased in industry (due to the reduced production volumes in some processing manufacture and electricity, gas, steam and air conditioning supply companies).

According to the revised figures, 53,939 million litas of GDP was generated in the first quarter of 2012, or 3 per cent more than in the first half of 2011. After adjusting the seasonal and working-day effects, in the first half of this year compared with the second half of 2011, GDP increased by 1 per cent, and by 2.5 per cent compared to the first.

In the second quarter of 2012, construction works accounted for 1.7 billion litas. 94.1 per cent of all construction works (1.6 billion litas) were carried out within the country, while outside the country the number was 5.9 per cent (100.6 million litas). The scope of construction work in the country, compared with in the first quarter of 2012, increased by 71.3 per cent at comparative prices, and if seasonally adjusted, there was a decrease of 0.8 per cent.

The second in 2012 quarter compared to the same quarter of 2011 of the construction works in the country increased by 3.2 per cent at constant prices. Engineering construction work accounted for 874.7 million litas (54.7 per cent of all work), non-residential buildings – 580.4 million litas (36.3 per cent of all work), and the construction of residential buildings accounted for only 8.9 per cent of all work – they totalled 143 million litas. New construction totalled 529.9 million litas, which accounted for 33.2 per cent of all construction work carried out in the country.

In the first half of 2012 the construction works in the country accounted for 2.5 billion litas, which is 5.9 per cent more at constant prices compared with the first half of 2011.

In July compared with June 2012 construction cost item prices increased by 0.4 per cent. The monthly price change was mainly influenced by a 1.6 per cent increase in wages.

During the month, the highest – 0.7 per cent – recorded was the increase in the prices of residential construction.

During the year (in July 2012 compared with July 2011) the construction cost item prices increased by 2.6 per cent. The highest growth – 5.1 per cent – was recorded for road and street construction.

Table 3.1. Construction work carried out by type of construction, at current prices, LTL mill.

	2005	2009	2010	2011	
Iš viso šalies teritorijoje	5925,6	5775,8	5142,8	6553,2	<i>Total within the country</i>
Pastatai	3602,3	3087,8	2263,5	2981,5	<i>Buildings</i>
Gyvenamieji pastatai	849,6	772,5	408,5	466,1	<i>Residential buildings</i>
Negyvenamieji pastatai	2752,7	2315,3	1855,0	2515,4	<i>Non-residential buildings</i>
Inžineriniai statiniai	2323,3	2688,0	2879,3	3571,6	<i>Civil engineering structures</i>
Susisiekimo komunikacijos	1193,0	1219,9	1294,9	1491,7	<i>Transport infrastructure</i>
Inžineriniai tinklai	908,4	1073,5	1245,2	1480,7	<i>Engineering system</i>
Kitos paskirties inžineriniai statiniai	221,9	394,6	339,2	599,2	<i>Other civil engineering structures</i>

Source: Lithuania in Figures 2012, Statistics Lithuania

The construction of 700 new residential housing was completed in the second quarter of 2012. A total of 1046 apartments were equipped, i.e., 31.9 per cent less than the same in period of 2011. A total of 731 apartment, or 69.9 per cent of all completed dwellings, were equipped in 1-2 dwelling houses and

this number in apartment buildings was 315 dwellings, or 30.1 per cent. The useful floor area of completed apartments was 134.5 thousand m², i.e. 90.4 thousand m², or 40.2 per cent, less than in the second quarter of 2011. Average useful apartment area in one family houses was 128.6 m² and in apartment house flats – almost half the size (76 m²). The number of construction permits issued in the second quarter of 2012 was 1470 to build 1564 residential buildings, i.e. 185 permits, or 14.4 per cent more than the same quarter of 2011.

In residential houses it was allowed to build twice as many apartments as over the same period of the last year. In the second quarter of 2012, the construction of 338 non-residential buildings was completed in the country with total floor area of 122.3 thousand m², or 46.1 thousand m² less than in the same quarter of 2011. The major construction by the total area was seen in the buildings in agriculture, commerce, hotels and catering companies, also transport and communications. 514 permits to build 730 non-residential buildings were issued in the second quarter of 2012. The gross area of non-residential buildings permitted for construction was 341.8 thousand m², or 38.5 per cent more than in the second quarter of the previous year.

The status quo in the construction industry is well-characterized by the number of building permits issued. In the fourth quarter of 2011 the number of issued permits was 460, for 630 non-residential buildings. The total floor area of non-residential buildings permitted for construction comprised 257 thousand m². In terms of total floor area, the construction permits were issued mostly for manufacturing, industrial, warehousing, trade, hotels and catering buildings (Lithuanian Department of Statistics 2012).

Table 3.2. Useful floor area of dwellings whose construction has been authorised by building permits and which have been completed, thous. m²

	2005	2009	2010	2011	
Leistų statyti butų	1349,0	1077,1	1107,7	948,2	<i>Construction authorised by building permits, dwellings</i>
1–2 butų namuose	938,0	979,1	951,9	800,6	<i>1–2 dwelling buildings</i>
3 ir daugiau butų namuose	411,0	98,0	155,8	147,6	<i>3 and more dwelling buildings</i>
Baigtų statyti butų	651,6	1075,0	512,4	699,4	<i>Dwellings completed</i>
1–2 butų namuose	416,8	688,0	467,0	613,7	<i>1–2 dwelling buildings</i>
3 ir daugiau butų namuose	234,8	387,0	45,4	85,7	<i>3 and more dwelling buildings</i>

Source: Lithuania in Figures 2012, Statistics Lithuania

According to the Lithuanian Department of Statistics, the structure of activities in the construction sector changed only slightly from 2005 till 2011. Compared with all work carried out in the construction sector, there was a slight decrease in the volume of new construction and an increase in the percentage of other types of work shares. For example, the reconstruction of the volume during the period increased by 7 percentage points.



Fig. 3.4. Type of construction work carried out, per cent

Source: Lithuania in Figures 2012, Statistics Lithuania. www.stat.gov.lt

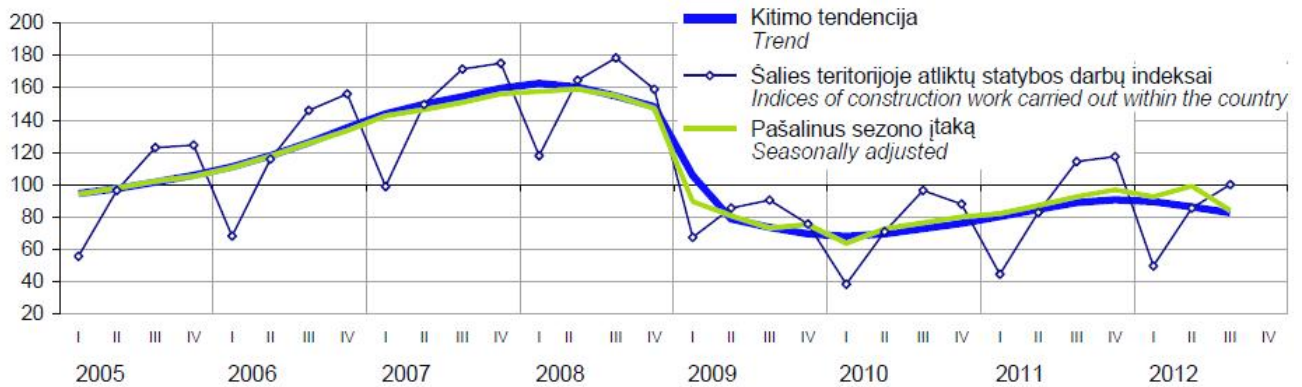


Fig. 3.5. Indices of construction work carried out within the country

Quarterly average 2005 = 100

Source: *Economic and Social Development in Lithuania, 2012/11*, Statistics Lithuania

Lithuanian Department of Statistics in its press release of 28-09-2012 presents the business trend survey results and economic sentiment indicators, along with the construction confidence indicator. The construction confidence indicator describes the business climate in construction. It is calculated using the forecast of enterprise managers' opinions about the number of employees and the construction demand (orders). For each question, three variants of answers are offered: positive, neutral and negative. Given the size of companies (annual revenues), the percentage of businesses that have chosen different answers is calculated, and the balance is made (the difference between positive and negative responses). The arithmetic average of the two balances of the previous mentioned questions is the confidence indicator.

Compared with September 2011, the construction confidence indicator in September 2012 increased by 3 percentage points, but the value of the index remains negative. It is expected that in the coming months the volumes of construction jobs and numbers of workers will decrease because of seasonal influence. Only 8 per cent of managers expect to have more construction work while 27 per cent managers have lesser expectations. The number of managers who plan to increase the number of employees is going down – 12 per cent (one month ago it was 17 per cent), while 23 per cent of them are planning to reduce it (a month ago the number was 14 per cent).

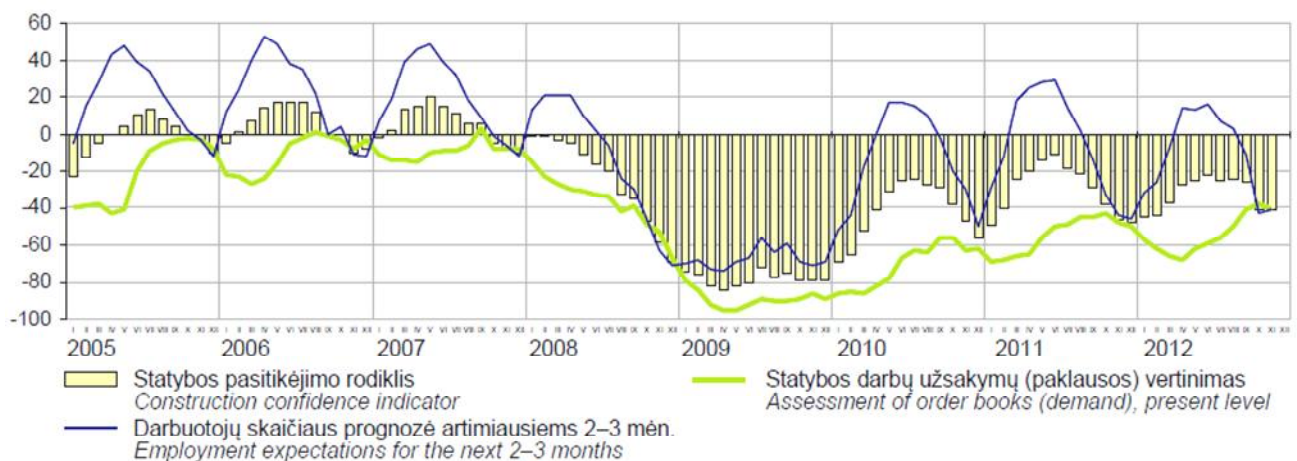


Fig. 3.6. Construction confidence indicator and its elements

Balance, per cent

Source: *Economic and Social Development in Lithuania, 2012/11*, Statistics Lithuania

Table 3.3. Economic sentiment indicator and it's components

	2011				2012								
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX
Economic sentiment indicator	-3	-7	-8	-11	-9	-6	-4	-2	-1	0	-2	-4	-2
Industrial confidence indicator	-13	-20	-19	-16	-16	-10	-11	-10	-6	-7	-7	-14	-13
Construction confidence indicator	-29	-38	-46	-48	-45	-44	-37	-27	-25	-22	-25	-24	-26
Retail trade confidence indicator	4	-1	-7	-12	-27	-13	-11	3	-7	8	-9	-10	-4
Services confidence indicator	24	24	23	15	20	19	22	24	22	22	22	24	28
Consumer confidence indicator	-18	-23	-23	-30	-23	-23	-21	-21	-19	-15	-18	-17	-20

Source: Statistics Lithuania, www.stat.gov.lt

Conclusion

Now the construction industry faces with a variety of structural problems: many companies lack skilled workforce, young people are not particularly attracted to the working conditions in this sector, as it offers poor opportunities for innovations, and is infested with extensive undeclared work. The built environment sector which grew at a staggering rate before the crisis, after the collapse of the real estate bubble in the country and the shrinkage of the investment, within two years experienced the largest downfall among all sectors of the economy in 2009. The number of unemployed in the sector has increased, labour rates and earnings shrunked significantly, and investment rates fell. The crisis in the built environment sector forced market participants to re-orient, giving more focus on the modernization of buildings, construction of non-residential and engineering, utility buildings and EU-funded projects.

3.2. Trends and forecast on the construction market

According to the Lithuanian Labour Exchange, 6.14 thousands of unemployed construction workers and 6.23 thousands of jobs were registered in January to October 2011. In 2011, the construction sector was recording an average of 600 unemployed per month and 620 vacancies, in 2010 – 920 unemployed and 520 vacancies per month.

Revenues of construction companies during the last three quarters grew by 23.43 per cent. Market participants argue that the sector is noticeably livelier, more orders are coming from the more active private sector. The Statistics Department (SD) announced that last year the value added in construction grew the most – by 15 per cent. Development in this sector was due to the orders for the construction of infrastructure, roads, non-residential buildings and renovation.

“In 2010, construction tenders were announced only by the public sector, and last year we had the equal numbers of orders from the private and public sectors. Private investors are real estate development, logistics companies, retail chains which began to construct more indeed,” says Julius Gendvilis, manager of Mitnija construction company, to media in 2012. *“We analyzed the needs of customers and attempted to offer a fast and high-quality construction service”*.

Irdaiva construction company increased its income by 180 per cent. Irmantas Kubilius, the company's director, said to media in 2012 that the situation in the market was strengthened by the timely head hunting, when during the crisis the company invited skilled workers from other less economical

advantageous entities. Since the beginning of the last year the company established more than 70 new jobs, and also has plans to employ new people. About 60 per cent of orders received by Irdaiva come from the public sector. The head of the company says that they will work to attempt to maintain a similar proportion between the public and private orders. According to Mr Kubilius, the sales management, good relations with suppliers and subcontractors allowed to offer the best prices and win contracts. “We carefully analyzed our client's financial situation last year and managed to avoid large debts owed by customers.”

Over the last three quarters of the year 2012 the majority of the construction and real estate sector companies enjoyed higher turnover – the revenue fell only in a few companies.

“This year (2012) there is no shortage of optimism, too, even though its less than the last summer. The construction sector is one of the first to feel the market turmoil, so we closely monitored the situation and this file we do not see negative trends. Although it is difficult to predict – forecasts change every month,” said Julius Gendvilis, the manager of Mitnija construction company, to media in 2012.

The year 2011 was quite positive for builders: the number of jobs and wages grew. While beginning to recover, construction companies faced with an unexpected problem. Work is in place, money is in place, but there is no one to carry out the work. Some companies engaged in poaching workers from other companies by offering higher salaries than competitors, although not yet at the level of Western Europe. Others have tried to go the other way importing cheaper labour. Construction companies' executives complained of low qualifications of local workers or them allegedly willing to be over-paid.

President of the Lithuanian Builders Association Adakras Šeštakauskas noted that attempts to invite workers from abroad have so far failed. There were companies trying to bring people from China and other countries, but such attempts remained only at the level of experiments.

An attempt was made to analyze what happened, that the construction companies which just a few months ago were complaining of being unable to find workers, are now again happy to once again choose from among several candidates? *“I think this is due to several factors. One indicator is seasonal: every year, there is an increase in the number of unemployed builders after the end of the warm season, which also means the end to custom orders – residents love to build or repair houses in summer. In 2011, I believe, the ended large projects also had a lot of influence. They completed the construction of new arenas, decommissioned the Ignalina Nuclear Power Plant – and people who worked there came back on the market,”* commented director of Eikos statyba company D. Martinkėnas.

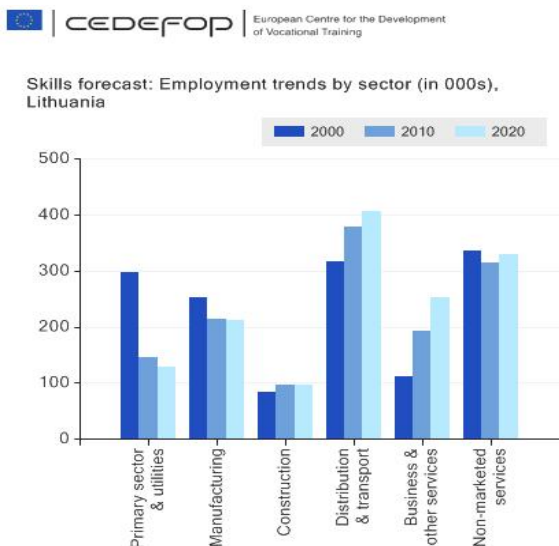
A. Šeštakauskas agreed that such large projects as the construction of new arenas had an impact on the construction sector, but, in his opinion, there is nothing too much to worry about them ending. *“A large part of these projects were funded by what is called the European money. Meanwhile, no less of this money is coming in 2012 than in 2010 or in 2011. Except that the projects will be different,”* he said.

While forecasts showed that the scope of construction in 2012 will decline, some companies were still trying to maintain a large number of employees just to be able to compete for large-scale contracts. However, others believe that the market is unfavourable, there are no large-scale projects, so keeping people just to participate in any project is hardly reasonable. They are planning to accept more people if they win any large tenders.

“We are trying to raise the skills of workers. We rather tend to pay higher wages to the lesser number of people who cope well with their actual work, than to recruit more new workers,” described the policy of Eikos Statyba company to media its construction director D. Martinkėnas.

In the beginning of 2012 the president of the Lithuanian Builders Association A. Šeštakauskas admitted that his optimistic mood was somewhat tainted by the latest GDP forecasts. “When the 4.7 per cent growth was predicted, I thought to myself, we can expect something better, too. But now the forecast is cut down to 2.5 per cent, so I think that the general scope of work will not grow, but I also hope that it will not become smaller,” he said.

According to the data from the European Centre for the Development of Vocational Training (CEDEFOP⁴), employment in the construction sector will increase by only 1.04 per cent in 2020 compared with 2010. Compared with the last decade changes, this forecasted rate is not optimistic. In 2000 – 2010 the change of persons employed in the construction sector accounted for 15.7 per cent. (Fig. 3.7).



	Levels (000s)			Change (%)	
	2000	2010	2020	2000-2010	2010-2020
Primary sector & utilities	298	146	129	-51.0 %	-11.6 %
Manufacturing	253	214	212	-15.4 %	-0.9 %
Construction	83	96	97	15.7 %	1.0 %
Distribution & transport	317	379	408	19.6 %	7.7 %
Business & other services	112	194	253	73.2 %	30.4 %
Non-marketed services	336	314	331	-6.5 %	5.4 %
All industries	1 399	1 342	1 429	-4.1 %	6.5 %

Fig. 3.7. Employment trends by sector, Lithuania

Source: Cedefop | Skills Forecasts | Data published in 2012

Conclusion

During the crisis construction companies could survive from public sector contracts. Construction companies that had such orders attracted skilled workforce from bankrupt companies. Survival during the crisis was not only due to the good relationship with suppliers and subcontractors, that enabled to offer the best prices to them and win tenders, but also management skills, market analysis, and prudence in choosing orders. In 2010, because of large-scale projects the construction market experienced severe labour shortages, companies have attempted to invite workers from abroad, but this endeavour failed and remained only at the experimental level. In 2011, after the completion of large-scale projects, the high labour supply is once again on the market. Construction industry representatives did not see negative trends in the market in the beginning of 2012, but at the end of the year the optimism was suppressed by the latest GDP forecasts. The forecasts of the European Centre for the Development of Vocational Training (CEDEFOP) forecast are not optimistic, according to the data of the Centre employment in the construction sector in 2020 compared with 2010 will increase by only 1.04 per cent.

⁴ CEDEFOP – European Centre for the Development of Vocational Training, <http://www.cedefop.europa.eu/>

3.3. Immigrants in the construction market and the informal economy

Labour migration is a new challenge for the 21st century. Great part of the world's migrants (measured at about 150 million annually) travel for labour /economic considerations.

As of 11 October 2012, the Lithuanian Labour Exchange data register had registered 198.1 thousand unemployed – 9.83 per cent of the working age population. In October, employers registered 4.1 thousand vacancies during one week. The most marketable on the labour market are painters, carpenters, woodworkers and other construction workers – 381, vendors – 314, heavy truck and lorry drivers – 152, marketing specialists and sales managers – 141, cooks – 105, tailors 77, accountants and bookkeepers – 60, warehouse workers – 60, welders – 57.

To meet the demand for skilled manpower in different sectors of the economy, with the industrial necessity of the enterprise, in the first quarter of 2012 the Lithuanian Labour Exchange issued 1027 work permits to foreigners in Lithuania, including 712 work permits for foreigners in Lithuania to work under an employment contract, and 89 work permits for posted foreigners. During this period 226 permits for foreigners to work in Lithuania were extended. Compared with the first quarter of 2011, the number of work permits issued increased by 1.6 times.

In Lithuania, immigrants total to 1 per cent of the country's population. Among them, there is even less immigrant labour – from 0.2 to 0.5 per cent. Most of them are the representatives of working-class occupations: builders, drivers, cooks, welders. Only very few highly skilled professionals come to Lithuania.

“Most Western European countries, Lithuania also, will need immigrants in the future, not only for demographic reasons, the aging of society, but also for the transition from an industrial to a knowledge society, where there are completely different job needs,” said Vilnius Office Manager of the International Organization for Migration (IOM) Audra Sipavičienė.

During the first quarter of 2012, most permits were issued to foreigners to work in the services (74 per cent) and industry sectors (24 per cent). Most foreigners were issued/renewed work permits as international freight vehicle drivers – 65 per cent of work permits, metal hull installers – 14 per cent of work permits, welders – 10 per cent of all work permits in the Republic of Lithuania.

Emigration rates from Lithuania are several times higher than immigration. It is interesting to note that even in the times of economic growth more people were leaving than coming to Lithuania (see Table 3.4). Immigration remains weak and unable to compensate for the losses of emigration.

The Lithuanian National Information Centre of the European Migration Network prepared the Migration and Asylum Policy Report of 2011 with an overview of the key developments that have taken place in 2011 in this area⁵. The report is prepared in accordance with the general requirements for this report applied by the European Migration Network.

Emigration. Compared to 2010, when the greatest emigration from Lithuania was recorded (in 2010, the emigration was declared by 83.5 thousand of Lithuanians), in 2011 it decreased (in 2011, the emigration was declared by 53.9 thousand Lithuanians). The main target countries of emigration remained the same as in the previous years – the United Kingdom, Ireland, Norway, and Germany. The emigration flow analysis indicates that the majority of emigrants are young (20-34 years old), able-bodied and well-educated residents of Lithuania, therefore the workforce loss is obvious. The share of emigrants younger than 35 years of age is more than 65 per cent of all immigrants over the last few years.

⁵ A. Sipavičienė, M. Jeršova. Labour Force migration: the need and policy in Lithuania, 2010

Immigration. In 2011, the arrival to Lithuania was declared by 15.7 thousand persons, namely three times more than in 2010 (5.2 thousand arrived in 2010). Over 89 per cent of immigrants were citizens of the Republic of Lithuania. According to the Lithuanian Statistics, 1.7 thousand foreigners immigrated, i.e. almost three times more than in 2010. Most of them came from Russia, Belarus, Ukraine, and Latvia. The majority of immigrants come for work purposes, and almost twice more work permits were issued to foreigners in 2011 than in 2010.

According to the Lithuanian Statistics, the declared international migration flows and numbers of foreign workers are provided in the tables below.

Table 3.4. International migration. Features: administrative area, statistical indicators and years

	2005	2006	2007	2008	2009	2010	2011
Emigrants	62 847	34 713	32 327	26 761	40 444	83 157	53 863
The number of emigrants for 1000 population in a population	18,9	10,7	10,0	8,4	12,8	26,9	17,8
Immigrants	6 789	7 745	8 609	9 297	6 487	5 213	15 685
The number of immigrants for 1000 population in a population	2,0	2,4	2,7	2,9	2,1	1,7	5,2
Net migration	-56 058	-26 968	-23 718	-17 464	-33 957	-77 944	-38 178
Net migration for 1000 population in a population	-16,9	-8,3	-7,3	-5,5	10,7	-25,2	-12,6

The number of emigrants in 2001-2009 is recalculated on the basis of the results of the general population and housing census of the Republic of Lithuania in 2011 and the statistical surveys conducted in 2006-2010 based on which the unreported emigration flows were evaluated. Preliminary data.

Table 3.5. Number of employees in Lithuania

	2004	2005	2006	2007	2008	2009
Employees	1 431 300	1 468 800	1 494 300	1 529 900	1 517 000	1 412 700
Unemployed (annual average)	142485	100768	73235	67256	73380	203118
Long-term unemployed (annual average)	38423	28833	14764	8096	3775	15710
Employees foreigners	877	1565	2982	5686	7819	2239
Share of foreign employees, %	0,06	0,1	0,2	0,37	0,52	0,16

Source: Statistics Lithuania, the Lithuanian Labour Exchange

Sectors employing foreign workers. The absolute majority (95 per cent) of foreigners who come to Lithuania work in construction, transport (especially long-distance truck drivers), and manufacturing sectors. These trends have been observed since 2004, but they became especially obvious in the economic boom from 2006 to 2009. Global trends show that immigrants have traditionally been employed in the service area, but in Lithuania they are concentrated in the most growing sectors and those which are abandoned by the greatest number of emigrants.

Table 3.6. Labour of foreigners by sectors in 2008.

Construction	Transport, storage, communication	Manufacturing	Real estate, leasing	Hotels and restaurants	Other
3321	2713	1375	170	151	89
42%	35%	18%	2%	2%	1%

Table 3.7. The number of foreign workers in the most popular occupations in the construction sector in 2004-2009.

Occupation	2005	2006	2007	2008	2009	Iš viso
Bricklayers	88	229	705	931	72	2025
Welders	291	426	471	682	193	2063
Steel and reinforced concrete structure installers	-	-	176	676	56	908
Installers of technological equipment	31	-	-	-	-	31
Joiners / carpenters				95	119	214

Source: Lithuanian Labour Exchange

The largest positive job creation balance projected:

- *In the services sector:* wholesale and retail trade, road transport, hotel and restaurant sector, storage and communication, and other communication, social and personal service industries.
- *In industry:* clothing industry (manufacturing), furniture manufacturing, food, beverage production, and timber and wood production enterprises.
- *Construction:* building construction companies.

History. Until 1 July 1999 the *Law on Immigration* was in force in Lithuania⁶, which provided that a foreigner can immigrate to Lithuania (arrive for permanent residence) only in accordance with the procedure established by law, provided that the immigration quota is not exceeded. Applications for immigration were examined by the Ministry of the Interior – it had to make a decision no later than in one year. The quota system has resulted in strict regulation of immigration flows.

In 2004 the *Law on the Legal Status of Aliens*⁷ came into force and it clearly regulates the labour immigration rules and procedures. The Law provides the main economic migration provisions: an immigrant must obtain a work and residence permit before entering the Republic of Lithuania; a work permit is issued to an immigrant taking into account the needs of the labour market of Lithuania; a work permit is issued to an immigrant for a period of up to 2 years, specifying the job (position) and the enterprise, agency or organisation at which the immigrant will be employed; upon the expiry of a work permit, an alien must depart from Lithuania. On 16 July 2004 the *Description of procedures and conditions for the issue of work permits for foreigners*⁸ was approved, which elaborated the work permit issue conditions for foreigner groups that are not required to obtain a work permit, and the refusal and withdrawal conditions of permits. Later on, labour immigration conditions were changing in an effort to respond to the economic and labour market demands and the EU directives.

The analysis of work permits and unemployment level in Lithuania shows that these permits are issued to foreigners in Lithuania, in view of the current status quo, i.e. with a lack of manpower, which is evaluated by the number of jobs recorded by the Lithuanian Labour Exchange. The status quo fairly accurately reflects the main trend – with declining unemployment, the number of work permits issued is increasing, and vice versa, due to rising unemployment, the number of work permits issued is less.

Recognition of qualifications. Only highly skilled or skilled workers may enter Lithuania. Low-skilled work permits are not issued. By submitting an application for a work permit, the immigrant must provide documentation of their education (qualification) and work experience.

⁶ Law on Immigration of the Republic of Lithuania (*Official Gazette* 1991 No 27-730).

⁷ Law on the Legal Status of Aliens of the Republic of Lithuania, *Official Gazette*, 2004, No 73-2529.

⁸ The order of the Minister of Social Security and Labour of the Republic of Lithuania “On the approval of description of procedures and conditions for the issue of work permits for foreigners”, (*Official Gazette*, 2004, No 113-4256).

Education (qualification) recognition is carried out by the Centre for Quality Assessment in Higher Education. The Centre assesses whether the skills (education) of the immigrant meets the requirements applied in Lithuania for persons entitled to engage in professional activities⁹. If the right to engage in a specific activity is not regulated, the professional recognition of qualification is carried out by the employer, i.e., he/she decides on the suitability of an immigrant to be employed.

A work permit is issued only to highly skilled or qualified employee. But filing the documents for this permit, the immigrant must provide their copy of the document certifying 2 years work experience according to their professional qualifications within the past 3 years. The labour experience is usually assessed on the basis of a work book of an immigrant.

Employment procedures of foreigners with understaffed professions. List of understaffed occupations. Due to the mass emigration of Lithuanian citizens and the growth of economy since 2006, the Lithuanian labour market began to experience a labour shortage since the end of 2006 (especially in the construction, transport and services). Employers were also facing the problem that foreign recruitment procedures lasted for quite a long time (6-7 months), so employers' associations asked the Government to simplify and speed up the processes and procedures of the recruitment of foreigners. The lists of professions in demand in the Republic of Lithuania were concluded. This list determines what professionals may be permitted to work in Lithuania, i.e. what professions are in shortage and this shortage limits the company's capabilities. The procedure of drafting the list determines that this list is populated mostly by professionals required by large businesses, the demand for which cannot be satisfied by the local labour market.

On 4th of July, 2012 the Minister of Social Protection and Labour proved the list of occupations that are understaffed in the Republic of by types of economic activity for the second half of 2012¹⁰. According to this list most demanded occupation in Lithuania is welder (code 721206).

Simplification of immigration procedures. Immigrants who have a specialty understaffed in Lithuania upon receipt of a work permit can come to Lithuania immediately with the national visa D¹¹, and can obtain a residence permit while already staying in Lithuania. The national D visa is issued within 10 working days, therefore the recruitment procedure is reduced from 7-8 to 2-3 months. However, the labour market test still applicable to the personnel of understaffed occupations, i.e. the employer must register vacancies at the local labour exchange one month before in order to initiate the recruitment of an immigrant.

Determination of understaffed occupations. The main mechanism to assess the shortcomings of labour is the analysis of the registered labour supply (unemployment) and demand (jobs). The list of understaffed occupations is drafted based on the following criteria:

- High demand for workforce: the labour demand is two times higher than the labour supply;
- Difficulties in filling vacancies: the vacancy is open for more than 3 months or there was no labour supply, meeting the necessary skills for more than 3 months;
- Analysis of professions of foreigners employed in Lithuania.

In the preparation of this list, not only general parameters but also individual territorial and economic indicators are measured. In addition to the name of profession, the list specifies an economic activity in which the shortage occurs. If the shortage of occupations is determined in a given area, the area is then specified. For example, the shortage in welding industry professionals may be experienced in

⁹ Information on regulated professions and institutions carrying out their professional recognition is presented here: <http://www.profesijos.lt/?pid=12>.

¹⁰ "On the approval of the List of occupations that are understaffed in the Republic of Lithuania according to types of economic activity for the second half of 2012", (*Official Gazette*, 2012, No 79-4126).

¹¹ on the amendment of "On the approval of rules of submission of documents to obtain a visa, on the visa issue, as well as visa issue in border checkpoints, the extension of time of stay in the Republic of Lithuania having a visa, on visa annulment, on the approval of accreditation rules of tour operators and travel agencies", (*Official Gazette*, 2007, No 1V-395/V-100)

industry, but not in construction, the shortage of cooks can be in Vilnius, but not in the entire Lithuania.

These data is collected in local labour exchanges which number in Lithuania is 46. In some cases, areas can be merged and information provided on the county level (10 counties).

Inclusion of social partners. Before drawing up a list of employees, labour exchange representatives meet with employers' associations. During the meetings they express their viewpoint on a shortage of certain professions within the sectors represented. During the meeting they discuss the key requirements for understaffed occupations, analyze opportunities of developing necessary skills from among unemployed workers through vocational training. Meetings are also attended by trade union representatives, who also express opinions on the list of understaffed occupations.

Inter-sectoral migration. The largest employer in Lithuania is currently the private sector, employing just under one million people. With about 400 thousand employees, the public sector also plays an important role in the labour market. However, the Government's plan to balance the state budget will not allow to increase the public sector workforce in the near future, so unemployment will depend largely on the potential of the private sector to create new jobs in the near future.

After the collapse of the Soviet Union the number of blue collar workforce employed in industry decreased from 400 to 250 thousand from 1992 to 1998. Redundant industrial employees and employees from the agricultural sector less demanding to working hands were harboured by the construction sector.

Economic downturn revealed structural changes in the Lithuanian labour market, which is characterized by the declining manufacturing sector and the growing numbers of service sector workers. From 2007 to 2010, the number of private sector employees fell by 186 thousand, four thousand of which were employed in production, and only one thousand in the service sector. Such changes in the labour market developed because at the end of 2008 the service sector has become the largest employer in Lithuania and does not promise to give up this position in the near future: in 2010, the number of service sector employees increased by 22 thousand, while in the manufacturing and the public sector fell by 17 and 21 thousand, accordingly. The general decline in the numbers of workers in the manufacturing sector was largely due to the decline in the construction sector, but the number of employees in the industrial sector during the economic downturn also significantly decreased and was historically lowest during the period of Lithuanian independence.

During the economic boom traditional industries (food, textile and wood processing) decreased or only slightly increased by the number of employees. Such behaviour of firms in these sectors is driven by increasing competition on international markets and as a result these companies, in order to reduce production costs, or to modernize their production processes, were forced to replace the increasing share of labour with robotics or move their production to the countries of cheaper labour.

High and medium-high tech manufacturing companies increased the number of employees during the economic prosperity time, but the bankrupt of several large companies slowed down this growth, and then the economic downturn wiped out all of the sector's "achievements."

In order to develop this sector, Lithuania will be facing severe challenges as it will have to compete not only with technologically advanced countries, but with aggressive new emerging economies.

Having become unemployed during the economic boom, personnel from the industry and agriculture migrated to the construction sector, which absorbs a large part of the cross-sectoral economic migrants like a sponge. However, the real estate market stagnation that started in 2008 not only stopped this flow of migration, but also left higher proportion of construction workers jobless.

These unemployed will need significant challenges in the future because of sluggish job creation in industry and agriculture, as a result the "cross-sectoral" migration in these sectors should not be rapid, and having a second "golden age" of the construction sector is unlikely. Historical experience

shows that at the end of the construction sector boom, the unemployment rate remains high for some time.

The number of service sector workers is increasing moderately, but the jobs created in this sector will not compensate for the loss of jobs in the manufacturing sector.

Lithuania, which does not have a strong industrial sector, will have difficulties in developing the domestic market-oriented service sectors, and the most promising for it could be the successful expansion of the IT service export sector.

Lithuanian population attitudes towards immigration. Lithuanian population attitudes about immigrants are very negative. This is mainly affected by the rhetoric of politicians and the media, and only a very small contribution of personal experiences of people. Immigrants are still perceived like a big threat, an evil and trouble for Lithuanians.

“Negative attitudes towards immigrants can be an existential self-defence instinct, because the existential question of survival is quite relevant for Lithuanians,” philosopher Vytautas Rubavičius said.

According to the information from the Labour Department of the Ministry of Social Security and Labour, this year (2010) most immigrants arrived to Lithuania from Belarus (573), Ukraine (298) and China (88).

Experts believe that immigration as a problem is equal to zero, the status quo is much worse with youth unemployment. Out of the 42 thousand of undergraduates in 2010, 19 thousand came to register to the labour exchange.

Unaccounted economy. Although there is a rule that immigrants of the understaffed professions are employed in Lithuania, often it is not the specialist shortage that is the real cause.

“During the economic crisis, when the construction industry contracted, unemployed construction workers began to work independently. Some emigrated, others became self-employed, not paying for a business license or other taxes,” said the director of ABM Statyba company Aurelius Bambalas.

According to him, before the recession, people who were avoiding the tax office and working without any patents were generally offering very low quality services. Currently, the situation is opposite – only the most skilful work in the shadow.

Many studies dealing with the shadow economy show that the shadow economy was rapidly growing in Lithuania during the economic downturn.

In 2012 the Lithuanian Free Market Institute (LFMI) conducted a survey of the Lithuanian economy, suggesting that the share of shadow economy in GDP has grown rapidly since 2008, and in 2010 accounted for 28 per cent of the country's GDP, in 2011 and 2012 slightly reduced - up to 26%, and in 2013 this part downsizing up to 25%. Informal economy, traditionally referred to as the value of goods produced and services rendered, officially undeclared because of taxes or regulations. In 2011, at least part of their activities were carried out on the shadow by 4 out of 10 economic units.

The Department of Statistics, while counting the country's gross domestic product, includes the informal economy which is not accounted. The latest official data of the Department of Statistics data are available for the year 2009. Then, officially unaccounted economy accounted for about 17 per cent and increased by 3 per cent points in comparison with the previous year. Department of Statistics estimates that similar levels of unaccounted economy was in 2000-2001. Therefore, the growth of officially unaccounted economy was recorded also in official statistics.

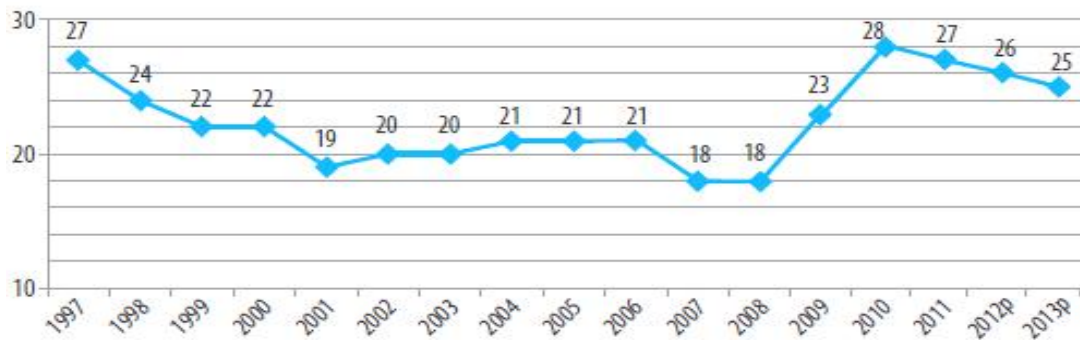


Fig. 3.8. The share of shadow economy in GDP, %

Source: 30th Lithuanian Economic Survey of the Lithuanian Free Market Institute

According to F. Schneider survey, in 2010 Lithuania was in position 4 out of the 31 European countries by the shadow economy share of GDP, following Bulgaria, Croatia and Romania. According to him, the share of shadow economy in GDP in Lithuania in 2010 was about 30 per cent, not far away from Estonia and Latvia, where the informal economy accounts for respectively 30 and 27 per cent of the GDP. The most transparent European countries were Switzerland and Austria, with 8 and 9 per cent of GDP in the shade. The European average is 20 per cent.

All these studies of informal economy use different methods of assessment, however, show a similar trend – the shadow economy in Lithuania has increased since 2008.

As shown by the 30th Lithuanian Economic Survey of the Lithuanian Free Market Institute (2012), in 2012 the Lithuania's gross domestic product (GDP) will grow by 2.9 per cent and in 2013 the economic growth will remain similar and reach 3 per cent. In 2012 the unemployment rate in Lithuania was about 14 per cent, no significant decline in unemployment is expected in 2013: it is forecasted that at the end of next year 13 per cent of the labour force will have no jobs.

“The shadow economy can shrink by the improved economic situation, slightly reducing unemployment, as well as the measures of local authorities' to fight with the shadow economy. But the shadow still creates as much as a quarter of the country's GDP, while the shadow cannot quickly shrink because of significant tax burden and slow recovery of the economy,” they say in the 30th LFMI study of the Lithuanian economy.

So, in 2012, a total of 26 per cent of GDP in the shadow will be generated by 41 per cent of economic entities, while in 2013 a total of 25 per cent of GDP will be created in the shadow by 39 per cent of economic entities.

Conclusion

Lithuania has a negative attitude toward immigrants. Most immigrants come from Belarus, Ukraine and China. Most foreigners were issued/renewed work permits for welders. Compared to the first quarter of 2011, the number of work permits issued to foreigners in Lithuania increased by 1.6 times. However, the scale of immigration is not high, because in Lithuania legally restricts the flow of incoming workforce: only highly skilled or skilled workers may enter Lithuania. Low-skilled work permits are not issued. In the opinion of experts of the Ministry of Social Security and Labour, Lithuanians do not agree to work for a salary as low as immigrants do. Lithuanians receive benefits for which they can live; moreover, more than half of the unemployed in Lithuania are working illegally. During the economic crisis, when the construction industry shrunk, some redundant construction workers emigrated, others began to work independently, in the shade, without paying taxes. There is a trend that the number of skilled workers is growing in the shade. Shade creates as much as a quarter of the country's GDP, while the shadow cannot quickly shrink because of significant tax burden and slow recovery of the economy.

4. National strategies and instruments related to the European Union target indicators for buildings

4.1. National strategies related to energy use in buildings

Lithuania has rather harsh climate characterized by cold winters and fairly hot summers, so energy savings in buildings in Lithuania are always relevant. It is true that in the past, when energy was relatively cheap (until the announcement of Lithuania's independence), requirements for using energy-saving measures were different than they are now. For example, requirements for building envelope thermal insulation properties were mainly based on the hygienic requirements, i.e., partitioning heat transfer coefficients and thermal conductivity had to be so that under normal operating conditions there is no condensation on the building envelope surface and mould does not grow.

After Lithuania regained its independence in 1990, there was not only a substantial increase in energy prices, but also the supply of energy resources to the country has become uncertain (energy blockade), so there emerged a need to increase the requirements for energy efficiency at the state level. New requirements for the design of buildings were approved in 1992 by adopting the Republican building regulations RSN 143-92 "Building envelope thermal technique", in which newly designed building envelopes were subject to about three times more stringent requirements (three times lower envelope heat transfer coefficients) than it was before the approval of these norms. The requirements for energy-saving of building envelopes were further increased in the Construction Technical Regulations STR 2.05.01:1999 ir STR 2.05.01:2005 "Building envelope thermal technique". To implement the European Parliament and Council Directive 2002/91/EC of 16-12-2002 on Energy Performance of Buildings, the Construction Technical Regulation STR 2.01.09:2005 "Energy performance of buildings. Energy performance certification" was approved. This regulation describes the energy performance certification procedure and the requirements for the compliance of new buildings with energy efficiency classes.

4.1.1. Main legislation defining strategies for energy performance of buildings

Currently, the main legal document defining the guidelines for energy-efficient buildings throughout the European Union for the period until 2020 is The Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. Other Directives are also directly linked with this Directive: Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services.

Main legislation of Lithuania related with the implementation of those European directives on energy efficiency in buildings are:

- Law on Construction of the Republic of Lithuania;
- Law on Energy of the Republic of Lithuania;
- Law on Energy from Renewable Sources of the Republic of Lithuania.

The main legal documents defining the requirements of energy efficiency of buildings, indicating how to achieve the strategic objectives are:

- Technical regulation of construction STR 2.05.01:2005 "Building envelope thermal technique", which presents minimum thermal performance requirements for the design of buildings.
- Technical regulation of construction STR 2.01.09:2005 "Energy performance of buildings. Energy performance certification", which was designed to implement the European Parliament

and Council Directive 2002/91/EC of 16-12-2002 „On energy efficiency of buildings“, i.e., assessment of building energy efficiency (certification). According to the requirements of the new directive 2010/31/EU, supplements to this Regulation was relieved in 2011, which contains the requirements for energy-efficient buildings;

- Technical regulations of construction STR 2.01.09:2012 “Energy performance of buildings. Energy performance certification”. Effective from 9 January 2013. This Regulation, which is designed to implement the requirements of the new Directive 2010/31/EU, lays down the requirements for envelopes of energy efficient buildings, efficient energy use in buildings, and the use of renewable energy resources.

The legislation also includes the National Energy Independence Strategy, which was approved by the resolution of the Seimas of the Republic of Lithuania on 26 June 2012 and provided for the effective energy use strategy, including buildings, and the development of renewable energy resources.

Conclusion

Lithuanian legislation is currently sufficient for the implementation of the Directive 2010/31/EU on the energy performance of buildings. Relevant Lithuanian legislation provides guidelines for the implementation of the Directive in stages by 2020, to create conditions for the construction of energy-efficient buildings in terms of energy saving potential, the use of renewable energy resources, environmental conservation and cost-effectiveness.

4.1.2. The construction sector's contribution to energy efficiency

The energy efficiency in the construction sector will be influenced mainly by the implementation of the regulations of Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings. These provisions are mandatorily transposed into national legislation specifying the steps and necessary measures in implementing the Directive.

The Directive specifies the targets of energy efficiency in the building sector for the period up to the year 2020:

- 20 per cent reduction in energy consumption by 2020;
- 20 per cent of energy production must consist of renewable energy sources by 2020;
- 20 per cent reduction in total greenhouse gas emissions (compared to the level of 1990) and 30 per cent reduction if an international agreement is made, by 2020;
- each country, depending on local weather conditions, should establish economically reasonable requirements of energy cost-saving;
- from 2018, public buildings, and from 2020 all new buildings must be nearly zero-energy buildings.

Directive 2010/31/EU also has the following important provisions:

- Minimum energy efficiency requirements for buildings and parts thereof should be set so as to achieve optimal balance between cost-related investments and savings in energy costs over the building life cycle, without prejudice to the right of the Member States to set minimum requirements that ensure energy efficiency is higher than the one that ensures cost-optimal energy efficiency levels.
- Measures are needed to increase the number of buildings which not only fulfil current minimum energy performance requirements, but are also more energy efficient, thereby reducing both energy consumption and carbon dioxide emissions. For this purpose Member States should draw up national plans for increasing the number of nearly zero-energy buildings and regularly report such plans to the Commission.
- This Directive promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness.

- Member States shall take the necessary measures to ensure that new buildings meet the minimum energy performance requirements.
- For new buildings, Member States shall ensure that, before construction starts, the technical, environmental and economic feasibility of high-efficiency alternative systems such as those listed below, if available, is considered and taken into account:
 - a) decentralised energy supply systems based on energy from renewable sources;
 - b) co-generation;
 - c) district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources;
 - d) heat pumps.
- Member States shall take the necessary measures to ensure that when buildings undergo major renovation, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements in so far as this is technically, functionally and economically feasible;
- With a view to achieving a high level of technical competence, objectivity and reliability, Member States shall ensure, where they deem it necessary, the availability of appropriate qualification, accreditation and/or certification schemes for providers of energy services, energy audits and energy efficiency improvement measures. Member States the following system requirements may also apply to new buildings.
- System requirements shall be set for new, replacement and upgrading of technical building systems and shall be applied in so far as they are technically, economically and functionally feasible.
- The system requirements shall cover at least the following: a) heating; b) hot water; c) air-conditioning; d) for large ventilation systems; e) or a combination of such systems.
- Member States shall ensure that:
 - a) no later than by 31 December 2020 all new buildings are nearly zero-energy buildings; and
 - b) after 31 December 2018 public authorities, occupying, owning and managing new buildings must ensure that the buildings are nearly zero-energy buildings.
- Member States shall draw up national plans for increasing the number of nearly zero-energy buildings. These national plans may include targets differentiated according to the category of building.
- Member States shall furthermore, following the leading example of the public sector, develop policies and take measures such as the setting of targets in order to stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings, and inform the Commission thereof in their national plans.

The Directive contains a nearly zero-energy building definition which is provided in detail in the Lithuanian legislation by distinguishing low-energy-efficient buildings and a nearly zero-energy buildings.

- **Directive 2010/31/EU**: “nearly zero-energy building” means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.
- **STR 2.01.09:2012**: low-energy buildings (or parts thereof) are the buildings (or parts thereof) conforming to the requirements of this Regulation for B, A, A+ class buildings;
- **STR 2.01.09:2012**: nearly zero-energy building are buildings that meet the requirements of this Regulation for A++ energy efficiency class of buildings, i.e. buildings with very high energy performance, where energy consumption is almost zero or very low; most of the energy comes from the from renewable energy sources, including energy from renewable sources produced on-site or nearby.

In the Construction technical regulation STR 2.01.09:2012 “Energy performance of buildings. Energy performance certification”, that come into force from 9 January 2013 and is intended for the implementation of the requirements of the new **Directive 2010/31/EU**, providing requirements for energy-efficient building envelopes, efficient energy use in buildings, and the use of renewable energy resources.

Lithuania has set transitional requirements for newly constructed buildings in 2014, 2016, 2018, 2021 by the energy efficiency classes of buildings (**STR 2.01.09:2012**).

New buildings or parts thereof must comply with the requirements of:

- till 1 January 2014 – for class C buildings;
- from 1 January 2014 – for class B buildings;
- from 1 January 2016 – for class A buildings;
- from 1 January 2018 – for class A+ buildings;
- from 1 January 2021 – for class A++ buildings;

The Regulation specifies the requirements for buildings so that are recognised as compliant with the given class (Table 4.1).

Table 4.1. Requirements D, C, B, A, A+ and A++ energy consumption class buildings

Energy efficiency class of buildings	Requirements for the buildings of the corresponding energy performance class
Class D buildings	1. The value of the building energy efficiency index C_1 must meet the requirements of this Regulation
	2. Estimated building envelope specific heat loss must not be greater than the reference building envelope specific heat loss: $H_{env} \leq H_{env,R}$
Class B and C buildings	1. The values of building energy efficiency indicators C_1 and C_2 must satisfy the requirements of this Regulation
	2. Estimated building envelope specific heat loss must not be greater than the regulatory own specific heat loss: $H_{env} \leq H_{env,N}$
Class A buildings	1. The values of building energy efficiency indicators C_1 and C_2 must satisfy the requirements of this Regulation
	2. Estimated building envelope specific heat loss must not be greater than the regulatory own specific heat loss: $H_{env} \leq H_{env,(A)}$
	3. Tightness of the building must comply with the requirements of this Regulation
	4. If the building is equipped with a mechanical ventilation system with heat recovery, the efficiency coefficient of the unit must be no less than 0.65, and the power used by the unit fan energy must not be greater than 0.75 Wh/m ³
Class A+ buildings	1. The values of building energy efficiency indicators C_1 and C_2 must satisfy the requirements of this Regulation
	2. Estimated building envelope specific heat loss must not be greater than the regulatory own specific heat loss: $H_{env} \leq H_{env,(A+)}$
	3. Tightness of the building must comply with the requirements of this Regulation
	4. If the building is equipped with a mechanical ventilation system with heat recovery, the efficiency coefficient of the unit must be no less than 0.80, and the power used by the unit fan energy must not be greater than 0.55 Wh/m ³
Class A++ buildings	1. The values of building energy efficiency indicators C_1 and C_2 must satisfy the requirements of this Regulation
	2. Estimated building envelope specific heat loss must not be greater than the regulatory own specific heat loss: $H_{env} \leq H_{env,(A++)}$
	3. Tightness of the building must comply with the requirements of this Regulation
	4. If the building is equipped with a mechanical ventilation system with heat recovery, the efficiency coefficient of the unit must be no less than 0.90, and the power used by the unit fan energy must not be greater than 0.45 Wh/m ³
	5. The building energy consumption from renewable resources must meet the requirements of this Regulation

Requirements for individual building envelopes and thermal bridges for A, A+ and A++ classes of buildings are given in Tables 4.2 – 4.5.

Table 4.2. Values of envelope heat transfer coefficient U(A) (W/(m²·K)) for energy efficiency class A building envelopes for specific heat loss calculations for various buildings

Description of enclosures	Sub-letter representing the envelope	Residential buildings	Non-residential buildings	
			Public buildings*	Industrial buildings**
Roofs	<i>r</i>	0,10	0,11	0,16·κ
Floors, adjacent to the outside	<i>ce</i>			
Heated indoor enclosures adjacent to the ground	<i>fg</i>	0,14	0,16	0,25·κ
Floor above unheated basements and underground	<i>cc</i>			
Walls	<i>w</i>	0,12	0,15	0,20·κ
Windows, skylights, bay windows and other transparent enclosures	<i>wda</i>	1,0	1,3	1,4·κ
Doors, gates	<i>d</i>	1,0	1,3	1,4·κ

Explanations:

$\kappa = 20/(\theta_{iH} - 0.6)$ – temperature correction, θ_{iH} – industrial building design temperature in the heated area of the building during the heating season, °C. Taken from the building project, and in the absence of data – from Table 2.4.

*Public buildings include: administrative, commercial, services, catering, transport, culture, education, health care, recreation, sports, hotels and special purpose buildings.

**Industrial buildings include: warehousing, garage, industrial and manufacturing buildings.

Table 4.3. Values of envelope heat transfer coefficient U(A+) (W/(m²·K)) for energy efficiency class A+ building envelopes for specific heat loss calculations for various buildings.

Description of enclosures	Sub-letter representing the envelope	Residential buildings	Non-residential buildings	
			Public buildings*	Industrial buildings**
Roofs	<i>r</i>	0,09	0,10	0,14·κ
Floors, adjacent to the outside	<i>ce</i>			
Heated indoor enclosures adjacent to the ground	<i>fg</i>	0,12	0,14	0,18·κ
Floor above unheated basements and underground	<i>cc</i>			
Walls	<i>w</i>	0,11	0,13	0,17·κ
Windows, skylights, bay windows and other transparent enclosures	<i>wda</i>	0,85	1,0	1,2·κ
Doors, gates	<i>d</i>	0,85	1,0	1,2·κ

*, ** - explanations are provided in table 4.2

Table 4.4. Values of envelope heat transfer coefficient U(A++) (W/(m²·K)) for energy efficiency class A++ building envelopes for specific heat loss calculations for various building

Description of enclosures	Sub-letter representing the envelope	Residential buildings	Non-residential buildings	
			Public buildings*	Industrial buildings**
Roofs	<i>r</i>	0,080	0,090	0,12·κ
Floors, adjacent to the outside	<i>ce</i>			
Heated indoor enclosures adjacent to the ground	<i>fg</i>	0,10	0,12	0,12·κ
Floor above unheated basements and underground	<i>cc</i>			
Walls	<i>w</i>	0,10	0,11	0,14·κ
Windows, skylights, bay windows and other transparent enclosures	<i>wda</i>	0,70	0,85	1,1·κ
Doors, gates	<i>d</i>	0,70	0,85	1,1·κ

*, ** explanations are provided in table 4.2

Table 4.5. Values of heat transfer coefficients $\Psi(A)$, $\Psi(A+)$, $\Psi(A++)$ (W/(m·K)) for thermal bridges of all purpose buildings for the estimates of specific heat loss calculations of A, A+, A++ energy efficiency class buildings

Characterization of linear thermal bridges	Sub-letter representing the bridge	Values of normative linear thermal bridging heat transfer coefficients $\Psi(A)$, $\Psi(A+)$, $\Psi(A++)$, (W/(m·K))
Between the building foundation and exterior walls	<i>f-w</i>	0
Around the window openings in the walls	<i>wdp</i>	0,05
Around the external door openings in the walls	<i>dp</i>	0,05
Between the walls and the roof	<i>w-r</i>	0
In the inner and outer corners of facades	<i>c</i>	0
On balcony floor intersection points with external walls	<i>bc-w</i>	0,01
Between the floors, adjacent to the outside, and the walls	<i>c-w</i>	0
Around the perimeter of the roof windows, skylights and other openings of transparent partitioning	<i>s</i>	0,05

The guidelines for the decrease of the use of renewable energy resources are provided in the National Energy Independence Strategy approved by resolution No XI-2133 of 26 June 2012 of the Seimas of the Republic of Lithuania.

The most important objective of energy policies and actions planned in the strategy is ensuring Lithuania's energy independence by 2020 that will enhance Lithuania's energy security and competitiveness. Energy independence will ensure the freedom to choose the type of energy sources and their supply sources (including local production), best matching the energy security needs of the state and the interests of Lithuanian consumers to buy energy resources at the most favourable price. *“Like most other European countries, Lithuania is faced with major challenges in three areas: security of energy supply, energy industry competitiveness and sustainable development of the energy sector. Such a situation in Lithuania is due to both the historical and political context, and limited internal energy resources,”* the strategy says.

A major challenge of the heating sector is to increase the efficiency of heat production, transmission and use while at the same time replacing natural gas used for heat production with biomass. As stated in the strategy, the state will support initiatives that increase the energy efficiency and promote the use of waste for energy production and increasing the use of biomass to produce heat.

In the long term the natural gas sector will aim to reduce natural gas consumption by replacing it with renewable energy resources, while in the short term – to secure gas supply alternatives; in the oil sector – gradually replace oil products with renewable energy resources and increase competition in the Lithuanian market. Lithuania will continue to increase the use of renewable energy sources (RES) for generating electricity and heat production, and the share of RES in the transport sector. According to the strategy, by 2020 at least 23 per cent of end energy consumption will be comprised of renewable energy resources.

Electricity generation from renewable energy sources is one of the most important state energy policy priorities. The priority will be given to biomass fuelled cogeneration power plants and wind energy. By 2020, the state will allow to install 500 MW of summarised power wind power plants, and to increase up to 355 MW the total capacity of biofuel power plants connected to the grid. It is also planned to exploit the potential of hydropower, which has no adverse effects on the environment. Electricity generation from renewable energy sources will be no less than 20 per cent of the final electricity consumption. Renewable energy sources in electricity production will be developed to the economically, technically and environmentally beneficial level. The main criterion for the development of electricity generation from renewable energy resources is competitive, affordable price to the consumer.

Heat sector strategy. Lithuania has a well-developed district heating system – about 65 per cent of heat is produced in a centralized manner. In recent years, this proportion remained nearly unchanged.

One of the biggest problems in the heat sector is inefficient heating energy consumption. Average annual heat consumption of buildings in Lithuania is 209 kWh/m². Currently, the majority of district heat is produced using fossil fuels – more than 70 per cent of gas which is imported from a single external supplier. After increasing heat production from renewable energy sources, the structure of fuel used for thermal energy generation will be diversified and the negative impact of centralized heat supply sector on the environment will be reduced.

Increasing heat generation and transmission efficiency. Heat generation and transmission efficiency will be increased by improving the consistency of heat generation and transmission infrastructure. When renovating relatively old and unreliable heat transfer networks, it is expected to reduce energy losses to 0.4 TWh per year. Heat production efficiency will be increased by replacing old boilers with new more efficient biomass production plants in the right places and the installation of biomass cogeneration plants.

Increasing heat consumption efficiency. Till 2020 in Lithuania thermal energy consumption in buildings, after the renovation of the most of them, will reduce by 30-40 per cent. Since the thermal energy efficiency is extremely useful for people due to the declining cost of heating, and for the state due to increasing energy independence, also because of a positive impact on the domestic economy and the environment – in terms of reduced pollution and greenhouse gas emissions, Lithuania will implement all possible cost-based thermal efficiency initiatives. Given the large investments required, the priority for improvement will be given to the buildings with highest efficiency improvement potential.

The initiatives of energy efficiency will help reduce greenhouse gas emissions. Therefore, the heat sector will be environmentally friendly. With better energy efficiency, greenhouse gas emissions from the heat sector will decrease by 1.1 million tons of carbon dioxide equivalent (which represents more than 5 per cent of greenhouse gases emitted into the atmosphere in Lithuania in 2008).

In order to achieve such a result, about 5-8 billion litas will be required for building renovation. Renovation work will be funded by the state, the European Union structural funds and the funds of the population. It is planned that these investments will pay off over 10 years.

Increase of the use of renewable energy resources in heat sector:

1) **promotion of the use of bio-mass.** The country will encourage economically efficient investment in the use of biomass for heat production, prioritizing biomass cogeneration power plants that will produce an additional 2.3 TWh of heat. Also, each year will be 1.1 TWh of heat energy will be additionally produced in the new biomass boiler stations. Investments in these power plants and biomass boilers will have no negative impact on the price that consumers pay for heat and allow to reach the final energy balance of renewable energy resources in 2020 to no less than 23 per cent. Specific solutions for biomass boilers or cogeneration biomass power plants will be taken in the light of the specifics of heat consumption in individual district heating systems;

2) **use of household waste for heat production.** Waste incineration plants in particular are planned in major cities of the country or close to them. The planned production of heat in these plants of major cities is about 0.8 TWh of heat each year. Other possible locations for waste incineration plants will be provided at the national level to ensure an adequate amount of fuel for these plants;

3) **use of solar energy.** It is planned to promote the use of solar cells for hot water preparation;

4) **use of heat as a secondary product.** Heat, discharged as the additional power generation product, must be used for heating of buildings where it is economically feasible (for example, heat generated in the Lithuanian power plant could potentially be used for heating of buildings in the surrounding cities and areas).

The implementation of the development strategy of renewable energy sources (RES) is aimed at increasing the share of final energy consumption from renewable energy resources by at least 23 per

cent to the year 2020 thus significantly strengthening Lithuania's energy independence and reducing greenhouse gas emissions.

In 2011, the energy received from RES accounted for about 20 per cent of the final energy consumption in Lithuania. Most of this energy comes from biomass, which will continue to be the main source of RES. However, given the country's natural conditions, Lithuania this not utilise the full wind and biomass energy potential. Therefore, it will create technical, economic and regulatory measures for the economic exploitation of the wind and biomass energy potential.

Lithuania will promote the RES development by creating clear long-term economic and procedural incentives. They will be created by considering all energy production and transmission costs, among them systemic reservation, balancing and network development costs required for the development of RES. Priority will be given to economically is beneficial RES types.

Strategic initiatives to the year 2020

To increase the share of final energy consumption from renewable energy resources:

- 1) **Electricity energy sector.** By 2020, Lithuania will increase the share of RES for electricity generation to more than 20 per cent. Most electricity will be produced in co-generation biomass power plants and wind power plants. In order to achieve this goal, in 2020 Lithuania will install 500 MW total wind power plants, at least 355 MW biomass-fired power plants, 141 MW hydro-electric power plants and 10 MW of solar power plants;
- 2) **Heating sector.** In 2020 in Lithuania part of the RES in the district heating sector will account for at least 60 per cent. The maximum energy share in this sector will come from biomass. It is therefore necessary to ensure the sufficient amount of fuel at a competitive price. Accordingly, infrastructure for proper fuel wood collection and processing will be developed, and the use of the straw as fuel will be significantly increased;
- 3) **Transport sector.** Renewable energy sources will account for at least 10 per cent of energy consumption.

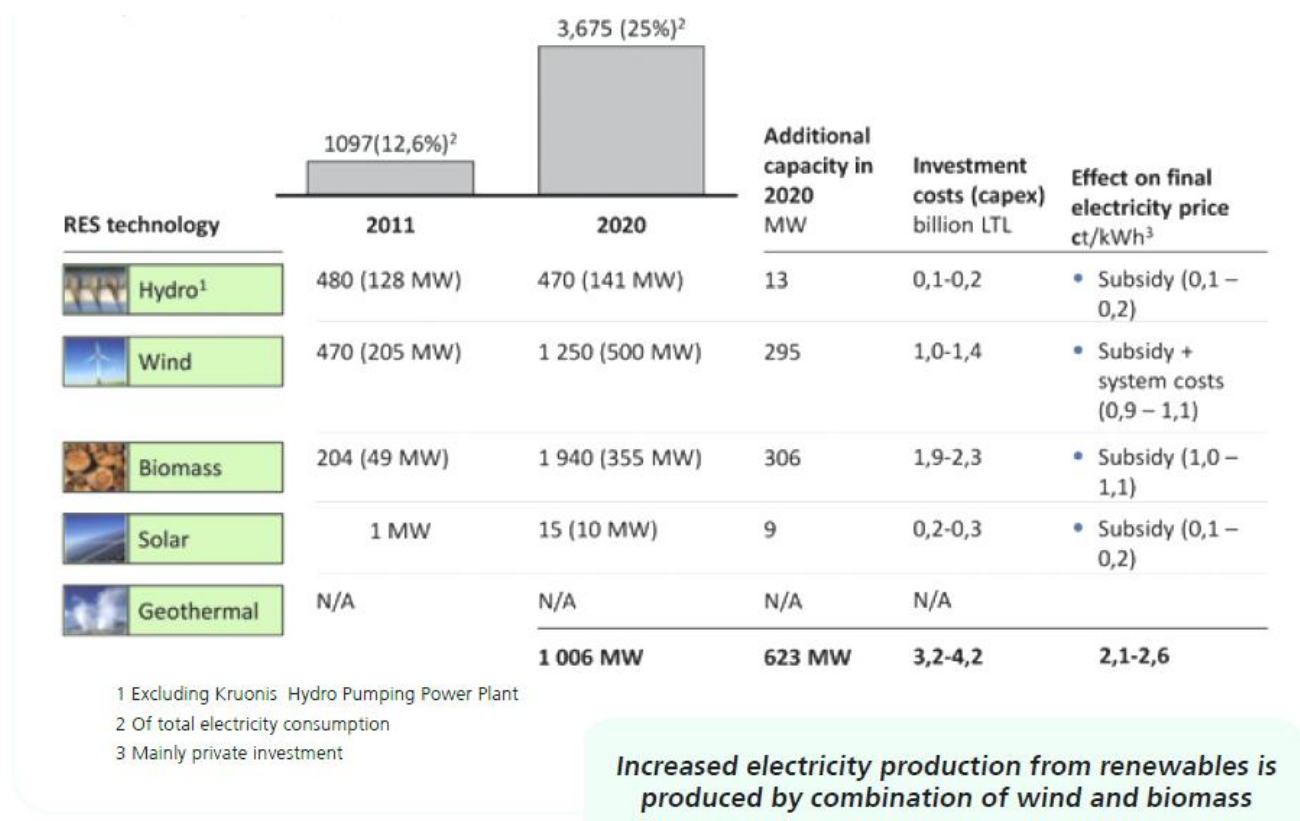


Fig. 4.1. Strategic initiatives to increase the electricity production from renewables till 2020 (GWh production (net MW))

Source: National Energy Independence Strategy of the Republic of Lithuania

Conclusion

In order to increase the energy efficiency of buildings in view of the requirements of Directive on the energy performance 2010/31/EU, provisions were adopted in the Lithuanian legislation that since 2020, the heat loss through the walls of the buildings designed and constructed in Lithuania should be reduced by about half, the heat losses due to infiltration will be reduced to a minimum, as very stringent requirements are set for building tightness. This requirement will be verified by mandatory building tightness measurements. The use of regenerative cooling systems will be binding for effective use of thermal energy. The mandatory renewable energy sources will have to be used for the building energy balance. It is envisaged that by 2020, renewable energy resources will account for no less than 23 per cent of final energy consumption.

4.2. Strategic instruments of a continuous professional education system

On 12 November 2002 the Parliament of the Republic of Lithuania passed a resolution to approve the Long-Term Development Strategy of the State. The Strategy projects development of Lithuania, as a future EU member state, by identifying three priority areas: knowledge society, secure society and competitive economy. The role of education in this development is of exceptional importance. In the Presidency Conclusions of the Lisbon summit on March 23-24, 2000, the EU Council underlined the direct link of the continuing economic and social progress in the EU and investment into people and their education: *“People are Europe’s main asset and should be the focal point of the Union’s policies. Investing in people and developing an active and dynamic welfare state will be crucial both to Europe’s place in the knowledge economy and for ensuring that the emergence of this new economy does not compound the existing social problems of unemployment, social exclusion and poverty”*. As Lithuania is striving to establish itself in the West, education should contribute to the strengthening of creative powers of society, protection and development of the identity of the nation, nurturing the mature civil society, increasing employment and competitiveness of the market, reduction of poverty and social exclusion.

In the light of the challenges faced by society today, as well as taking into account that knowledge society, secure society and competitive economy are defined as priorities in the Long-Term Development Strategy of the State, the mission of education is as follows:

- 1) to help an individual to understand the contemporary world, to acquire cultural and social competences and to become an independent, active and responsible person who is willing and able to learn and create a life of his own and life of society;
- 2) to help an individual to acquire a vocational qualification corresponding to the level of modern technologies, culture and personal skills, and to create conditions enabling life-long learning, which encompasses continuous satisfaction of cognitive needs, seeking to acquire new competences and qualifications that are necessary for the professional career and meaningful life;
- 3) to ensure balanced and knowledge-based development of the economy, environment and culture of this country, domestic and international competitiveness of the economy, national security and evolution of the democratic society, thus strengthening the creative powers of the society;
- 4) to guarantee continuity of culture nourished by the nation and the country, continuous process of creation, protection of identity, as well as to foster the open and dialogic nature of the culture.

In 2003–2012 the efforts made by the State and the society have helped to accomplish the fundamental aspirations for the development of an education:

- an effective and harmonious system of education is being designed. The system has a responsible governing, an expedient funding and is using its resources rationally;

- a continuous and socially correct system of education is being developed. The system is easily accessible and it is giving a warranty for a whole life's studies.

On the third of December, 2007, the Ministry of Education and Science of the Republic of Lithuania has confirmed the order Nr. ĮSAK – 2333 that is a program for broadening the practical professional training resources.

A program for broadening the practical professional training resources was prepared for accommodating the system of professional training to the new conditions of a changing environment: renewing the training programs and tools, giving services corresponded to the abilities and needs of a person, creating the conditions to study an entire life.

National strategy for long life learning

The indications for an long life learning were drawn in the regulations of the *National Education Strategy 2003–2012* (2003) and in the *National strategy for long life learning* (2004, new issue–2008).

The regulations of National Education Strategies for 2003–2012 define the fundamental quantitative and qualitative goals with which the development of education in Lithuania in 2003–2012 will be estimated and substantiated. By joining their efforts, the State and society shall seek to achieve the following key aims of developing education in 2003–2012:

- to develop an efficient and consistent education system which is based on the responsible management, targeted funding and rational use of resources
- to develop an accessible system of continuing education that guarantees life-long learning and social justice in education;
- to ensure a quality of education which is in line with the needs of an individual living in an open civil society under market economy conditions, and the universal needs of society of the modern world.

The development of the professional training system 2007-2011

Principal actions to improve the system of the professional training during this period were:

Year 2007

- New edition of the law on vocational education and training has been approved.
- The Law on income tax of individuals has been modified. The replacement legitimates that the means for the learning in accordance with the professional training programme are taken from the taxable income.
- The concept of the Sectoral Practical Learning Center has been approved.
- The program of national vocational education guidance system has been approved.
- The programme for the development of the practical professional training resources has been approved.
- The description of the procedure for pre-vocational training has been approved.
- The description of the procedure for independent learning has been approved.

Year 2008

- The assurance strategy of an long life learning and its realization scheme has been approved.
- The development programme of the Sectoral Practical Training Centers has been approved.

Year 2009

- The realization of the programme for the development of the practical professional training resources has been started. Agreements have been signed to establish 8 sectoral practical training centres.
- The amendments of the law on vocational education and training have been accepted. Ministry of Education and Science was given the function to regulate the qualifications. The activity of Qualification office within the Government of the Republic of Lithuania has been terminated and the management of qualifications system was given to the Qualifications and Vocational Training Development Centre (QVTDC).
- The law on higher education has been approved. The actual law defined the new funding mechanisms for the universities and colleges.

Year 2010

- The description of the Lithuanian qualifications framework (LTQF) has been approved.
- The referencing of the Lithuanian qualifications framework (LTQF) to the European qualifications framework has been started.
- The description of the procedure for funding of the Qualification regulation institution's central and sectoral professional committees, their tasks, functions, formation of the committees has been approved.
- The development program of the Sectoral practical training centers has been modified. The list of the expected sectoral practical training centres has been renewed.

Year 2011

- The changing in the law on vocational education and training has been approved. Ministry of Economy of the Republic of Lithuania transferred the functions of the human capital and vocational training to Ministry of Social Security and Labour.
- In 2011 the report on project of the compliance between LTQF and EQF was introduced to the Lithuanian society and to the counsellors group of EQF in the European Commission.
- The Central Professional Committee (CPC) has been created to co-ordinate the questions of the formation of strategic qualification system. CPC is formed of 18 members from the state, municipality institutions and representatives of the social partners.
- At the end of 2011 the national project for the external evaluation of vocational training quality has started. This project aims to produce objective, professional and comparable estimations of a vocational training quality in 90 vocational training's programs, which are accomplished by different suppliers. Furthermore, it seeks to present the recommendations for the vocational training programs and to improve the system of the quality assurance.

Year 2012

- The report of the compliance between LTQF and EQF has been announced.
- While accomplishing the project Nr. VP1-2.2-ŠMM-04-V-03-001 „The formation of the qualifications and the creation of a modular vocational training system” funded by the European Union and Lithuania's government, the conception for the Modular system of vocational training system has been prepared.
- While accomplishing the project Nr. VP1-2.2-ŠMM-04-V-03-001 „The formation of the qualifications and the creation of a modular vocational training system” funded by the European Union and Lithuania's government, new methods for the preparation of a professional standards have been prepared.

Conclusion

In response to the challenges given to the society, the priorities of information society, i.e. safe society and competitive economics are determined in the Long-Term Development Strategy of the State. By accomplishing the indications of a long life learning drawn in the regulations of the State's education strategy 2003–2012 and in Long Life Learning assurance strategy, significant efforts were made to improve the system of the vocational training. Moreover, the actions to set the links between LTQF and EQF were fulfilled, new methods for the preparation of a professional standards and the conception for the modular vocational training system have been approved. In addition, recommendations were given to improve the programmes of vocational training and the system of a quality assurance. Professional standards were approved and the modular programmes have been estimated with a participation of the sectoral committees. However, up to now, the biggest deficiency in a vocational training system is the training standards that are not yet renewed.

5. Statistics - construction and energy sectors

5.1. Buildings in Lithuania

European buildings consume about 40 per cent of energy, one-third of this amount is used by industrial, commercial and public buildings (offices, schools, hospitals, hotels, etc.), the rest – in residential homes. Specific values of Lithuanian building heat demand vary widely, depending on the age and size of the building, building materials, heating systems, and other factors. In 2006 in Lithuania the total area of dwellings amounted to 81.4 million m² and about 70 per cent of the housing was built in 1960-1990 – mostly large-panel concrete and brick apartment houses. After 1990, housing construction declined significantly and in 2007 was below the level of 1993 (based on the number of constructed apartments). In 2008 there was more than 511,320 residential buildings in Lithuania, of which 39 790 were apartment houses, 18 500 of them large-panel houses. The values of heat transfer coefficients applied in the building codes for buildings before 1992 are: for the walls – 0.5 to 1.4 W/(m²K), roofing – 0.5 to 0.8 W/(m²K), windows – 2.2 to 2.7 W/(m²K). On average 160-180 kWh/m² per year is used in the apartment buildings, so they need to be thermally insulated.

Table 5.1. Apartment blocks by the year of construction, data of 2010 (Ministry of Environment of Lithuanian Republic, 2012)

Year of construction	Number of dwellings		Total floor area	
	in units	%	m ²	%
Up to 1940	10 362	28	3 790 024	7,4
1941–1960	3 740	10	2 259 107	4,4
1961–1992	21 090	56,5	39 244 450	76,4
1993 and later	2 075	5,5	4 092 634	11,8
Total	37 267	100	51 386 305	100

As can be seen from the table, about 60 per cent of apartment blocks were built in the last century, over the last four decades of it, when brick and panel-typical apartment buildings prevailed. Exterior envelope thermal resistance characteristics of those houses are poor, not corresponding to the current regulatory requirements and the practices of our close neighbours in the north (Scandinavian countries). Thermal energy power consumption, expressed in kilowatt-hours per square meter of room floor space, of these houses range from 160 to 180 kWh/m² per year, while in newly constructed homes after 1993 they are from 80 to 90 kWh/m² per year. Fossil fuel energy consumption in apartment buildings constructed in accordance with construction technical standards and legislation in force before 1993 is about 5,000 GWh per year (calculated for the thermal energy consumption statistics over the past three years).

According to the study of the situation in the housing in 2008, 60 per cent of households in apartment buildings are unhappy with the home heating efficiency and feel the need to improve the condition of the house (house upgrade).

Over the past decade, at the initiative and expense of residents in apartment blocks, home owners associations they replaced about 60 per cent of apartments windows, about 60 per cent of front doors, and glazed about 30 per cent of balconies. In addition, at the initiative of these home administration companies, energy service companies and municipal initiatives more than 80 per cent of heat units were modernized (automated). This led to the reduction of actual thermal energy consumption for almost 80 per cent of the apartment houses by 10-15 per cent compared with project costs, i.e. up to 150 kWh/m².

Table 5.2. Wall materials in apartment blocks

Wall materials	Number of houses	
	In units	per cent
Brick and block masonry	24 331	65
Ferro-concrete slabs	5 502	15
Monolithic concrete	312	1
Logs and other structures	7 121	19

Source: Apartment block renovation (modernization) program)

Energy consumption in buildings is analyzed based on three energy classes (EPBD document CEN/BT EPBD 2006):

- primary energy: energy, which has not undergone any processing or modification process;
- final energy: energy supplied to the building and the last vendor (fossil fuels, electricity etc.)
- additional energy: energy required for harvesting energy from the environment, as well as the energy required for the distribution of heat in the and allocation in separate rooms.

Most of the energy consumed in the transport sector, 34 per cent of final energy consumption in this sector, and 31 per cent in households. The industry consumes 18 per cent of total final energy. Final energy consumption is presented in figure 5.1.

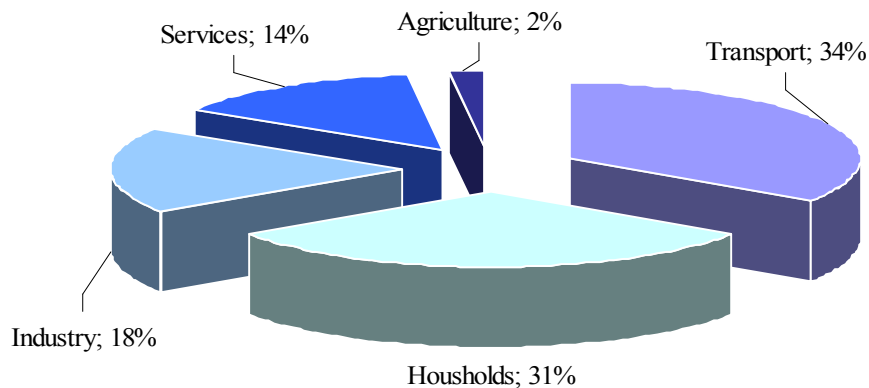


Fig. 5.1. Final energy consumption in Lithuania, per cent

(Source: Lithuanian Energy Institute, 2012)

Conclusion

About 60 per cent of apartment blocks in Lithuania were built over the last four decades of the last century, they were mainly brick and typical panel apartment buildings. Thermal characteristics of exterior envelopes in these houses are poor. Heating energy consumption in apartment buildings constructed in accordance with construction technical standards and legislation in force before 1993 are about 5,000 GWh per year. Lithuania has a big potential for building modernization, but because of unfavourable political support for people, buildings are upgraded slowly. Therefore, it must be concluded that the process of modernization will not have significant impact on the demand for labour in the construction sector in the future.

5.2. Energy use in buildings

The energy efficiency of buildings can be seen from the building certificate database. Building energy performance certification is carried out in Lithuania by implementing the provisions of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy efficiency of buildings and the times provided him the Directive for the application of these requirements. There was an amendment in the Law on Construction, which established the minimum principal certification requirements for the energy performance of buildings. certification of new buildings started on the 1st of January 2007, and the buildings sold or leased with the useful indoor

area larger than 1000 m² – hotels, administration, trade, services, catering, transport, culture, science, treatment and recreation buildings are certified from 1st of January 2009.

In its order No D1-462 of 7 June 2011 the Minister of the Environment approved the amendments to STR 2.01.09:2005 „Energy performance of buildings. Energy efficiency certification“. From 01-02-2012 the requirements for building energy performance certification and energy performance calculations were changed, starting to use updated software for the calculation and enter the building heating energy consumption indicators (kWh/m²). The amendment applies only to newly issued certificates, so the analysis was made only on the basis of this information, as it objectively reflects the building energy demand.

This analysis was made based on the data from 2063 certificates issued before 1st of October 2012.

Table 5.3. Consumption for heating according to the building certificate data in the corresponding class of buildings

Class	Administrative buildings	Pools	Garage, industrial and manufacturing buildings	Treatment buildings	Residential buildings of one and two rooms apartment	Other residential buildings (houses)	Cultural buildings	Catering buildings	Scientific buildings	Service buildings	Recreation buildings	Commerce buildings	Warehousing buildings	Special purpose buildings	Sports buildings except pools	Transport buildings	Hotel buildings
B	75	59	72	101	65	61	33	45	105	63	51	95	82	30			73
C	160		245	134	181	120	96	90	108	125	148	112	142		68		72
D	303	170	133	166	264	231	327	159	135		259		212		108		130
E	318		329		589	345		103	375							465	
F			388		924			434					1473				
G					1233												

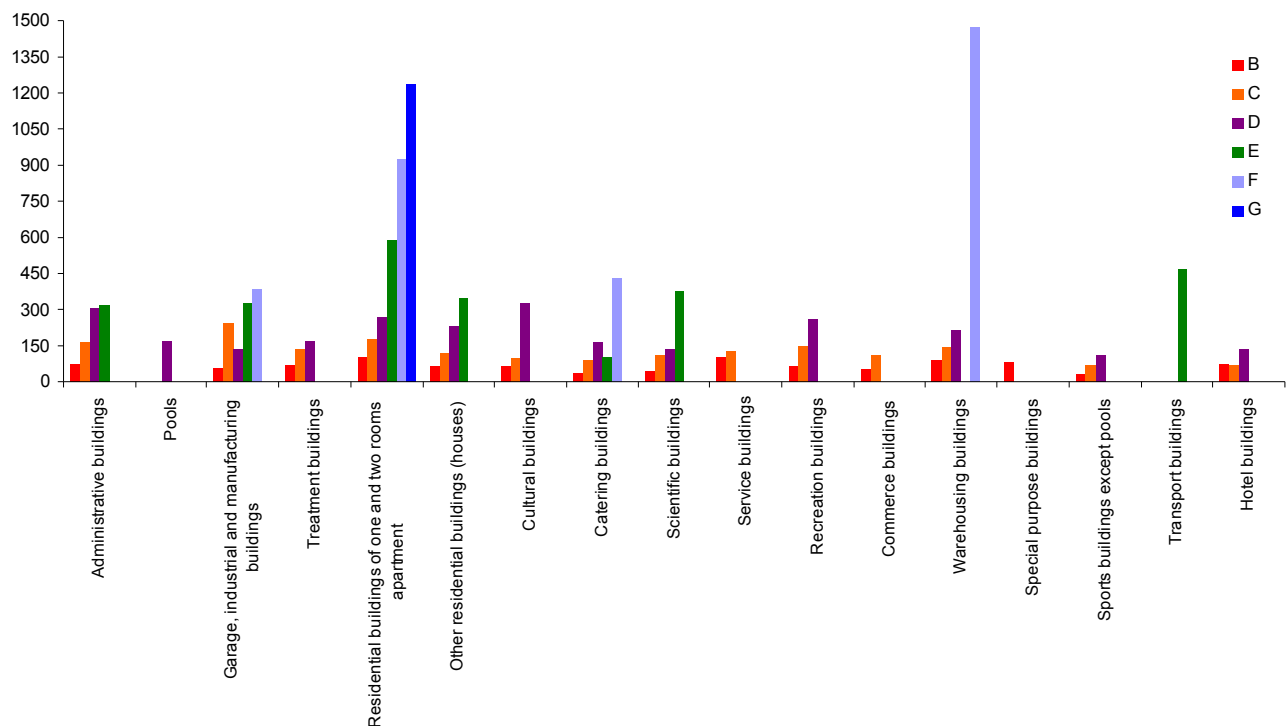


Fig. 5.2. Consumption for heating according to the building certificate data in the corresponding class of buildings

Building certification data can be broken down by classes and the energy consumption for heating can be estimated by each class and the purpose of the building. Details of the building energy performance certificates for Class C in 2012 are presented in table below.

Table 5.4. Details of the building energy performance certificates for Class C in 2012

The purpose of the building	Minimal heating costs	Maximum heating costs	Average heating costs	Number of certificates
Administrative buildings	65	315	160	16
Garage, industrial and manufacturing buildings	67	1387	245	27
Treatment buildings	53	472	134	27
Residential buildings of one and two rooms apartment	97	743	181	894
Other residential buildings (houses)	55	236	120	72
Cultural buildings	61	139	96	5
Catering buildings	67	105	90	3
Scientific buildings	43	267	108	26
Service buildings	102	155	125	3
Recreation buildings	89	219	148	9
Commerce buildings	37	287	112	13
Warehousing buildings	105	183	142	3
Sports buildings except pools	68	68	68	1
Hotel buildings	41	134	72	4

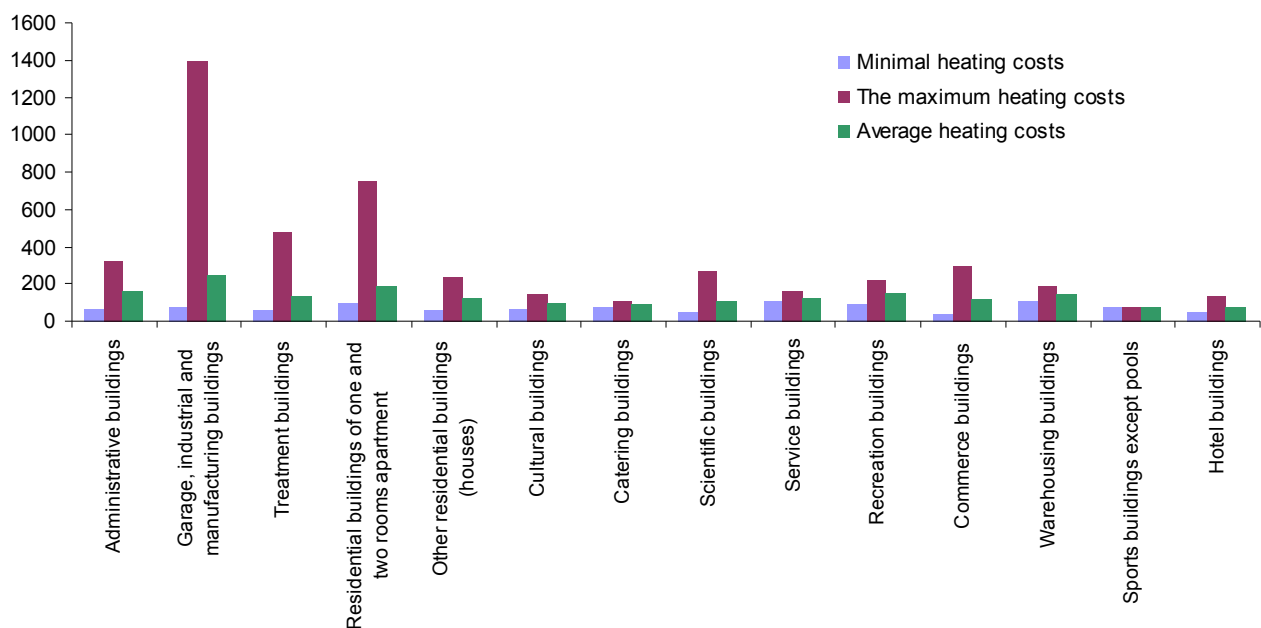


Fig. 5.3. Average heating costs during heating season in C class buildings, kWh/m²

Table 5.5. Details of the building energy performance certificates for Class D in 2012

The purpose of the building	Minimal heating costs	Maximum heating costs	Average heating costs	Number of certificates
Administrative buildings	153	449	303	3
Pools	170	170	170	1
Garage, industrial and manufacturing buildings	73	193	133	2
Treatment buildings	75	333	166	5
Residential buildings of one and two rooms apartment	80	628	264	236
Other residential buildings (houses)	55	608	231	102
Cultural buildings	327	327	327	1
Catering buildings	125	193	159	2
Scientific buildings	45	266	135	18
Recreation buildings	259	259	259	1
Warehousing buildings	179	235	212	3
Sports buildings except pools	49	167	108	2
Hotel buildings	103	156	130	2

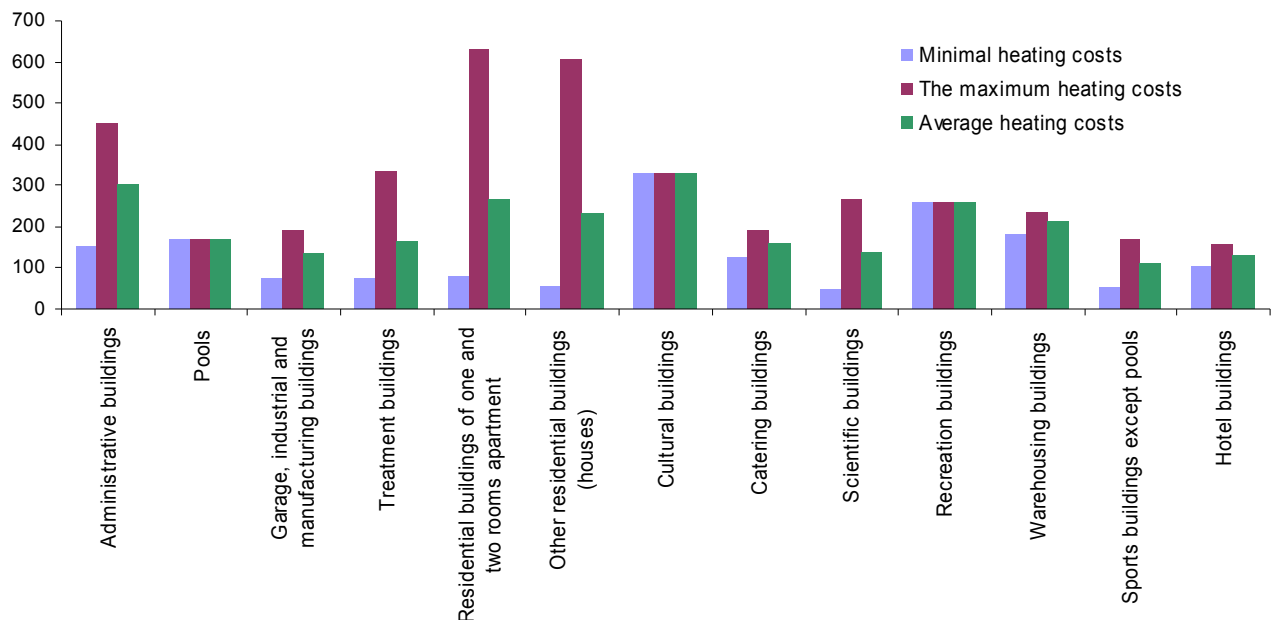


Fig. 5.4. Average heating costs during heating season in D class buildings, kWh/m²

Table 5.6. Details of the building energy performance certificates for Class E in 2012

The purpose of the building	Minimal heating costs	Maximum heating costs	Average heating costs	Number of certificates
Administrative buildings	318	318	318	1
Garage, industrial and manufacturing buildings	247	455	329	3
Residential buildings of one and two rooms apartment	282	1010	589	45
Other residential buildings (houses)	189	2672	345	159
Catering buildings	103	103	103	1
Scientific buildings	329	420	375	2
Transport buildings	465	465	465	1

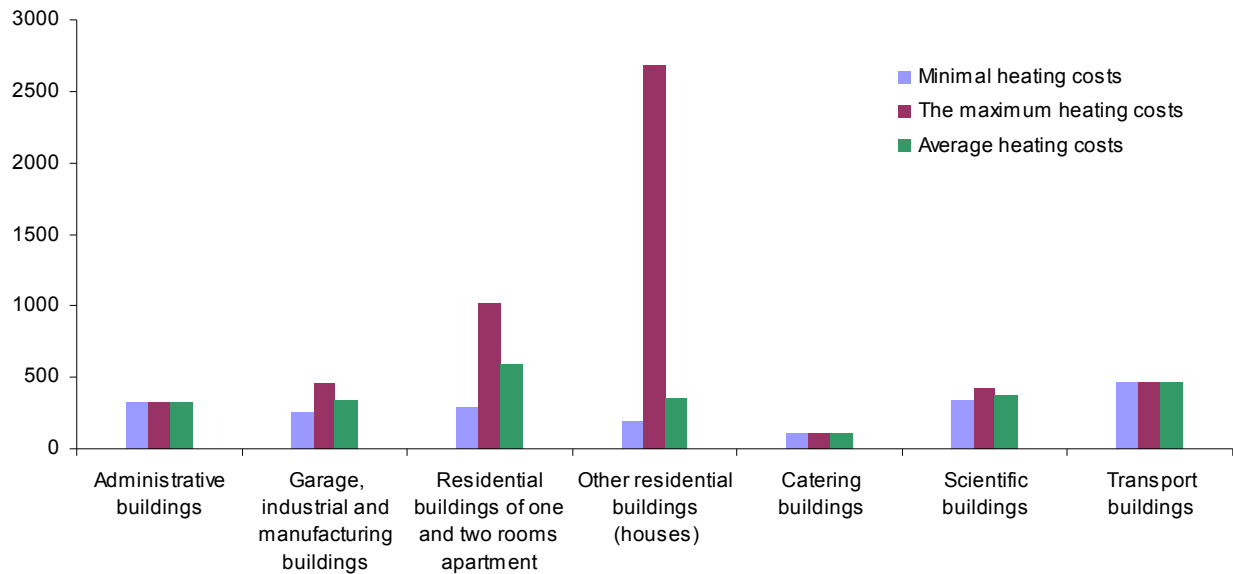


Fig. 5.5. Average heating costs during heating season in E class buildings, kWh/m²

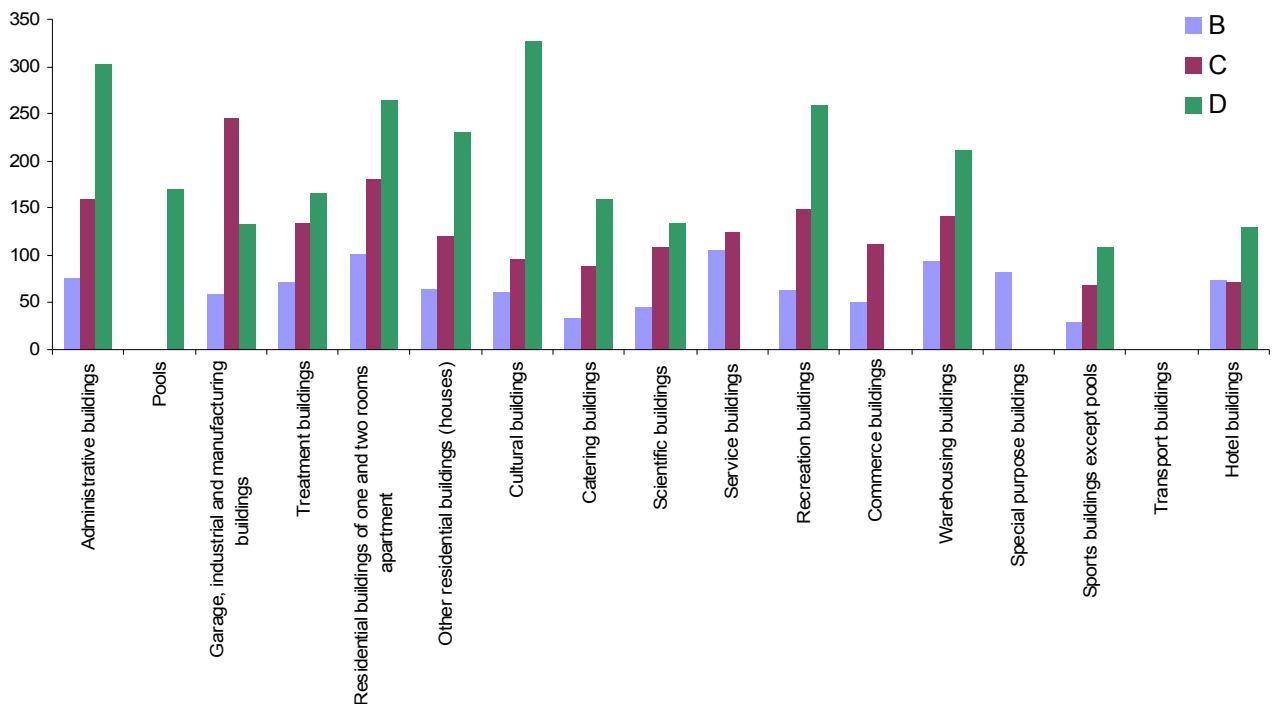


Fig. 5.6. Consumption of heating according to the building certificate data in class B, C and D buildings.

In assessing the energy performance indicators worth noting that the certification horizon gets only buildings, for which certification is mandatory. For buildings constructed prior to the requirement, the certification has not done. And from the statistics we can see that the apartment buildings constructed in period of 1961-1992 has over 56% of the multifamily buildings market (Section 5.1.). So the existing energy-performance situation on republic level can be significantly worse than the official values given in most certificates of homes that are built or modernized in recent years.

Conclusion

The analysis of energy efficiency of buildings according to the energy certification data shows that energy consumption in buildings is very high. Energy costs in old buildings (mostly D, E; F; G class buildings) are very high, so the renovation of these buildings (additional insulation) definitely has a very high potential for energy savings. Energy costs for new buildings (most of them being class B and C buildings) are often also high enough (especially the maximum values), which indicates the energy cost saving opportunities by increasing the energy efficiency of buildings. No class A buildings were certified for the specified date (as of 1 October 2012), indicating little experience in the construction of energy-efficient buildings in Lithuania and the requirement for greater focus to such building design and generation of construction ideas.

5.3. Modernisation of buildings in Lithuania

The objective of apartment building modernization program is to reduce the thermal energy consumption in apartments until the end of 2020, built according to the construction technical standards came in force before in 1993, by no less than 20 per cent, i.e. the calculated annual heating energy costs in these houses until the end of 2020 should be reduced by at least 1,000 GWh per year, and carbon dioxide emissions into the atmosphere should be reduced by no less than 230 thousand tons per year, compared to 2005.

A total 375 apartment blocks were renovated (modernized), more than 325 million litas were invested according to the program in 2005-2010. The renovated house savings were up to 40 per cent of thermal energy.

Over the past year in Lithuania, according to the apartment building and public building rehabilitation programs, 477 apartment blocks (see Fig. 5.8) and 689 public buildings (see Fig. 5.7) were renovated and upgraded – a total of 1166 public buildings and apartment houses were modernized. Society saved nearly 70 million litas per year for heating, the costs for the purchase of natural gas were reduced by this amount. Investments to the renovation of public buildings were in total 1 billion litas. The modernization of public buildings allowed for total savings of 187.09 GWh of thermal energy per year comprising about 54.3 million litas in annual cost.

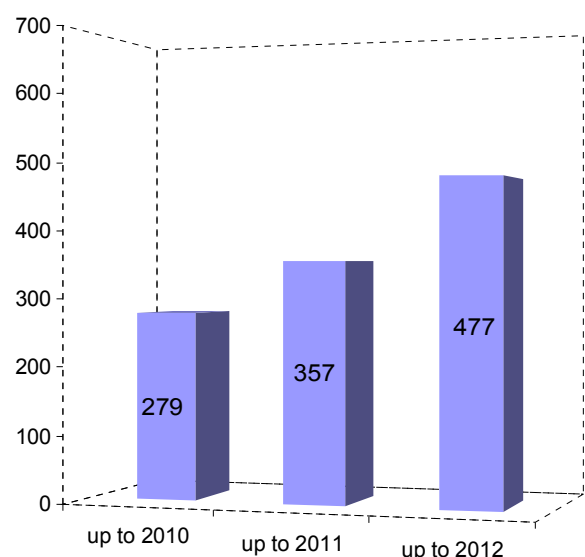
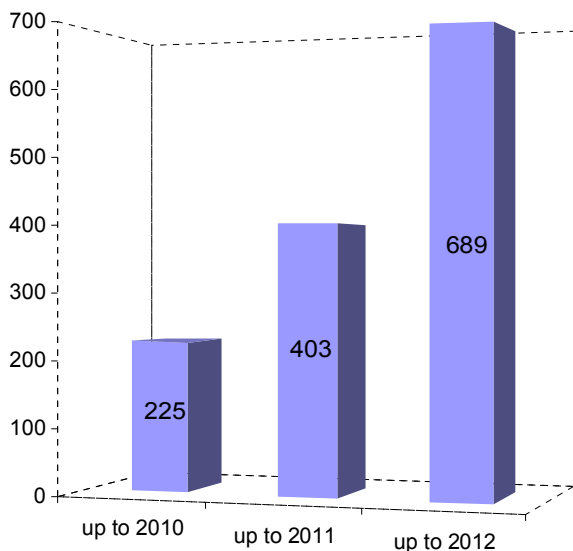


Fig. 5.7. Modernization of apartment blocks

Fig. 5.8. Modernization of public buildings

Source: <http://www.lrv.lt/>

In view of the Lithuanian state budget restrictions, the country's financial and economic situation, in early 2009, the Government of the Republic of Lithuania adopted a decision on the creation of a new funding mechanism by using the EU structural support funds for the implementation of the Cohesion Promotion Action Programme according to the European Commission JESSICA initiative. JESSICA

Holding Fund was established, which is managed by the European Investment Bank (under the JESSICA Holding Fund financing agreement signed by the European Investment Bank, the Ministry of Finance and the Ministry of Environment). In the supplement to the ‘Promotion of Cohesion’ operational programme approved by resolution No 787 of the Government of the Republic of Lithuania of 23 July 2008 (*Official Gazette*, 2008, No [95-3720](#)), In 2007-2013 at total of 783.8 million litas was allocated for JESSICA funding mechanism. The money from the Holding Fund is used for preferential credits for the implementation of apartment renovation (modernization) projects that meet the program requirements and payment of interest-rate on subsidies and credits.

The conditions and procedures for state support for dwelling renovation (modernization) are set in the Law on the state support of the Republic of Lithuania for purchase or rent of housing renovation (modernization) of apartment buildings (*Official Gazette*, 1992, No [14-378](#); 2002, No [116-5188](#)) (hereinafter referred to as the Law on State Support). The state support is granted for low income families and single persons – a credit for the renovation (modernization) of the apartment block of flats and interest are covered according to the procedures of the Law on Financial Social Assistance to Low Income Families of the Republic of Lithuania (*Official Gazette*, 2003, No [73-3352](#); 2011, No [155-7353](#)) (hereinafter referred to as the Law on Financial Social Assistance) and its implementing legislation.

Renovation of apartment houses is funded also under the funding mechanism VP3-1.1-VRM-03-R „Renovation of apartment blocks primarily by increasing their energy efficiency” of Priority 1 of the Cohesion promotion action programme “Local and urban development, cultural heritage and nature conservation and dictation for tourism development” (responsible entity – Ministry of the Interior). This funding mechanism is financed with 163.471 million litas. The funds are allocated to municipalities which, according to Resolution No 112 of the Government of the Republic of Lithuania of 31 January 2007 “On problem areas” (*Official Gazette*, 2007, No [15-555](#)) are assigned to problem areas. About 150 apartment buildings should be renewed by the year 2013.

Table 5.7. Criteria of the evaluation of the program goals and objectives

No	Objective / purpose	Evaluation criterion	Unit of measurement	Value of evaluation criterion		
				2011	2015	2020
1.	Objective (15 clause)					
1.1.	relative decrease of estimated thermal energy costs in apartment blocks built according to the construction technical standards came in force before 1993, compared to 2005		per cents	3	8,4	not less than 20
1.2.	decrease of estimated thermal energy costs in apartment blocks built according to the construction technical standards came in force before 1993 (since 2005)		GWh per year	150	420	1 000
1.3.	reduction of carbon dioxide emissions into the atmosphere (since 2005)		thousand tonnes per year	34	96	230
2.	First task (17.1 clause)					
2.1.	implemented projects of apartment block renovation (modernization), funded under the Programme and other state-supported programs or programs approved by municipalities (since 2005)		projects	430	1 500	4 000
2.2.	implemented energy-saving measures in apartment blocks at the initiative of the managers of common use facilities and residents		measures	3 000	6 000	10 000
3.	Second task (17.2 clause)					
3.1.	improvement in the awareness of population		per cents	45	70	90
3.2.	growth in the number of persons intending to participate in the program or independently install energy saving measures		per cents	30	50	60

Source: *Dwelling renovation (modernization) program*, 2011

Currently, the total state support to the renovation of apartment blocks is provided to compensate the 15% of energy efficiency and other measures, if the computational cost of thermal energy reduced not less than 20%. Up to 2013 December 31st, if the funds in the Special Climate Change Programme available, it was decided to increase the compensation up to 30%, for those applicants who were able to reduce the calculated thermal energy consumption not less than by 40%.

For the remaining amount the preferential credits with fixed rate by up to 3% is granted. Preferential credits means that there is no requirement to mortgage the dwelling, and the costs of financially vulnerable families are covered by 100 per cent. The maximum period of loan is 20 years. The loan agreement is concluded with each of the co-owners of the building alone, but all cash flows carried through the house savings account, which was opened specifically for the project.

Public support

The housing renovation program has been a great tool to achieve a reduction in energy intensity in households and in the construction sector. The economic crisis has particularly affected the drop in the performance of construction sector indicators. Additional financing of apartment block renovation would bring a double benefit: recovery of construction sector and reduction of energy intensity in both the construction sector and the economy as a whole. However, Lithuania is currently experiencing problems in implementing the Energy Efficiency Action Plan. The main problems are associated with the energy-saving objectives in the household sector, where the implementation of apartment block renovation programmes was unsuccessful.

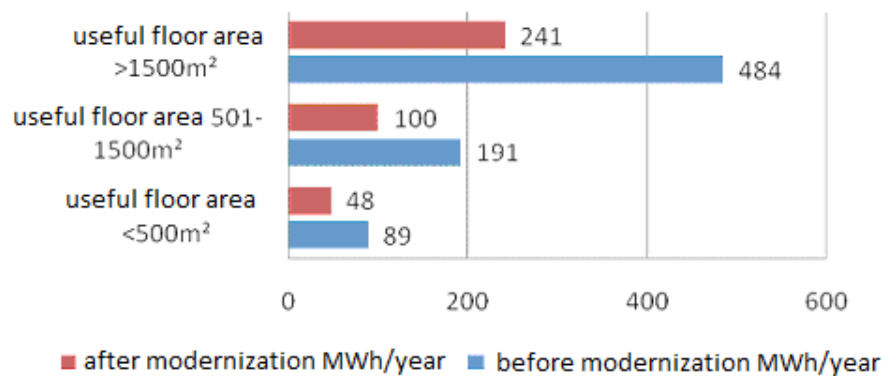


Fig. 5.9. Heat savings (MWh/year)

Source: Housing and Urban Development Agency, 2012

Figure 5.9 shows the heat consumption for heating per square meter of floor space, divided by groups of buildings:

- average heat consumption of one apartment block with <500 m² of useful floor space is recalculated for regulatory year on average is 89 MWh; to generate such energy, 18 t of CO₂ is emitted to atmosphere. The estimated savings percentage of energy consumed for heat after the implementation of measures for the modernization of buildings, provided in investment projects, amounts to 54 per cent and comprises 48 MWh per year, while CO₂ emissions are reduced up to 10 tons per year;
- average heat consumption of one apartment block with 501-1500 m² of useful floor space is recalculated for regulatory year on average is 191 MWh; representing an average of 39 tons of CO₂ emissions per year. The estimated energy savings are 52 per cent and comprises 100 MWh per year, reducing CO₂ emission levels up to 21 tons per year;
- Heat consumption of one apartment block with 1501 m² of useful floor space is recalculated for regulatory year on average is 484 MWh; to generate such change, on average 99 t of CO₂ is emitted to atmosphere. Meanwhile, the estimated savings percentage of energy consumed for heat after the implementation of all measures for the modernization of apartment blocks, provided in

investment projects comprises respectively 50 per cent and is 241 MWh per year, while CO₂ emissions are reduced up to 49 tons per year.

Conclusion

It is obvious that Lithuania is currently experiencing problems in implementing the Energy Efficiency Action Plan. The main problems related to energy-saving purposes originate in the household sector, which failed to implement the apartment block modernisation program. Despite recent positive trend and the previous growth of the number of renovated buildings, it is not realistic to achieve the expected results by 2020. Only the growing motivation of apartment block residents in participation of the dwelling renovation could radically change the course of events. You can still see cautiousness to initiate such projects, and there is not enough good experience. Residents are most wary of long-term liabilities to banks (taking loans for housing renovation), therefore it is necessary to consider additional project funding models where apartment dwellers might avoid such obligations.

5.4. Low-energy buildings

There is very little information in Lithuania on low-energy buildings. On one hand, the interest of construction companies in low-energy buildings is quite high, but the information provided on the constructed buildings is usually promotional in its nature, therefore not suitable for reliable statistical evaluation.

The main official source of data on low-energy-buildings can be the SPSC database with building energy certification data. According to the definition provided in the Construction technical regulations STR 2.01.09:2012 “Energy efficiency of buildings. Energy efficiency certification” – low-energy buildings (or parts thereof) are the buildings (or parts thereof) conforming to the requirements of this Regulation for B, A, A+ class buildings. Hence, according to the building certification data, class B (A and A+) and higher buildings can be called low-energy buildings. Details of the building energy performance certificates for class B buildings in 2012 are presented in the table (excluding the pool and transport building certificates).

Table 5.8. Details of the building energy performance certificates for class B buildings (in period from 1st of February 2012 till 1st of October 2012)

The purpose of the building	Minimal heating costs	Maximum heating costs	Average heating costs	Number of certificates
Administrative buildings	59	105	75	11
Garage, industrial and manufacturing buildings	25	106	59	8
Treatment buildings	51	93	72	12
Residential buildings of one and two rooms apartment	18	138	101	224
Other residential buildings (houses)	38	121	65	40
Cultural buildings	61	61	61	1
Catering buildings	24	42	33	2
Scientific buildings	23	83	45	10
Service buildings	60	156	105	7
Recreation buildings	45	103	63	5
Commerce buildings	22	116	51	11
Warehousing buildings	46	146	95	9
Sports buildings except pools	82	82	82	1
Hotel buildings	30	30	30	1
Administrative buildings	32	118	73	9

According to this table and graph data, the most representative in this case are residential one-and two-apartment buildings, the number of certificates for which was the highest (224), but the estimated costs for heating of these buildings during the heating season differed very significantly, from 18 kWh/m² to 138 kWh/m². Energy consumption for heating 18 kWh/m² is very small, they are close to the general provision of “passive houses” (15 kWh/m²) while the maximum energy consumption of a class B building (138 kWh/m²) is quite high. Average energy consumption for this type of buildings of 101 kWh/m² are also quite high. Compared with other types of buildings, it is one of the highest energy costs for heating (costs are higher only for service purpose buildings 105 kWh/m²). These differences for other building groups (between the highest and lowest costs for heating) are not so high.

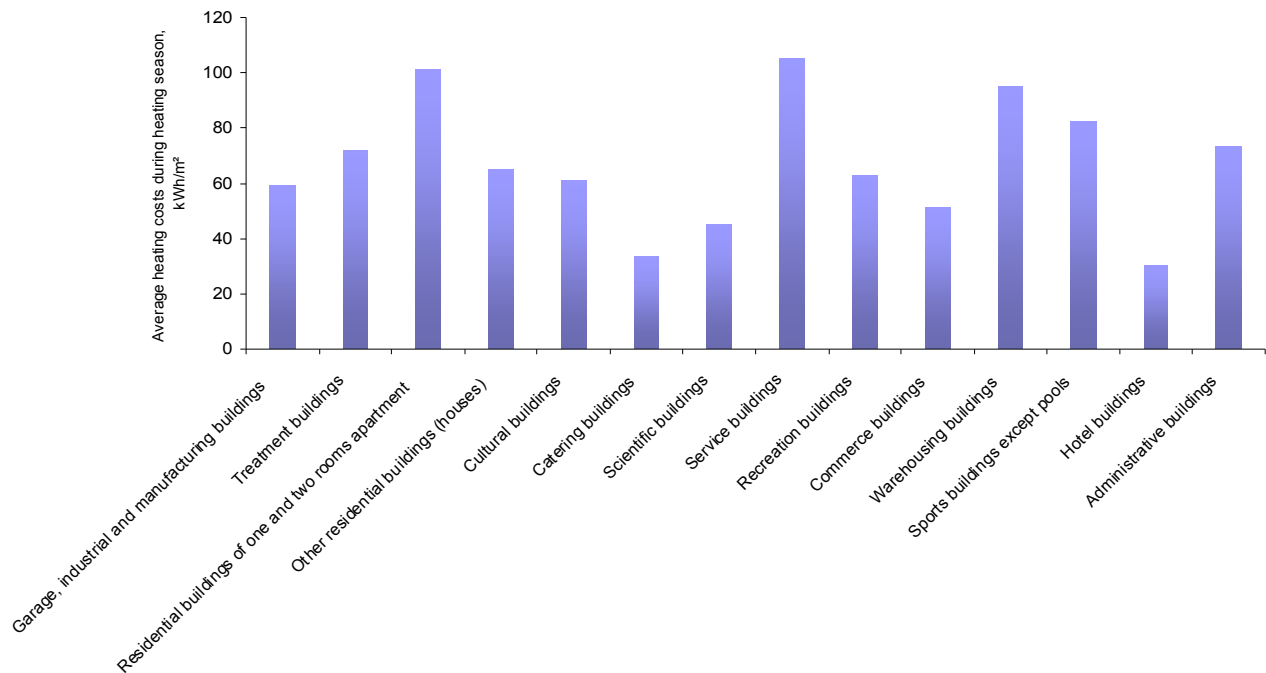


Fig. 5.10. Details of the building energy performance certificates for class B buildings (for period from 1st of February 2012 till 1st of October 2012)

Image 5.11 presents a fragment from the data base of Energy Performance Certificates where the data on the first A class energy performance building can be seen. The data received after the new certification regulations have been enforced on the 1st of February, 2012. The indicated energy consumption for the heating (17 kWh/m²) is very low, therefore, such a building will undoubtedly can be attributed to energy-efficient buildings. The new order strictly defines the requirements for the classes of energy performance, especially for the energetically effective buildings (e.g. an obligatory test of airtightness, a usage of ventilation system with heat recovery). Therefore, it is hard to compare the new and the old data of certificates. Otherwise, comparing common energy consumption for the other buildings of A class, we see that in many cases the consumption is close to the one of the newly certificated building (60 kWh/m²). Therefore, a presumption can be made that they could be attributed to the energetically effective buildings in accordance with the new definitions. Altogether 15 of A class energy performance buildings were indicated in the data base till the 3rd of December, 2012.

The date of issue of certificate	The purpose of building	Class of energy efficiency	Useful floor area	Energy consumption	Energy consumption for heating	
Sertifikatas Išdavimo data Galiojimo data	Unikalus Nr. Adresas	Pastato paskirtis	Energinio naudingumo klasė	Naudingasis plotas (m ²)	Energijos sąnaudos (kWh/m ²)	Energijos sąnaudos šildymui (kWh/m ²)*
GM-0051-0047 2009-03-03 2019-03-03	4400-1557-1325 Pramonės 17, Klaipėda, Klaipėdos m. sav.	Garažų, gamybos ir pramonės paskirties pastatai	A	2733	85	
GV-0017-0152 2009-11-30 2019-11-30	4400-0981-9661 Baltų pr. 52, Kauno m., Kauno m. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	229	63	
GV-0017-0202 2010-06-22 2020-06-22	4400-0928-8333 Sakiškių k., Vilniaus r. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	149	106	
GV-0017-0273 2011-07-04 2021-07-04	4400-2187-4708 Žilvičių g. 2A, Teleičių k., Garliavos sen., Kauno r. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	77	129	
GV-0031-0006 2009-11-12 2019-11-12	0101/0101:915 Padvarės g. 83, Mažųjų Gulbinų k., Vilniaus m. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	194	52	
GV-0031-0007 2011-03-01 2021-03-01	4400-0879-6929 Padvarės 69, Vilnius, Vilniaus m. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	181	55	
GV-0031-0008 2011-03-01 2021-03-01	4400-0928-8900 Padvarės g. 71, Vilnius, Vilniaus m. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	180	55	
GV-0343-0002 2011-12-06 2021-12-06	4400-2054-4727 Žuvinių k. 41, Vilnius, Vilniaus m. sav.	Gyvenamosios paskirties vieno ir dviejų butų pastatai	A	203	116	
KG-0395-0029 2012-11-12 2022-11-12	4400-2212-9617 Bajorų kelias 9, Vilniaus m, Vilniaus m. sav.	Kiti gyvenamosios paskirties pastatai (namai)	A	2305	60	17
MK-0017-0226 2010-09-13 2020-09-13	4400-2015-4285 Vytauto Didžiojo g. 53B, Jurbarko m., Jurbarko r. sav.	Mokslų paskirties pastatai	A	209	79	

[1 2]

PASTABA
* - Energijos sąnaudos pastato šildymui (kWh/m²) įvedamos nuo 2012-02-01, įsigaliojus naujai STR 2.01.09:2005 "Pastatų energinis naudingumas. Energinio naudingumo sertifikavimas" redakcijai, patvirtintai 2011-06-07 AM įsakymu Nr.D1-462. Pakeitimas taikomas tik naujai išduodamiems sertifikatams.

Fig. 5.11. A fragment from the data base of Energy Performance Certificates with data on Class A buildings certificates. There appear the data of first certified after 2012-02-01
Class A building
 (Source: <http://www.spsc.lt/>)

Conclusion

According to the definitions for low-energy buildings provided in the Lithuanian legislation, the details from energy efficiency certificates of buildings we can see that there is little experience in the construction of such buildings. On the one hand, it can be stated that the requirements of Directive 2010/31/EU on energy performance of buildings to gradually increase the energy efficiency of buildings are carried out during the transitional period, as the increasing number of buildings is being built using less energy than the mandatory minimum energy performance requirements, but on the other hand, currently there are no buildings fully meeting the “near-zero-energy” building definition (in Lithuanian legislation it corresponds with the definition of a “near-zero-energy” building, subject to A++ energy efficiency class requirements), i.e. such buildings, which will be designed and built after 2020. As a result, it is difficult to identify the qualification deficiencies associated with the construction of such buildings.

5.5. Construction companies and workforce

Enterprises. The construction sector has about 5 thousand enterprises. 39 % of them specialize in the construction of buildings and their parts. Small and micro enterprises (the number of employees do not exceed 49 people) predominate in the sector. In period of 2002 - 2006 the number of enterprises in construction sector have increased more than twice. The highest concentration of construction enterprises is in the districts of Vilnius and Kaunas. Such a situation is in large part was influenced by the unequal distribution of investments in Lithuania. On the other hand, construction companies are very mobile and tenders in cities had been often won by companies from other areas, mainly because of the cheaper labor.

Table 5.9. Construction part in Gross domestic product

Indicators	Metai										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP, LTL billion	48,879	52,351	57,232	62,997	72,401	83,227	99,229	111,920	92,032	95,323	106,369
Construction, LTL billion	2,582	2,938	3,565	4,110	5,085	7,053	10,001	11,261	5,486	5,047	6,251
Construction part in GDP, %	5,3	5,6	6,2	6,5	7,0	8,5	10,1	10,1	6,0	5,3	5,9

Source: Statistics Lithuania, 2012

Table 5.10. construction work carried out outside the country (for all building groups) (LTL without VAT)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Construction work carried out on their own (without VAT), at current prices, LTL thousand	76288	61900	66920	63761	67876	126914	156353	166346	258381	324419
Construction work index, compared with the previous period, %	116,1	80,3	101,8	88,5	96,9	164,4	112,5	119	162,3	120,9

Source: Statistics Lithuania, 2012

Table 5.11. Construction work carried out within the country, indices (2005 index 100)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
All structures										
Construction work index, compared with 2005	66,4	84,9	91,2	100	122	149,1	154,4	79,2	73,2	89,8
Construction work index, compared with the previous period	121,9	127,9	107,4	109,6	122	122,4	103,6	51,3	92,5	122,7
Buildings										
Construction work index, compared with 2005	66	87,1	95,7	100	130	155,8	156	70,9	54,4	68,7
Construction work index, compared with the previous period	119,5	132	109,9	104,5	130	120,3	100,1	45,5	76,6	126,3
Engineering structures										
Construction work index, compared with 2005	67	81,6	84,2	100	110	138,6	151,8	91,9	102,5	122,7
Construction work index, compared with the previous period	125,9	121,8	103,3	118,7	110	126,1	109,5	60,6	111,4	119,8

Source: Statistics Lithuania, 2012

Table 5.12. Construction work carried out within the country (LTL without VAT), at current prices

	2007	2008	2009	2010	2011
Work performed	11009724	12486977	5775788	5142761	6553152
New construction works	6190453	6850149	2569110	2114584	2746982
Reconstruction	2478869	2922788	1778094	1862323	2090615
Repair and restoration	2124253	2467503	1231760	988659	1491419
Other work	216149	246537	196824	177195	224136

Source: Statistics Lithuania, 2012

Workforce. Approximately 100 thousand employees are working in a construction sector. The main part of them - in a subsection of construction of buildings and their parts (about 68% of all the employees from the construction sector). During the five years period (2002–2006) the number of employed was growing evenly. Men are the majority of the employees (around 93,5 %). The part of the people who have shorter work hours form 3% from all the employees in the sector. The biggest is the group of the qualified employees. The majority of an architectural subsector is formed from specialists and technicians. Around 10,3% of all the employees are 55 years old and older. In 2007 the permission to work in the construction sector was given to 998 foreign citizens (4 times more than in 2005). The majority of them are skilled workers and craftsmen (around 77% of whose with permissions). The migration of employees in the sector is high and reaches 35%. Mostly, the fluctuation is caused by the hard working conditions and the seasonal prevalence. The highest fluctuation exists in the group of unqualified employees, in which, during the year, almost all the workers are replaced. The fluctuation in the group of specialists and technician reaches 23%, in the group of qualified employees - 32%. The lowest fluctuation is noticeable between the managers and administration professionals.

Table 5.13. The number of employed in construction sector, thousand.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 IIQ
	1	2	3	4	5	6	7	8	9	10	11	12	13
Total	83,7	84,8	93,2	107,1	116,2	132,5	148,7	170,9	166,5	122,6	93,3	93,7	94,4
Skilled workers and craftsmen*	48,2	50,2	53,3	61,1	69,6	75,7	85,5	98,8	95,7	68,9	46,4	49,00	48,6
Unskilled workers*	8,8	8,7	10,6	15,8	17,6	19,3	23,1	22,8	15,6	12,4	7,9	7,0	7,1

* According to the Lithuanian Classification of Occupations (based on the International Standard Classification of Occupations ISCO-08). *The sources for columns:*

1-3: DARBO JĖGA, UŽIMTUMAS, NEDARBAS (WORKFORCE, EMPLOYMENT), UNEMPLOYMENT 2000–2005 Statistics Lithuania, 2006.

4-8: DARBO JĖGA, UŽIMTUMAS IR NEDARBAS (WORKFORCE, EMPLOYMENT, UNEMPLOYMENT) 2003–2007, section 2.5., p. 31. Statistics Lithuania, 2008; DARBO JĖGA, UŽIMTUMAS IR NEDARBAS (WORKFORCE, EMPLOYMENT, UNEMPLOYMENT) 2004–2008, section 2.6., p. 36. Statistics Lithuania, 2009.

9-11: WORKFORCE, EMPLOYMENT, UNEMPLOYMENT, section 2.6., p. 22. Statistics Lithuania, 2010.

12-13: Darbo rinkos metraštis (Yearbook of Labour Market), section 2.7., p. 29. Statistics Lithuania, 2011.

Table 5.14. Vacancies in the construction sector, quarterly

Size of company	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2
Total	523	458	474	262	1398	841	1419	453	734	726
1–9 employees	113	41	72	36	142	93	12	129	106	43
10 and more employees	410	417	402	226	1256	748	1407	324	628	683

Source: Statistics Lithuania, 2012

Table 5.15. A list of demanded professions (distributed by county) in construction sector (Lithuanian Labour Exchange, 2012)

County									
Vilnius	Kaunas	Klaipėda	Šiauliai	Panevėžys	Marijampole	Utena	Alytus	Tauragė	Plungė
Finisher Concreter Painter The fitter of an electricity Electrotechnician of the electricity systems Builder Welder	Concreter The machinist of excavator Fitter for an electricity Machine operator of the wood treatment Welder for gas and electricity Locksmith welder Pipelayer Locksmith electrician Welder	Welder Concreter Builder	Concreter Carpenter Painter Electricians Electro-Mechanic Installer of an electricity devices Installer of the metal constructions Bricklayer, plasterer Bricklayer - concreter The installer of plastic windows Builder Tiler Bricklayer Plumber Tinsmith Joiner Joiner, carpenter Joiner, installer Roofer Welder Plasterer	Concreter, plasterer and similar professions Roofer Welder Electrician The fitter of an electricity devices	Finisher Concreter Painter The machinist of excavator Electricians Installer of an electricity devices Builder Welder The installer of plastic windows Tiler	Finisher Painter Electrician The fitter of an electricity devices Bricklayer, plasterer Tileer Joiner carpenter Welder Plasterer	The operator for the manufacture of the window glazing	Decorator Electrician, the fitter of an electricity devices Bricklayer Builder Joiner - carpenter Roofer Welder Locksmith (repairer) Plumber and pipelayer Builder - joiner - carpenter	Decorator Concreter Fitter of the metal constructions Joiner Welder Welder for gas and electricity Welder using automatic apparatus Locksmith

In the construction sector, the highest demand in the first quarter of 2012 was for welders and decorators. The most demanding profession in the construction sector was a decorator, a builder, a concreter, a painter and an electrician. Table 5.15 presents a list of demanding professions (distributed by counties) in the labour market (*Lithuanian Labour Exchange, 2012*).

Table 5.16. The labour demand in the construction sector in 2011 and the first six months of 2012

Professions and the groups of the professions in accordance with the Lithuanian Classification of Occupations	Jobs, thousand	
	2011	2012 first half
<i>Skilled workers and craftsmen, total</i>	44,6	23
painters and similar professions	6,0	2,2
builders, carpenters and joiners	3,6	1,5
builders, who use traditional materials	3,2	1,5
welders	2,9	1,5
concreters, plasterers and similar professions	22,5	0,9
bricklayers	2,2	0,9
building electricians and etc.	2,1	0,8
plumbers and pipelayers	1,7	0,7
manufacturers and installers of the metal constructions	11,0	-

Source: Labor exchange, 2012

The majority of the unoccupied workplaces were registered in the territorial labour exchanges, which are serving the biggest cities in Lithuania. Almost half of the vacancies were registered in the biggest cities of Lithuania - more than a quarter of all the job offers in Vilnius (28%), less in Kaunas (18%), Klaipėda (14%), Šiauliai (12%), Panevėžys (12%).

According to the data of Lithuanian Labour Exchange, in the first quarter of 2012, 11% of vacancies were registered in a construction sector (comparing with the other economic sectors). However, in comparison with the same period on 2011, in construction sector the decrease of the workforce demand has been fixed (17%).

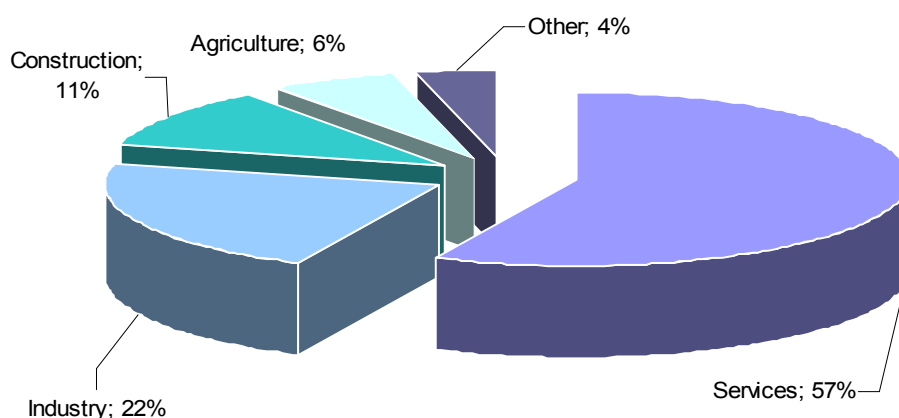


Fig. 5.12. Job vacancies, by activity.

Source: Laisvų darbo vietų analizė (The analysis of job vacancies). Labor exchange, 2012

Conclusion

The construction sector has about 5 thousand enterprises, 39 % of them specialize in the construction. Small and micro enterprises (the number of employees does not exceed 49 people) predominate in the sector. Approximately 100 thousand employees are working in a construction sector. The main part of them is- in a subsection of building and their parts construction (about 68 %). Skilled workers and craftsmen form approximately 50 % of a sector of workforce. According to the data of Lithuanian Labour Exchange, the most demanding professions in the construction sector on the first half of 2012 were welders, finishers, concreters, painters, electricians, roofers and builders.

Local labour market is not able to satisfy the need for all the employees of the most demanding professions; therefore, employees from abroad are occupying the workplaces. For example, during the first quarter of 2012 the permissions for the foreigners to work as welders formed 10 % of all permissions to work in the Republic of Lithuania.

5.6. Demand for information

The lack of information was defined while arranging the report:

- The great part of a CVET of employees in construction sector is done by the enterprises, especially the large ones, which are training their labourers in the workplaces. Furthermore, the suppliers of an energy usage technologies are also committing some training functions of installers and operators. The majority of these trainings are dispersed between many enterprises and are not included into the statistics. Hence, there is no registration of how many employees from which profession are trained every year in that way.
- Although the statistics reports of the vocational training institutions and colleges that implement the initial vocational training are announced by the Centre Information Technologies in Education (every year the reports present the numbers of students and graduates in a different professions of the vocational training institutions), the information is delays to appear on the internet. The reason for the delays is not a work of a centre, but the forms of the vocational training institutions that are not being filled and resend on time. This delay hinder the monitoring of the vocational training system's indicators.
- Information about the continuous non-formal vocational training of the employees, is dispersed and not available in a single document or a study. Moreover, due to the fact that the construction sector and all the related sectors were highly affected by the crisis, it is not clear, which training programme is still operating. Furthermore, it is thought that in the last three years, no significant investments were made into the creation of training programmes for the builders that could potentially participate in a construction of an energy efficient buildings.
- During the development of this report, none of the interview participants have noticed bigger problems concerning the qualification of their employees and the lack of their skills. These conclusions can not be strictly valued, because the small number of the energy efficient buildings does not allow to define the exact problems, concerned to the workforce skills and qualification. Currently the energy consumption efficiency enterprises are connecting just with materials that are being used and not with the qualification and the skills of the employees that are responsible for the work done.
- The drastic decrease of the construction work have caused the diminishing of the demand for blue-collar professions. In addition, it also have had an impact on the growth of the emigration. While analyzing the present situation in construction sector, an absence of the official data concerning the emigrated employees from the construction sector is noticed.
- The frequent alteration of the methods in assessing the energy efficiency does not allow to compare the qualitative indicators of the of the buildings in a longer period.

6. Existing provisions of Vocational Education and Training

6.1. National system for VET in construction sector

The construction sector is defined in compliance with the International NACE classification. It is made of six subsectors: Architectural and engineering activities and related technical consultancy (activity 74.20), Site preparation (activity 45.11 and 45.12), Building of complete constructions or parts thereof (activity 45.21, 45.22, 45.23, 45.24 and 45.25), Building installation (activity 45.31, 45.32, 45.33 and 45.34), Building completion (activity 45.41, 45.42, 45.43, 45.44 and 45.45), Renting of construction or demolition equipment with operator (activity 45.50).

Construction sector is one of the most important sectors in national economy. It generates about 10% of GDP and positively influences the growth of employment in other related economic activities. The sector is characterised by cyclic work, a large number of migrant workers and prevailing work under subcontracting.

Change of employees in the construction sector is rather high and amounts to 35%. It is in part determined by hard operating conditions and dependency of works on the seasons. Study of the Construction Sector (Research report on skill needs) performed in 2008 revealed that the workforce of construction sector lacks the skills of dutifulness, responsibility, situation management, inventiveness and inquisitiveness. Specialist, technicians and skilled workers are lacking in practical skills. Knowledge on modern technologies and materials and skills how to work with them as well as competences of project management and time planning are also relevant.

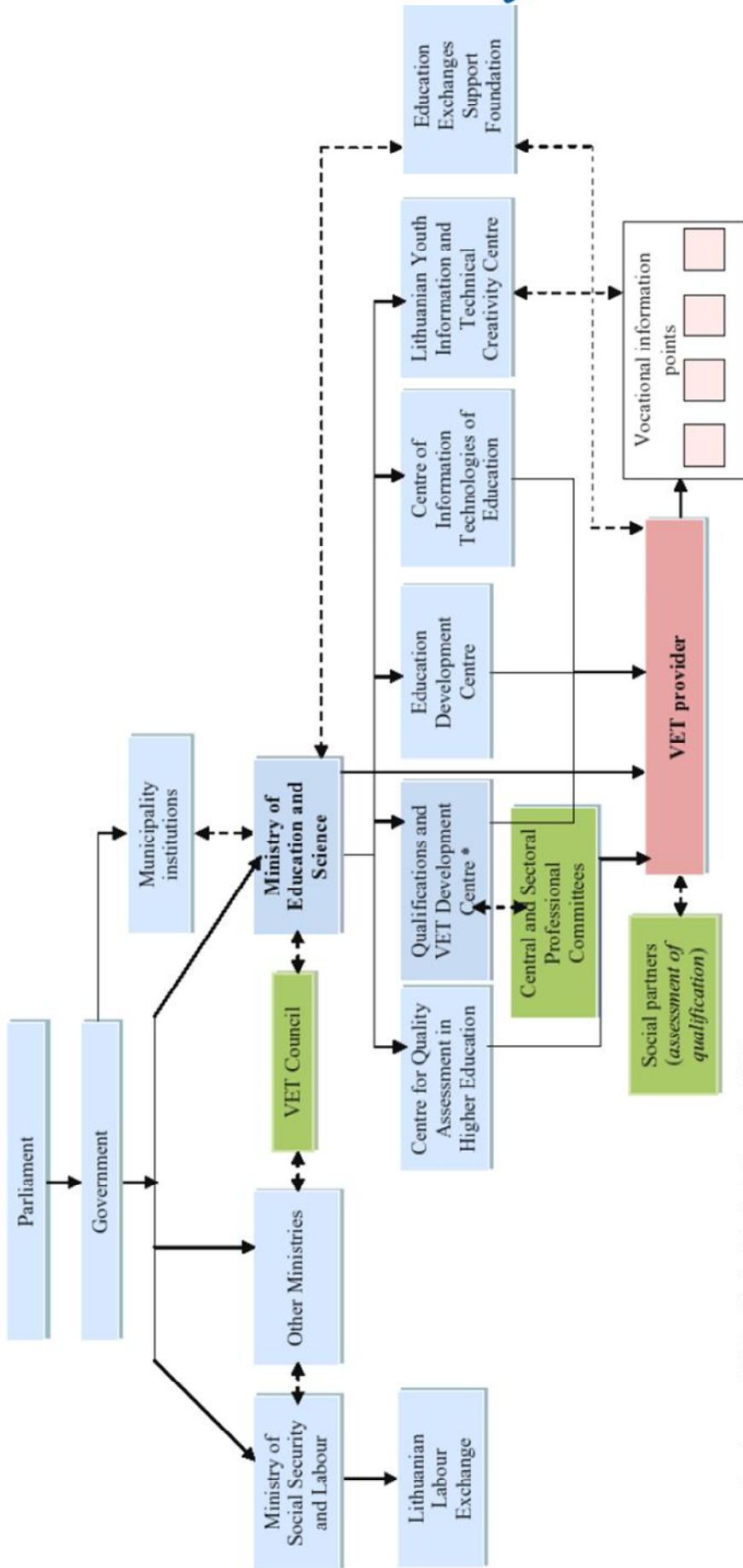
National Vocational Education and Training (VET) system changes accelerated the adoption of the new issue of Law on Vocational Education and Training. Law establishes the structure and administration of the vocational education and training (VET) system of the Republic of Lithuania, based upon co-operation of the state government institutions and social partners, and also regulate organisation of VET.

The description of different institutions and organizations implementing the provisions of Law provided in figure 6.1.

The Ministry of Education and Science: implements the national system of formal and non-formal education which secures social attitudes in favour of education and creates conditions for lifelong learning in a changing democratic society; implements the state policy of science and studies in accordance with the Law on Science and Studies and other legal acts and coordinates the activity of Lithuanian institutions of science and studies; approves the general curriculum content of formal education, and achievement levels; organizes and coordinates the accreditation of the secondary education programme; etc. **Vocational Education and Training Council** acts as an advisory body to the Ministry of Education and Science, and other public institutions in decision-making on strategic issues in VET. **The central and sectoral committees** determine the sequence of professional standards required to develop and approve, represent employers and educational institutions. Central and sectoral committees created by Qualifications and VET development center. One of the committees created represent the needs of the construction industry. **The Lithuanian Labour Exchange** is responsible for active labor exchange policy measures and vocational training for the unemployed organization. The Lithuanian Labour Exchange offers support for jobseekers who want to find a job more quickly, giving them the opportunity to acquire the necessary skills to compete and succeed in the labour market. **Organizations representing employers** (associations, chambers of commerce, etc.) performs evaluation of standards drafts, participate in the development of standards and applied research. **VET providers** (training institutions and enterprises) analyze the needs for programs at the local level, develop programs and includes additional competencies required for the occupations, involved in the development of standards.

Fig. 6.1. National VET system

Source: VET in Europe – Country report. Lithuania. Qualifications and VET Development Centre



* to January 2010 – Methodological Centre for VET

The aim of **Qualifications and Vocational Education and Training Development Centre (QVETD)** is to ensure the developments of Lithuanian qualifications system correspond to the needs of the economy as well as national and international initiatives. QVETD manages Lithuanian qualifications system, develops of qualifications and VET standards, performs applied research in VET, including specialists demand forecasts, performs monitoring of skills supply and demand, assesses formal VET programmes, assesses the readiness to implement formal VET programmes, provides the external assessment of VET institutions activity and implementation of formal VET programmes, provides the recommendations for improvement of VET teachers qualification, organises the develops of modular programmes and their renewal, develops VET credits system, performs dissemination of VET information, organises the activities of central and sectoral professional committees, cooperates with national and international VET actors, performs national and international projects, performs coordination of ReferNet network in Lithuania.

Education Development Centre (EDC) is a state educational institution which responsible for the most important areas of educational support for Lithuanian educational community. EDC provides educational support for students, teachers and for school. The aim of EDC is formation of general, non-formal children and adult education curriculum which corresponds to the needs of society. EDC develops general education curriculum, teacher training programmes, and implements continuing adult education, evaluates textbooks and educational tools, carries out EU Structural Support projects, and successfully collaborates with teachers of all Subject Associations and the other social partners.

Centre of Information Technologies in Education (CITE) is educational institution founded by the Ministry of Education and Science of the Republic of Lithuania. At the moment the mission of CITE is to help the Ministry of Education and Science to implement and apply information and communication technologies (ICT) by provision the education community with necessary, secure, and up-to-date data and information. Its strategic aim is to participate in creation of the strategies and programs on ICT implementation in education, and to implement these programs' projects dealing with the Centre's mission. The strategic tasks of the Centre are to collect, store and structure information on the Lithuanian education and science system, and to analyse the data on ICT in education; to implement, develop and manage the educational data bases, registries and information systems, and to coordinate their usage; to warrant the provision of the education community with the necessary information to create, communicate and collaborate; to organise and coordinate the in-service training of teachers and other employees of the educational institutions and organisations in the area of the application of ICT.

Vocational Education and Training Council of Lithuania (VETCL) is a collegial institution that advises national education authorities on solving strategic issues of vocational education and training. The VETCL in equal parts consists of representatives of state governance and municipal institutions, associated institutions of business self-governance and employers, and organisations representing employees' interests.

Centre for Quality Assessment in Higher Education (SKVC - Studijų kokybės vertinimo centras) is an independent public agency founded by the Ministry of Education and Science of the Republic of Lithuania as an expert institution. The Centre implements the external quality assurance policy in higher education in Lithuania and contributes to the development of human resources by creation of enabling conditions for free movement of persons. The main function of the Centre is to assist HEI to assure quality and to constantly improve it.

An important role in the formulation and implementation of education and qualification system development policy plays advisory bodies, the most important are Central Professional Committee (*Centrinis profesinis komitetas (CPK)*), Lithuanian Education Council (*Lietuvos švietimo taryba (LŠT)*), General Education Council (*Bendrojo ugdymo taryba (BUT)*) and Lithuanian Vocational Training Council (*Lietuvos profesinio mokymo taryba (LPMT)*).

Central Professional Committee (CPC) – is a collegial, cooperation-based advisory body that coordinates strategic issues pertaining to the development of the qualifications system. The CPC has been established under the Law on Vocational Education and Training. The main functions of CPC are to initiate the development of draft legislation, necessary for the development and maintenance of

qualifications system; to initiate the renewal of LTQF; to establish priority sectors for the formation of qualifications system; to discuss and suggest decisions regarding the controversial qualifications system's formation issues; to advise the Qualifications Management Institution, the functions of which are performed by the QVETDC on assuring correspondence of the qualifications and the economy needs; on accreditation of competence assessment institutions; on linking national qualifications with the EQF and other issues.

Lithuanian Education Council (LEC) is an institution that performs expert evaluations and advises on strategic education development issues. The LEC performs the following functions: assesses draft laws and regulations of the Republic of Lithuania prepared by the Ministry of Education and Science, other documents regulating education activities; advises the Seimas of the Republic of Lithuania, the Government of the Republic of Lithuania, the Ministry of Education and Science, municipal institutions, providers of education, research and higher education institutions on national education policy issues; submits proposals to the Seimas of the Republic of Lithuania, the Government of the Republic of Lithuania, the Ministry of Education and Science, municipal institutions, providers of education, research and higher education institutions regarding the directions of education development, implementation of the national education development programmes and priorities for financing education. LEC represents a very wide range of interested parties. Organizations involved in educational system delegate one member to the LEC each. Minister of Education and Science delegates seven Council members from education experts and representatives of social partners.

Construction sector participation in qualification development system. Lithuanian Builders Association is actively involved in qualification improvement system for construction workers. One of the main objectives of Lithuanian Builders Association - to improve the qualification of managing staff and workers and to promote the new construction and building materials, technologies and best practices. Cooperation agreements were signed with universities, VET providers, including Kaunas University of Technology, Vilnius Gediminas Technical University Faculty, Quality Management Center of VGTU, Vilnius College of Technologies and Design, Vilnius Builders Training Centre, Panevezys Centre of Vocational Education, Marijampole Vocational Education and Training Center, Klaipeda Builders School, Kaunas Technical College, Kupiškis Technological and Business School, Šiauliai Vocational Education and Training center, Labor Market Training Centers and others.

Sectorial practical training centres (SPTC). The main aim of SPTC is to assure that learners, using the latest technologies and equipment, gain practical skills matching the needs of the labour market. A sectorial practical training centre is a vocational training institution or its autonomous division related to one or few economic sectors of Lithuania and equipped with modern practical teaching facilities. Such centre carries out practical vocational training of persons who wish to acquire or improve professional qualification. Services offered by such centres are available to everybody. 42 such centres will be opened till 2015, and for that purpose 293 million are allocated from the EU European Regional Development Fund and the budget of the Republic of Lithuania.

The Lithuanian Labour Exchange under the Ministry of Social Security and Labour. Lithuanian Labour Exchange (LLE) actively participate in employees VET system. LLE invites VET providers to provide information on the possibility organize vocational training for the unemployed in formal and non-formal vocational training programs. Information is available by filling the certain forms approved and submitting the descriptions of non-formal VET programs aligned with the organization representing the area of activity, i.e. an industry association, union, chamber and so on. On the website of LLE VET providers have the possibility to locate the information about the formal and non-formal vocational training programs. At the end of November 2012, on the LLE database the 1646 non-formal and 2597 formal training programmes were registered

Lithuanian Qualifications Framework. Pursuant to Article 10(2) of the Law on Vocational Education and Training of the Republic of Lithuania (*Valstybės Žinios* (Official Gazette) 1997, No 98-2478; 2007, No 43-1627; 2009, No 93-3973; 2010, No 67-3338), Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C111/01) and with regard to Council Directive 2009/50/EC of 25 May 2009 on the conditions of entry and residence of third-country nationals for the purposes of

highly qualified employment (OJ 2009 L 155, p. 17), the Government of the Republic of Lithuania has approved the Description of the Lithuanian Qualifications Framework (hereinafter - Description). The Description sets out the system of the levels of qualifications established in the Republic of Lithuania on the basis of competencies required for personal activities. According to the Lithuanian Qualifications Framework laid down in this Description, the qualifications established in the Republic of Lithuania shall be categorised, assessed and compared by linking the Lithuanian qualifications system, which covers the Lithuanian Qualifications Framework, qualification planning, implementation, recognition and management, with the qualification systems of other Member States of the European Union. The Descriptions states that the Lithuanian Qualifications Framework is in conformance with the Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C111/01) and the 8 levels of the qualifications framework established therein. The qualifications defined in this Description shall be ascribed to the qualification levels established in this Description, which specify the functional, cognitive and general competencies necessary for the performance of activities of similar complexity, autonomy and variability.

The provisions of this Description shall apply to:

- the management of the Register of Studies, Training Programmes and Qualifications, other national and institutional registers as well as information systems;
- the development and approval of professional standards and vocational training standards;
- the development and implementation of formal vocational education and training or higher education programmes;
- the evaluation of the abilities acquired through formal, non-formal and informal learning;
- the provision of information and consulting on the issues of the Lithuanian system of qualifications;
- the evaluation and recognition of qualifications acquired in the country and abroad;
- the attribution to the respective qualification levels of qualifications acquired before the approval of this Description and during the period preceding the reorganisation of the vocational education and training and higher education programmes pursuant to the Framework;
- the issue of qualification certificates to persons

LTQF comprises 8 qualifications levels covering all educational sectors, i.e. general education, vocational education and training and higher education. Qualifications are competence-based and that they are attributed to the LTQF levels defining functional, cognitive and general competences intended for the performance of activities of similar complexity, autonomy and variability.

The levels of qualifications are arranged hierarchically, with regard to the underlying competence of the qualifications, the ways of acquiring the qualifications as well as the criteria defining the levels of qualifications:

- complexity of activities shall be a qualification criterion used to describe the character of activities, the variety of tasks and the degree of responsibility;
- autonomy of activities shall be a qualification criterion used to describe changes in the activity organisation and nature of subordination;
- variability of activities shall be a qualification criterion used to describe activities in terms of changing technological and organisational environment.

Each level of qualifications includes the qualifications intended for the performance of activities of similar complexity, autonomy and variability.

Qualifications of levels I-IV shall be acquired by completing vocational education and training and/or general education programmes or by independent study or by gaining professional experience.

Level V qualifications shall be acquired by completing training programmes intended for persons with a professional qualification as well as fixed-duration professional experience, higher education programmes not leading to a degree (except residency) and/or through professional experience and independent study.

Qualifications of levels VI-VIII shall be treated as the high professional qualification.

Level VI qualifications shall be acquired by completing cycle one of university or college studies and, in the cases and according to the procedure specified in the legislation – by completing study or requalification programmes not leading to a degree and/or through professional experience and independent study.

Level VII qualifications shall be acquired by completing cycle two of university studies or integrated study programmes, in the cases and according to the procedure specified in the legislation - by completing study or requalification programmes not leading to a degree and/or through professional experience and independent study.

Level VIII qualifications shall be acquired by completing doctoral studies and/or, in accordance with the procedure prescribed by the legislation, through professional experience and independent study.

Table 6.1. List of Lithuanian qualification levels

Level of Lithuanian qualifications	Description of the qualification level
I	<p>The qualification is intended for activities consisting of one or several simple specialised actions or operations. The activities require the ability to apply basic knowledge characteristic of the activities performed. The environment of the activities is clear, the activities are performed in line with detailed instructions, some cases require intense supervision, guidance and assistance.</p> <p>The situations, actions and operations constituting the activities are regular and constantly repetitive.</p>
II	<p>The qualification covers the activities consisting of actions and operations intended to solve simple problems. The activities performed require the application of the main factual knowledge characteristic of the activities. The activities performed require supervision, guidance and assistance.</p> <p>The activities and operations constituting the activities are regular.</p>
III	<p>The qualification is intended for activities consisting of actions and operations in narrow areas of activities. The activities may include several or more specialised activity tasks that require the application of well-known and tested solutions. Performance of the activities involves the ability to apply the knowledge characteristic of the activities performed pertaining to the facts, principles and processes of the activity area. The activities are carried out autonomously, under the guidance of an employee of a higher qualification and subject to external performance quality control.</p> <p>The activity environment may require the ability to adapt to simple context changes.</p>
IV	<p>The qualification is intended for activities consisting of actions and operations in relatively broad areas of activity. The activities are performed by carrying out several or more specialised activity tasks, solutions to which are not always tested or known. Performance of the activities involves the ability to apply factual and theoretical knowledge characteristic of a broad context related to the activity areas.</p> <p>The activities are performed autonomously, assuming the responsibility for the quality of the procedures and outcomes of performance. With the acquisition of experience, the qualification allows the transfer of practical skills to the staff of lower qualifications as well as supervision of their activities.</p> <p>The activity environment requires the ability to adapt to the developments predetermined by the context change, which is normally foreseeable.</p>
V	<p>The qualification is intended for activities distinguished by integrated coordination of activity tasks in different activity areas. The activities include the evaluation of the competencies of lower-qualification employees and training thereof. The activities require coordination of comprehensive knowledge of the activity area with general knowledge in dealing with various specialised activity tasks in several different activity areas.</p> <p>The employee performs the activities independently and is supervised only as regards the evaluation of results. The activity tasks are set by an employee of a higher qualification, who frequently grants the employee performing the activities the discretion as to the choice of methods and measures to complete the tasks. The employee supervises the activities of lower-qualification staff, plans and assigns activity tasks, oversees the performance of the activities, provides consulting and verifies the performance quality.</p> <p>The technological and organisational requirements of the activities as well as their environment are constantly changing, the changes are often unforeseeable and may be related to new areas of activity.</p>
VI	<p>The qualification is intended for complex activities distinguished by a variety of tasks and their content. Different means and methods are employed when dealing with problems in various areas of professional activities. Therefore, the performance of activities requires the application of broad theoretical knowledge based on the results of new fundamental and applied research or necessary for the introduction of various innovations.</p>

<p>Activities are performed independently, selecting the methods for task completion and organising the work of the respective staff for the completion of the set tasks. Thus, the qualifications in this level include the ability to plan activities with respect to the set tasks, to analyse and record the activity results and to submit reports to activity coordinators, to modify activities based on the activity result analysis and specialist recommendations, and to carry out different project activities.</p> <p>The activity environment requires the ability to adapt to constant and normally unpredictable changes predetermined by the progress of knowledge and technologies in a specific professional sphere. The qualification allows the enhancement and extension of professional knowledge and, following the self-assessment of the activities, enables independent learning (development of cognitive competencies) as required by the changing professional activities.</p>	
<p>VII</p>	<p>The qualification is intended for complex activities consisting of various interconnected tasks that may cover several related professional activities. Therefore, the performance of activities requires expert evaluation and application of the latest knowledge of the professional activities and similar or related areas, discovery of new facts in conducting applied research into the professional activities, and creative application of theoretical knowledge and research results.</p> <p>The activities are performed by means of independent setting of the tasks in the respective activity area and taking independent decisions aimed at activity enhancement and improvement. A peculiar characteristic of the activities is the supervision of other employees' activities. Thus, the qualifications of this level cover the abilities to independently carry out applied research, provide consulting in the activity area, coordinate projects aimed at the improvement of the qualifications of others as well as introduction of innovations, and to analyse and present the activity results.</p> <p>Due to the advancement of the knowledge, technology and labour organisation in various activity areas, the activities of this level and their environment undergo intense changes, the developments are difficult to predict, and the activities consist of constantly changing combinations of tasks. Thus, the activities require the ability to adopt innovative solutions based on research results as well as the evaluation of alternative solutions and possible social and ethical consequences of the activities.</p>
<p>VIII</p>	<p>The qualification is intended for activities of exceptional complexity, distinguished by the development of new knowledge, ideas, technologies, as well as work practices, methods and processes. Consequently, the activity demands the discovery of new knowledge in the activity areas on the basis of fundamental and applied research findings, integrating knowledge in different activity areas. The activities are characterised by strategic activity objectives that may cover several different activity areas or research subjects.</p> <p>The activities are strategically planned by assuming the responsibility for the results and quality of other employees' activities and independent strategic decision-making. The training and consulting of the specialists in the respective activity area is another characteristic. Thus, it is necessary to have the ability to adopt strategic decisions of public significance, to independently plan and conduct fundamental and/or applied research, to transfer the latest knowledge (to share know-how) to specialists in the respective area and to coordinate scientific and applied research projects.</p> <p>Intense and unpredictable changes in the activities and their environment require readiness for constant developments, openness to innovation, a positive attitude towards the development of the organisation and society, the ability to address issues originally in the light of their context, and the ability to initiate and make changes in various areas of activity and public life.</p>

Source: *Referencing the Lithuanian Qualifications Framework to the European Qualifications Framework for Lifelong Learning and the Qualifications Framework for the European Higher Education Area. National report, 2012. Qualifications and Vocational Education and Training Development Centre.*

Referencing of LTQF to EQF. The European Qualifications Framework for lifelong learning (EQF) provides a common reference framework which assists in comparing the national qualifications systems, frameworks and their levels. It serves as a translation device to make qualifications more readable and understandable across different countries and systems in Europe, and thus promote lifelong and life-wide learning, and the mobility of European citizens whether for studying or working abroad.

The core of the EQF concerns eight reference levels describing what a learner knows, understands and is able to do – 'learning outcomes'. Levels of national qualifications will be related to one (or in some cases two or several, as relevant for the national systems) of the reference levels of the EQF, ranging from basic (Level 1) to advanced (Level 8). This will enable a much easier comparison between national qualifications and may facilitate the recognition of qualifications when people move to another country.

In Lithuania, qualification is understood as readiness **for a certain activity**. Thus criteria characterising complexity, autonomy and variability of activities for which a person is ready were chosen for describing learning outcomes in LTQF. In LTQF all the qualifications provided in Lithuania as in the EQF divided into 8 levels. It was also foreseen that qualifications awarded in Lithuania are competence-based and that they are attributed to the LTQF levels defining functional, cognitive and general competences intended for the performance of activities of similar complexity, autonomy and variability.

There are two types of qualifications (see table 6.2):

- qualification for work, the main aim is to prepare a person for work;
- qualification for learning, which the main goal is to prepare a person for further learning.

This choice conditioned the peculiarity of description of LTQF levels. For example complexity of activity corresponding to level IV qualification is described in the following way: “The qualification is intended for activities consisting of actions and operations in relatively broad areas of activity. The activities are performed by carrying out several or more specialised activity tasks, solutions to which are not always tested or known. Performance of the activities involves the ability to apply factual and theoretical knowledge characteristic of a broad context related to the activity areas”. LTQF comprises 8 qualifications levels covering all educational sectors, i.e. general education, vocational education and training and higher education. In addition, it is legitimated that qualification of any level can be acquired by gaining professional experience or by independent study.

Table 6.2. Documents certifying qualification according to LTQF levels

LTQF level	Qualifications intended for work	Qualifications intended for study	LTQF level
8	Doctor of Science diploma		8
7	Certificate of Residency		7
6	Bachelor’s diploma/ Professional bachelor’s diploma		6
5	Currently, there are no qualifications of this level provided		5
4	Vocational training diploma	Matura attestation (school leaving certificate)	4
3	Qualification certificate <i>(The qualification of this level can be acquired learning both according to the programmes for adults and in the initial VET system)</i>		3
2		Certificate of basic education	2
1	Qualification certificate <i>(Programmes of vocational education and training of this level are used in adult education, mainly for training of unemployed)</i>		1

Source: *Qualifications and Vocational Education and Training Development Centre* (www.kpmc.lt)

Such a peculiarity of the LTQF has both, pluses and minuses. One of the main drawbacks is impeded referencing of LTQF to EQF and, in consequence, to other national qualifications frameworks. Direct comparison is encumbered by linguistic differences, - LTQF and EQF have different ways of describing learning outcomes. In one case, they describe the knowledge, skills and competence levels, and in other – by complexity, autonomy, and variability of activity, for which qualification acquired person is prepared. This complicates the compliance process and reduces its reliability. Correlation between levels should not be based on the comparison of detailed descriptions. Otherwise the identification of correspondence between levels is less evident and reliability of referencing may be questioned. EQF is more focused on the promotion of further education and LTQF – on the qualifications supply compliance to the demand in the labor market. Permeability between different qualifications levels is not evident in LTQF, professional and university undergraduate qualifications not separated, the common competences are not highlighted, it is unclear what kind of qualifications and their accompanying documents are classified to 5th level, it is unclear how to measure previously acquired skills, i.e. there are some doubts that implementation of LTQF will effectively influence the development of lifelong learning, what is one of the key EQF aims.

Alongside to the drawbacks mentioned above, implementation of LTQF has already given positive results bringing all educational sectors into a single system. EQF based on learning outcomes, defined by the knowledge, skills and competencies, and linking these two - LTKS and ECS tightly, will benefit various stakeholders: pupils, students, employers, employees, education providers, and so on. Linking facilitates pathways of the acquisition and improvement of qualifications and gives opportunities to facilitate learning and the labor movement in their country and internationally, promotes lifelong learning, flexibility in the application of any formal, non-formal and informal learning forms and methods. Linking facilitates the recognition of all or part of the qualifications, individual and informal learning and informal training, increases the transparency of qualifications acquired in other countries, helping to plan the number and qualification employees needed, better matcing the labor market demands and education and training supply.

In case Lithuanian Qualifications System and its national peculiarities and EQF logic of classifying qualifications will be taken into account, positive outcomes may be expected.

Accreditation and certification system for workers. Lithuania, in comparison with other European countries, has a national accreditation and certification system for only energy-sector workers (installers), which is implemented by the State Energy Inspectorate under the Ministry of Energy (<http://www.vei.lt>). It issues certificates on the basis of the Resolution "Rules and procedures for workers dealing with the construction energy objects, installation and use of equipment", the Ministry of Economy adopted on March 24, 2005, no. 4-122 (amended by Decree No. 4-385, 2006-10-17). The certificate gives the right to work with the electrical power equipment, namely, installation of technological equipment necessary for energy monitoring, maintenance, repair, measurement, validation, launch and adjustment works. Certification is carrying out by National Energy Training Centre (<http://www.remc.lt>), the Qualification Development and Training Center, gas supplier „Lietuvos dujos AB“and the The Lithuanian District Heating Association (LDHA). Additional certification of workers is associated with the heating system maintenance and monitoring. However, now certification and training is mostly related to current building energy efficiency standards, although there is a clear need to update the system with regard to 2020 targets. Training and certification of renewable energy equipment installation specialists held by Order No. 1-172 approved on September 6, 2012 by the Lithuanian Minister of Energy “Training and certification procedure of renewable energy production equipment installation specialist” (*Official Gazette, 2012, no.: 106-5396*), which defines the requirements for equipment installation specialists, who are responsible for renewable energy production equipment installation, including starting and alignment. Procedure gives the provisions for training and certification of installers, which determine whether the installers meet the requirements of the Procedure for certified installers (hereinafter - Certification) to assemble small-scale (up to 100 kW nominal output power) production facilities of renewable energy:

- biomass boilers and at non-brick ovens;
- geothermal systems and heat pumps;
- photovoltaic and solar heat power generation equipment.

Procedure establishes the qualification requirements for equipment installers, the requirements for installers’ training institutions, installers’ certification procedures, certification, provides descriptions of training programs.

This year finished two years ago started the Leonardo da Vinci project “Distribution Cert 2”. During the project Finland and the Baltic countries united to organize the distribution network of electricians (installers) pilot trainings based on apprenticeship. Created framework system for a unified Baltic Sea States distribution network, equivalent to the international level 3-5 qualifications for development of qualifications of electricians in formal and non-formal education way.

After this project appeared opportunity to acquire knowledge and practical skills, recognized in four countries, uniform, complying with the standards. Installers who successfully complete the training program, the National Energy Training Centre, now receive personal "qualification certificate",

which confirms a qualified installer knowledge and sets out the topics learned, and demonstrate that a person qualified to perform the work envisaged (see Appendix 1).

It is important to note that there is no national qualification and certification system for workers in the construction sector, particularly in relation to energy efficient buildings, including the almost non energy using buildings. On the other hand, the various continuous education and training programs are available for the construction industry professionals who are seeking to be certified on the possibility to perform certain tasks (technical maintenance, architecture, planning, management, engineering management, etc.).

The first is almost non energy using building installation in 2008 revealed a number of weak points in the construction sector, especially problem of skills and application of new technologies. Most of the workers involved in the construction work and energy-efficient technology instalment were self-taught, and they lacked the necessary knowledge to choose better solutions and better use of existing alternative technologies. Also, many problems are associated with demands for workers able to adjust newly installed equipment.

Construction VET sector needs analysis, which was carried out by the Qualifications and Vocational Training Development Center in 2008, set the following key weaknesses:

- Intensive growth of energy-efficient technologies and a variety of materials, to which the Lithuanian builders were not accustomed. Growth of new technologies, techniques and materials supply, building automation and globalization intensification leads to demand for new knowledge and skills that could ensure faster development of the sector and the compliance with the requirements for energy efficiency.
- Increasing environmental requirements, including reducing energy use in buildings. Some initial attempts to promote the use of recycled materials, applying new technologies in construction of non energy using buildings have not been successful. This was mainly caused by a limited number of qualified employees and in particular the lack of training programmes.

It is important that all vocational education and training system part related to construction workers. Even Qualifications and Vocational Training Development Center, responsible for the organization of VET system and standards development, the analysis of demand for skills and qualifications formation of the national level, do not have sufficient resources necessary to update the official standards for initial formal vocational education and training of builders who actually involved in construction of almost not using energy using buildings.

Studies performed in recent years showed that in order to increase the attractiveness and the quality of vocational education it is necessary to strengthen the relationships with employers, to raise of the status and professional competence of teachers, to improve the content of vocational training, strengthen the links of vocational training and higher education.

Conclusion

Referencing process of Lithuanian National Qualifications Framework to the European Qualifications Framework is already completed, but it is doubtful whether implementation of LTQF will effectively affect development of lifelong learning, which is one of the main objectives of the EQF. In the description of LTQF it is difficult to see the continuity between the different qualification levels, separation of professional and university undergraduate qualifications, do not clarified general competences, it is unclear what kind of qualifications and their accompanying documents are classified to level 5, it is unclear how the previously acquired skills should be treated. A national qualification and certification system for workers in the construction sector not yet developed, particularly in relation to construction of energy efficient buildings (including almost non energy using buildings).

6.2. Vocational training levels. National certification scheme of related workers and professionals

Vocational training

Vocational education is regulated by the Law on Vocational Training of the Republic of Lithuania (hereinafter referred to as the LVT). In Lithuania, the LVT was adopted in 1997. It did not define the qualification levels, but stated that the qualification is awarded upon completion of the vocational training program that meets the requirements of vocational training curricula included in the Registry of studies and curricula. In managing this registry, the Minister of Education signed order No 1383 “On the approval of the Lithuanian vocational education levels” in 1997 which validated four levels of vocational education. At the beginning of the conversion of higher schools that offered three-year post-secondary vocational training programs, into colleges, the descriptions of vocational education levels in Lithuania were adjusted in 2001, without making substantial changes to the description of the first four levels, and introducing the fifth level of vocational education, applicable for studies in colleges, which according to the Law on Higher Education of the Republic of Lithuania (hereinafter referred to as the LHE) are attributed to the higher education system. In the vocational education and training sector, which does not offer a higher education, four qualification levels were validated in the Lithuanian qualifications system (Table 6.3). Prior to adopting the structure of qualifications in Lithuania, it was used in formulating appropriate levels of qualifications.

Table 6.3. Lithuanian vocational education levels

Vocational education level	Description of vocational education level	Minimum general educational qualification*
First	Ability to carry out simple, routine work operations.	-
Second	Ability to perform a specialized work not requiring principle independent decisions.	Primary/basic
Third	Ability to perform complex work in the areas of activities requiring rather responsible and independent decisions, the ability to coordinate group activities.	Secondary
Fourth	Ability to carry out complex work in the areas of activities requiring responsibility, independence, profound knowledge and specific skills, the ability to organize and manage group activities.	Secondary

* General education required to achieve the appropriate level of vocational education may be acquired before or during the vocational training (integrated in the vocational training program).

The LVT (version of 1997, new version of the law was adopted in 2007) defined that the provider of vocational training is a vocational training institution, a freelance teacher and other vocational training provider (general secondary school, institution, organization, to which the vocational training is not the primary activity) who has the right to deliver vocational training programs according to the procedure established by law. Vocational training provider may accept individuals to teach and begin to implement vocational training programs only after the issue of a licence by the Ministry of Education and Science.

Initial vocational training

At the initial vocational training the curriculum is developed based on competencies and training objectives that are defined in the vocational training standard. Competence is understood as a whole set of knowledge, skills and values required to perform a particular activity, and the training

objectives define what knowledge and skills are needed to achieve a certain competence. In order to register a new qualification, first it is necessary to prepare the relevant professional training standard.

Vocational education and training standards are developed centrally by coordinating the development process through the Qualifications and Vocational Training Development Centre (hereinafter referred to as the QVTDC). Expert groups of industries determine what standards should be developed; they are equally represented by employers, trade unions and educational institutions. Before submitting the standards to the Minister of Education and Science for approval, they approve the standards developed. The standard is developed by a working group made up of profession teachers and professionals of the relevant type of activities. The working group examines the legal documents related to the given qualifications and performs qualification testing in companies or workplaces. The gathered information is used for building the contents of the standard.

Vocational education and training standards have been developed for qualifications corresponding to the third level of professional education requirements (Table 6.3).

Initial vocational training programs are developed by the providers of vocational training. They consist of two parts: general programs for the entire country, establishing vocational areas of activities, competences, learning goals and assessment provisions (these elements are transferred from the training standard), and school level programs, including additional competencies for the specialization and majoring, which, taking into account the local needs, are formulated by the school, as well as the programs of subjects, teaching methods, teaching materials etc.

The newly developed program is approved by the competent employers' organization (e.g., Chambers of Industry, Trade and Crafts). Then experts (vocational trainers, employers) evaluate the quality of the program and where there is a positive inclusion, the program is registered in the Register of Studies, Training Programs and Qualifications announcing all formal education programs. The licence for the engagement in the registered program is issued if the QVTDC draws a group of experts, who, after visiting the school, determine that the training provider's available material and methodological resources are sufficient to implement the program, and vocational teacher qualifications meet the training program and statutory requirements.

The following general requirements are set to Initial vocational training programs:

- practical training takes a total of 60-70 per cent of hours for the subject of specialty, of which 8-15 weeks of practical training must be carried out in the company or in the school facilities corresponding to the real work conditions;
- specialization subjects takes up to 10-15 per cent of hours of the specialty;
- programs include subjects of economic and business fundamentals, aesthetics, safety, and civil matter subjects. The schools on their own initiative include subjects of foreign languages to training programs;
- information technology is offered as a separate subject or can be integrated into specialty subjects;
- environmental issues are integrated into specialty subjects.
- the initial vocational training program offers the qualifications corresponding the second and third levels of professional education (see Table 6.3).

The programs for the second level of vocational education accept no less than 14 year old students who did not acquire basic education. The maximum age limit for students is not fixed. Students who choose such a program can also learn according to the basic education program and acquire the basic education. It is mandatory for persons younger than 16 years. The program duration is two years if only the profession is studied, and three years if the aim is to acquire the basic education, or if the program is designed for persons with special needs willing to acquire professional qualifications.

Programs are developed based on the vocational education standards for the third level, but in preparing them, schools may refuse some of the competencies where the knowledge needed to acquire them exceeds the basic education standards.

The qualification corresponding to the third level of vocational training may be sought by individuals who have at least the basic education. Those with basic education have two options – to seek professional qualifications only, or acquire the secondary education in conjunction with professional qualifications. In the first case, the studies last two years, and in the second – three years. In addition, this level of professional training programs are offered by those with secondary education. Given the complexity of the specific qualification, the program duration can be 1, 1.5 and 2 years. Some of these programs (e.g., environmental protection worker, nanny, chemical analysis laboratory assistant) accept only individuals with secondary education. This requirement is specified in the corresponding Vocational education and training standard.

Certificates are issued to individuals who have graduated initial vocational training programs

Second level of vocational education

- Qualification certificate attesting the acquisition of second level vocational training qualification.

Third level of vocational education

- Vocational training diploma certifying the acquisition of professional qualification corresponding to the third level of training.

Intermediate student outcomes are evaluated by the school. Social partners are responsible for the final assessment of students' qualifications (Chamber of Commerce, Industry and Crafts and the Chamber of Agriculture). They appoint employers' representatives to the examination committees, and participate in the development of theoretical and practical examination tasks. The examination board consists of at least three members, equally representing employers, trade unions and training providers.

The qualification examinations are comprised of the theoretical and practical parts. Qualification is conferred to a person who has obtained all competencies required for the qualification set out in the vocational training program. It is considered that the competence is acquired, when the demonstrated learning outcomes are assessed at no less than satisfactory level.

Formal continuing vocational training

The LVT adopted in 1997 states that the management of initial vocational training at the national level is carrying out by the Ministry of Education and Science, and the continuing training – by the Ministry of Social Security and Labour. Therefore there were two vocational training subsystems in Lithuania. In 2007 the new version of the LVT was adopted that legalized the combination of those subsystems, although the principles of formation of qualifications provided in the initial and continuing vocational education are still virtually unchanged. In the first case, the aim is to provide young people with a broad range of skills enough to ensure their higher demand in the labour market. Meanwhile, adults usually need to quickly acquired additional qualifications in addition to their already existing skills, to take certain jobs. The differences are also in the ways how the curriculum content requirements are determined nationally. In case of the initial vocational training, as we have mentioned, this is done by the adoption of national standards of vocational training and in case of continuing vocational training – by developing the national level programs, which can be slightly

adapted by training providers. But all the time there was an agreement, that in determining the skill levels commissions will be guided by the professional education level definitions approved by the Minister of Education and Science (Table 6.3).

In the initial vocational training the curriculum is developed based on the competencies and training objectives. To this end, a working group of at least three individuals is formed. It develops a program which is evaluated according to the laws and in case of positive evaluation is presented to the Ministry of Education and Science for the inclusion in the Register of Studies, Curricula and Qualifications.

The programme duration varies highly, from 1 to 10 months. It depends on the complexity of the target group and the qualification. Practical training comprises 60-80 per cent of the total training time. It is recommended that half of the practical training time is used for practical training in a real workplace.

Upon completion of training, a certification examination is organised to test the theoretical and practical knowledge and skills. The examination is organized by the vocational training providers. The examination commission includes the representatives of employers.

Certificates are issued to persons who have completed continuing vocational training programs

First level of vocational education

- Qualification certificate attesting the acquisition of professional qualification corresponding to the first level of vocational training.

Second level of vocational education

- Qualification certificate attesting the acquisition of second level vocational training qualification.

Informal continuing vocational training

Non-formal adult education may be provided by all education providers. There are no special requirements, but in some cases, institutions wishing to provide training for certain groups (e.g., civil servants) must participate in the assessment procedure and demonstrate the suitability of their staff and facilities. The LVT (version of 1997, new version of the law was adopted in 2007) provides that the requirements for non-formal vocational training programs and their delivery may be established by the institution ordering the training according to this program. The objectives of training programmes, the acceptance criteria and duration may vary depending on the target group.

For the qualification acquired in the extended vocational training system is recognized at the national level, the corresponding vocational training program must be included in the Register of Studies, Curricula and Qualifications.

At present, the national certification system for blue collar workers does not exist. Information about a continuous non-informal vocational training of the employees is dissipated and at this day is not presented in a single document or study. Furthermore, it is not clear which programme is still operating, because all the sectors were affected by crisis. It is also thought that in the last three years there have not been any efficient investments made into the creation of the training programmes for the builders, who could potentially participate into the construction of the energy efficient buildings. In 2002 Technical Supervision Service of Lithuania, as an institution for assessing technical condition of potentially dangerous equipment, has formed a department for certification, which according to the valid legal acts is estimating a qualification of the welders.

According to the law Nr. d1-12/a1-10 contributed on the 13th of January 2009 by the minister of Environment of the Republic of Lithuania and the minister of Social Security and Labour of the Republic of Lithuania “For the determination of an certification system of the workers, pursuing the activity, which is connected with equipment and systems, which contain gas, causing the Greenhouse Effect”. the National Association of Cooling and Freezing Equipment Installers (*Nacionalinė šaltininkų asociacija*) pursues an certification for the specialists of a corresponding profession.

No other assessment and certification of professions related to the construction sector have been practised. At this moment, there are no training and certification system for specialized builders, who could potentially participate in a construction of an energy saving buildings. Moreover, there is no system for the accreditation programmes of the tutors. It is thought that the majority of the vocational education and training institutions are not ready to come across with the growing need for skills, connected with a construction of the energy efficient buildings.

While accomplishing the growing requirements of an environmental protection, workplace safety and other directives, the list of corresponding specialists should broaden, especially on account of the resolution Nr. 132 of the Government on the second of February, 2012 “Due to the competency requests for the estimation institutions and a description order, which would confirm their accreditation” following 1st part of the 11th clause of the vocational training law of the Republic of Lithuania (Žin., 1997, Nr. 98-2478; 2007, Nr. 43-1627; 2009, Nr. 93-3973; 2011, Nr. 86-4140) have approved the requests for the institutions responsible for the competence estimation and the description of their accreditation order. More about the initiatives in sertivication and work already done read in section 6.1.

Conclusion

At this moment a national system of certification for working professions does not exist in Lithuania. Few prime steps have been made to change the situation: on the second of February 2012 the Government has approved the requirements for the institutions responsible for the competence estimation and the description of their accreditation order. However, so far, only the estimation and assessment of the qualification of the welders and labourers, participating in the activity connected with the equipment and systems, which contain gas and cause the Greenhouse Effect, are being made. While accomplishing the growing requests from directives concerning to an environmental protection, workplace safety and other the list of corresponding specialists should broaden.

6.3. Indicators of continuing vocational education

Currently, Lithuania has 79 vocational training institutions, training over 46 thousand students. Vocational training is free, and advanced students are paid scholarships. General education school graduates can acquire vocational education in one or one and a half years, and those who have completed 10 grades and wish to obtain a qualification along with vocational secondary education school, in three years. A practical profession acquired in a vocational training institution provides an opportunity to continue studies at colleges or universities. Professionally qualified person who enrolls to a college additionally receives two scores, and to universities – one score; and the evaluation of the final qualifying examination may be substituted for one state exam.

This year (2012) the vocational training system has exceeded the enrolment task. As many as to 19,680 girls and boys will study professions – it is three hundred more than had been planned. Nearly 9 thousands of admitted students chose vocational schools already having maturity certificates, and 800 have higher education.

This year, the most popular professions were vehicle mechanics, building finishes, and professions in the service industry – sellers, waiters and bartenders. The interest of entrants was attracted by some new professions – rural tourism, horse breeding.

The leaders among the vocational schools who got more new students than planned, were: Kaunas Vocational Training Centre of Social Services and Construction Business (plan 350, adopted 534), PI Elektrėnai Vocational Training Centre (plan 350, adopted 491), Vilnius Vocational Training Centre of Service Business (plan 320, adopted 410) Kaunas Vocational School of Communication Workers (plan 250, adopted 310) and others.

Statistical reports of vocational training institutions and colleges engaged in initial vocational training, containing information on the numbers of vocational education students and graduates by professions trades each year are published by the Centre of Information Technologies in Education (hereinafter referred to as the Centre).

Order No V-1233 of 16 October 2012 of the Minister of Education and Science “On office statistics” defined that „1.1. Date for delivery of PM statistical reports of vocational training institutions and colleges engaged in initial vocational training, “Report of the academic year 2012/2013 of vocational training institutions” to the Centre of Information Technologies in Education: <...> 1.1.1. PM students – until this October 31 of this year” and instructed: „3.1.1. <...> to publish the lists of educational statistics listed in paragraph 1 on the website of the Centre of Information Technologies in Education (<http://www.svis.smm.lt>) until August 20 <...> To enable institutions to provide information in electronic format, updating or creating the software for records and information systems till 1 September this year.”

The Regulation of the Centre of Information Technologies in Education provides that the Centre collects, manages, integrates, processes, calculates and publishes the values of indicators. The Centre also prepares and performs queries and statistical summaries, using educational databases, information available on internet and submits it to responsible professionals engaged in or related to the education system. The tables below provide information on the numbers of students enrolled in the 1st course in 2009-2011, students and graduates of vocational education institutions.

Data provided in Tables 6.4 – 6.6 shows that that applicant to professional schools mostly choose training programs to acquire profession of finisher (builder), carpenter, welder, electrical equipment installer, repairer, tuner and locksmith. These professions are in line with labor market demand (see section 5.5).

Table 6.4. Students admitted to study vocational training programs

Training program / occupation title	2009	%	2010	%	2011	%
Professions related to the construction of buildings	3384	68,46	2651	60	2971	77,67
Finisher (builder)	1807	36,56	1640	37,17	1518	39,69
Carpenter	9	0,18	11	0,25	6	0,16
High-rise building installer	0	0,00	0	0	0	0
Concrete worker bricklayer/Wall and stove bricklayer and plasterer	149	3,01	182	3,96	120	3,04
Building restorer	152	3,08	137	3,11	156	4,08
Woodworker	797	16,12	680	15,41	665	17,39
Builder	0	0,00	0	0	0	0
Roofer	6	0,12	1	0,02	0	0
Welder	470	9,51	420	8,69	434	10,19
Thermal insulator of buildings	0	0,00	103	2,33	72	1,85
Professions related to the building engineering utility	1559	31,54	1238	28,06	854	22,33
Automated system operation mechatronics specialist	132	2,67	119	2,70	23	0,60
Electrical installer	160	3,24	138	3,13	68	1,78
Electrical equipment installer, repairman, tuner	402	8,13	278	5,93	258	6,32
Energy electronics fitter	57	1,15	76	1,72	44	1,15
Installer of building engineering equipment	53	1,07	64	1,45	57	1,49
Locksmith	565	11,43	395	8,36	241	5,93
Plumber	146	2,95	140	3,17	137	3,58
Ventilation and air conditioning system manufacturer, installer	44	0,89	28	0,63	26	0,68
TOTAL	4943		4412,00		3825	

Data source: Centre of Information Technologies in Education, 2012

Table 6.5. I, II and III year students studying vocational training programs

Training program / occupation title	2009	%	2010	%	2011	%
Professions related to the construction of buildings	7886	73,71	6073	69,62	6216	75,21
Finisher (builder)	4230	39,54	3950	45,28	3450	41,74
Carpenter	21	0,20	17	0,19	18	0,22
High-rise building installer	44	0,41	18	0,21	0	0
Concrete worker bricklayer/Wall and stove bricklayer and plasterer	345	3,22	323	3,57	197	2,33
Building restorer	556	5,20	451	5,17	441	5,34
Woodworker	1467	13,71	1279	14,66	1189	14,39
Builder	280	2,62	31	0,36	0	0
Roofer	19	0,18	4	0,05	0	0
Welder	943	8,81	875	9,12	849	9,32
Thermal insulator of buildings	0	0,00	103	1,18	72	0,86
Professions related to the building engineering utility	2812	26,29	2650	30,38	2049	24,79
Automated system operation mechatronics specialist	299	2,79	319	3,66	160	1,90
Electrical installer	331	3,09	361	4,14	246	2,98
Electrical equipment installer, repairman, tuner	674	6,30	643	6,87	589	6,65
Energy electronics fitter	106	0,99	158	1,81	136	1,65
Installer of building engineering equipment	168	1,57	164	1,88	156	1,89
Locksmith	911	8,52	724	7,77	510	5,81
Plumber	243	2,27	235	2,69	216	2,61
Ventilation and air conditioning system manufacturer, installer	80	0,75	46	0,53	36	0,44
TOTAL	10698		8723,00		8265	

Data source: Centre of Information Technologies in Education, 2012

Table 6.6. Graduates of vocational training

Training program / occupation title	2009 m. baigė programa	%	2010 m. baigė programa	%	2011 m. baigė programa	%
Professions related to the construction of buildings	2550	75,31	2703	74,34	2785	76,66
Finisher (builder)	1088	32,13	1402	38,56	1407	38,73
Carpenter	5	0,15	6	0,17	5	0,14
High-rise building installer	0	0,00	20	0,55	0	0
Concrete worker bricklayer/Wall and stove bricklayer and plasterer	187	5,52	165	4,34	183	4,80
Building restorer	157	4,64	203	5,58	147	4,05
Woodworker	609	17,99	665	18,29	576	15,85
Builder	245	7,24	226	6,22	30	0,83
Roofer	0	0,00	16	0,44	2	0,06
Welder	246	7,27	365	9,12	338	8,51
Thermal insulator of buildings	13	0,38	0	0,00	97	2,60
Trades that are related to the building engineering	836	24,69	933	25,66	848	23,34
Automated system operation mechatronics specialist	51	1,51	83	2,28	69	1,86
Electrical installer	38	1,12	43	1,18	65	1,79
Electrical equipment installer, repairman, tuner	206	6,08	212	5,51	221	5,73
Energy electronics fitter	20	0,59	21	0,58	36	0,99
Installer of building engineering equipment	46	1,36	51	1,40	53	1,46
Locksmith	379	11,19	388	9,82	281	7,18
Plumber	96	2,84	100	2,75	93	2,56
Ventilation and air conditioning system manufacturer, installer	0	0,00	35	0,96	30	0,83
TOTAL	3386		3636,00		3633	

Data source: Centre of Information Technologies in Education, 2012

Vocational training institutions survey helped identify professional development priorities and trends. The data obtained show the number of people trained (by a different form of training for the period of 2008-2012). The number of trained under the programs associated with energy-efficient buildings presented in Table 6.7 and renewable energy technologies respectfully in Table 6.8.

Table 6.7. The number of trained under the programs associated with energy-efficient buildings

Types of training	Number of trained students				
	2008	2009	2010	2011	2012
Initial training programs	952	964	1449	1210	1268
Formal continuing training programs	20	30	137	225	191
Non-formal continuing training programs	427	489	810	1456	1578
Number of respondents answered	18	19	25	27	25

Table 6.8. The number of trained under the programs associated with renewable energy technologies

Types of training	Number of trained students				
	2008	2009	2010	2011	2012
Initial training programs	118	140	197	229	146
Formal continuing training programs	41	47	57	73	65
Non-formal continuing training programs	170	320	349	373	322
Number of respondents answered	13	12	14	12	12

Formal training is more directed to acquire general skills related to and typical technologies, but non-formal education related more to the newest technologies. Therefore, the number of trained by non-formal training programs related to renewable energy technologies is relatively higher compared to the formal initial and continuing training (Figure 6.3 and 6.5). There is a general increase in the number of trained (Figure 6.2 and 6.4). But after a deeper analysis of the different parameters is become visible the growth of the number of trained in non-formal continuing education programs (Figure 6.4 and 6.5). Particularly striking rise in the number of trained by non-formal education programs for energy-efficient buildings (Figure 6.3).

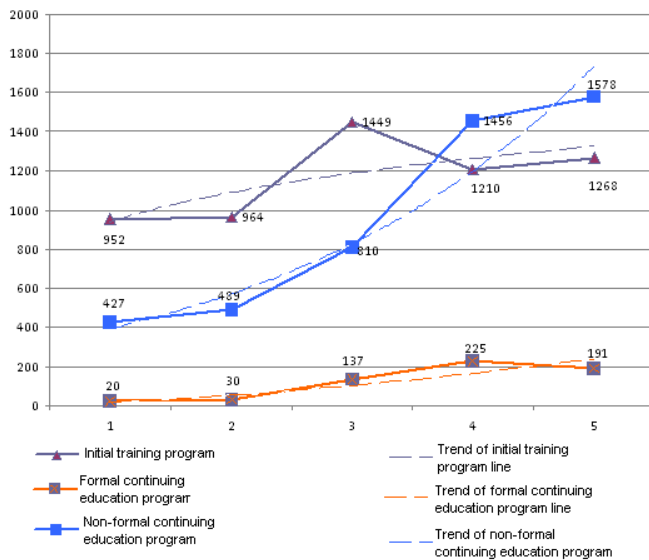


Fig. 6.2. The change in the number of trained by the training programs related to construction of energy efficient buildings

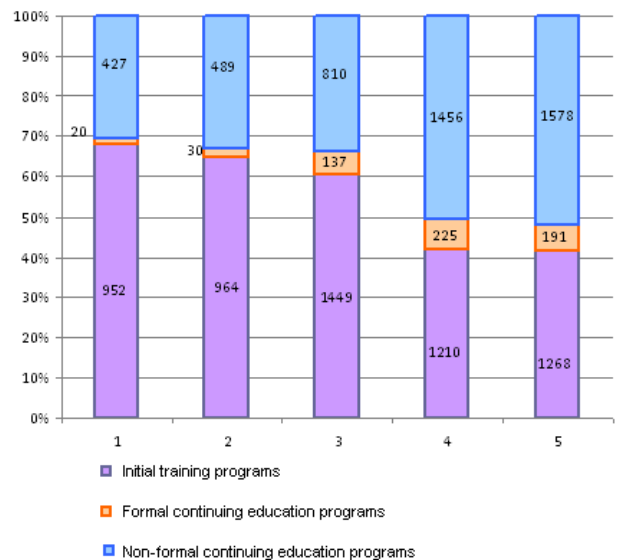


Fig. 6.3. The number of trained by the training programs related to construction of energy efficient buildings (distribution by type of training)

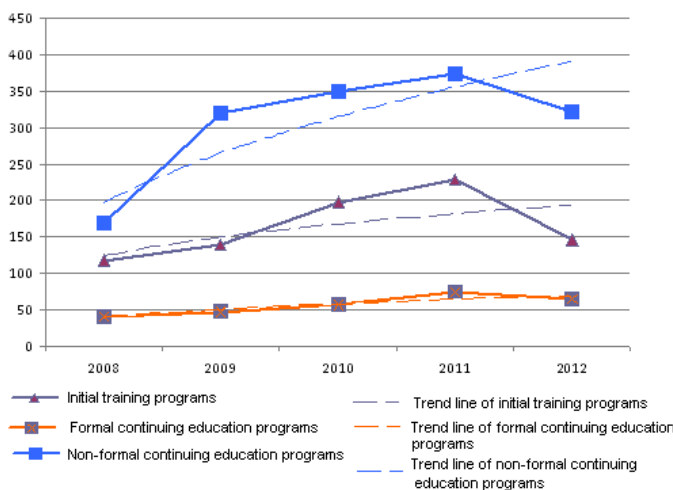


Fig. 6.4. The change in the number of trained by the training programs related to renewable energy technologies

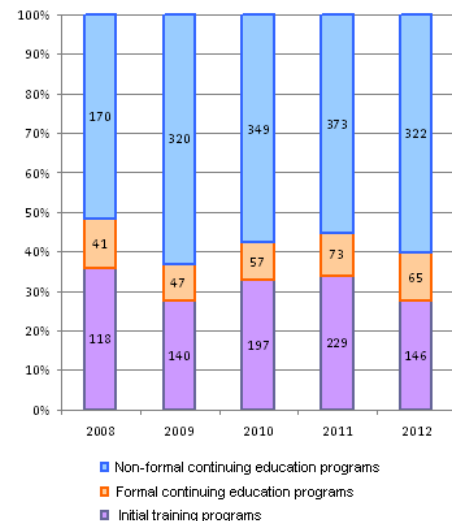


Fig. 6.5. The number of trained by the training programs related to renewable energy technologies (distribution by type of training)

Conclusion

Applicants to professional schools mostly choose training programs to acquire profession of finisher (builder), carpenter, welder, electrical equipment installer, repairer, tuner and locksmith. These

professions are in line with labor market demand. The survey results showed that the number of students trained by formal training programs related to renewable energy technologies are relatively higher compared to the initial and continuing formal types of training, as well as more noticeable growth in the number of trained in non-formal continuing education. This is natural, because the non-formal training is aimed mostly to take over the newest technologies. An analysis of vocational education teachers' supply indicators revealed that even a third of VET teachers are uncertified.

6.4. The extent to which the current system already addresses the teaching of skills for implementation of energy efficiency and renewable energy measures in buildings

In order to achieve the objective of the project BUILD UP Skills Lithuania – to ensure the proper training and qualifications of blue collar workforce in construction required for the construction of energy efficient buildings and the efficient use of renewable energy source technologies, and to answer the question, **to what extent the current system meets the requirements of skills in implementing energy efficiency and renewable energy measures in buildings**, the following tasks were identified:

1. To analyse the supply of training programs related to energy-efficient buildings and renewable energy technology in buildings in the continuing vocational education market.
2. To conduct the content analysis of training programs related to energy-efficient buildings and renewable energy technology of buildings.
3. To identify gaps in vocational training areas (demand for skills, to assess the readiness of training institutions, etc.).

In Lithuania, the demand for skills is determined by combining different methods: some of them are used for collecting data for statistical analysis, others – for expert evaluation. The special research methodology is applied according to which the skills monitoring and forecasting system consists of regular monitoring and a special study. Skills needs are assessed by creating vocational education and training standards, vocational training programs, carrying out industry sector research and labour market forecasts¹². In Lithuania, the monitoring of the skills supply and demand, prognostic studies of the need for qualifications, vocational training standard development, evaluation of formal training programs, and other related activities are carried out by the Qualifications and Vocational Training and Development Centre¹³.

A special study was carried out to implement the tasks of the project BUILD UP Skills Lithuania, which was based on two data collection methods:

- Survey of construction companies and training institutions and
- Content analysis and expert evaluation of training programs related to the training of blue collar workers in the construction industry and included in the AIKOS¹⁴ and in the Qualifications and Vocational Training and Development Centre databases.

The information obtained from the survey of vocational education institutions about:

- formal training programs related to the energy efficiency and the use of renewable energy in buildings
- non-formal training programs related to energy efficiency and the use of renewable energy in buildings, which are not part of the national continuing vocational training system (e.g., were established by other entities, such as trade and industry associations, professional chambers, suppliers and manufacturers etc.)

¹² European vocational training policy in 2002-2010 . National report on the implementation of the priorities of the Copenhagen process in Lithuania. *Cedefop ReferNet network report*. Qualifications and Vocational Training and Development Centre, 2010

¹³ KPMPK - Kvalifikacijų ir profesinio mokymo plėtros centras (Qualifications and Vocational Training and Development Centre). www.kpmc.lt/

¹⁴ AIKOS – Atvira Informavimo Konsultavimo Orientavimo Sistema. www.aikos.smm.lt/

- the extent at which the current system already meets the demand for skills in implementing the measures of the energy efficiency and renewable energy sources in buildings.
- information by occupations on training programs: duration of training, number of trained persons, curriculum content, funding sources
- readiness of educational institutions to conduct training programs related to the construction of energy-efficient buildings and sources of renewable energy technologies
- related initiatives, i.e., projects funded by the European Commission that focus on curriculum renewal and development of new curricula.

The survey included vocational training institutions and enterprises (contractors, manufacturers and suppliers) that provide training. Prepared electronic questionnaires were distributed to 100 respondents. Answers to the questions were provided by 46 respondents.

The respondents that took part in the survey indicated they offer different types of training programs: 48 per cent of the initial vocational training and formal continuing professional education programs and 61 per cent of non-formal continuing vocational education programs.

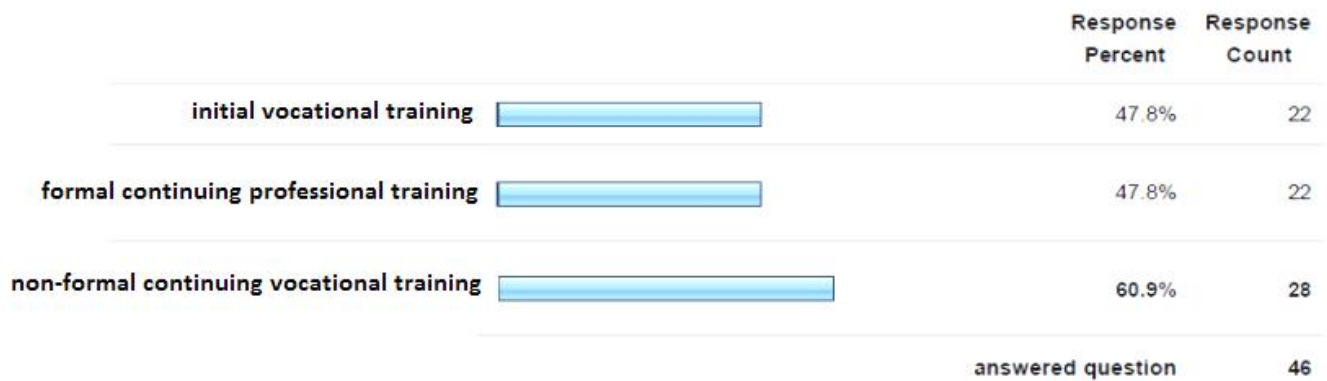


Fig. 6.6. Distribution of training providers by training types in survey.

The main questions of the survey:

- ❖ What type of vocational training are provided?
- ❖ Are you familiar with: Directives (The Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010 on the energy efficiency of buildings and Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of using the energy from renewable sources) and National Energy Independence Strategy?
- ❖ Questions about training programmes (type of training; program name; topics; links with the construction of energy-efficient buildings and use of renewable energy technologies; duration of training; number of persons trained in 2008-2012; source of training funding; completion form; compliance of program to the market requirements)
- ❖ Question on opinion, when the demand for personnel with the qualifications required for the construction of energy efficient buildings and efficient use of renewable sources of energy technologies will change in Lithuania?
- ❖ The training of blue collar workforce, which is mostly financed by employers?
- ❖ Questions about planned new and updated training programs (training type, program title, topics; links with the construction of energy-efficient buildings and use of renewable energy technologies; duration of training; number of persons planned to be trained)
- ❖ How much your training institution is prepared to conduct training programs related to the building of energy-efficient buildings and the use of renewable energy source technologies?

The main training programs and occupations related with the building of energy-efficient buildings and the use of renewable energy source technologies identified by focus groups are presented below in table 6.9.

Table 6.9. The main training programs and occupations related with the building of energy-efficient buildings and the use of renewable energy source technologies.

Main curricula and occupations related with the construction of energy-efficient buildings	Main curricula and occupations related with the construction of engineering systems and renewable energy sources
<ul style="list-style-type: none"> • Builder • Thermal insulation fitter • Envelope tightener/ Insulation fitter • Building renovator • Facade installer • Bricklayer • Bricklayer / concrete layer • Finisher • Plasterer • Carpenter • Concrete worker • Roofer • Woodworker • Welder 	<ul style="list-style-type: none"> • Plumber; • Pipe laying operator; • Installer of building engineering equipment; • Manufacturer and installer of ventilation and air conditioning systems; • Locksmith installer of gas networks and gas appliances; • Electrical installer; • Electrical equipment installer; • Electrician of electrical installation and maintenance; • Tuner of electric and automation devices; • Machinist of refrigeration devices; • Electronics specialist of energy systems; • Repairer of electronic and automation equipment;

Survey participants described links of training programs with the construction of energy-efficient buildings and use of renewable energy technologies differently. Educational institutions pointed out the greater connectivity to programs related to the construction of energy-efficient buildings (69.96 per cent). But as many as 72.73 per cent of respondents indicated that programs related to the technologies of renewable energy sources are somewhat related, therefore requiring additional training (see Fig. 6.7).

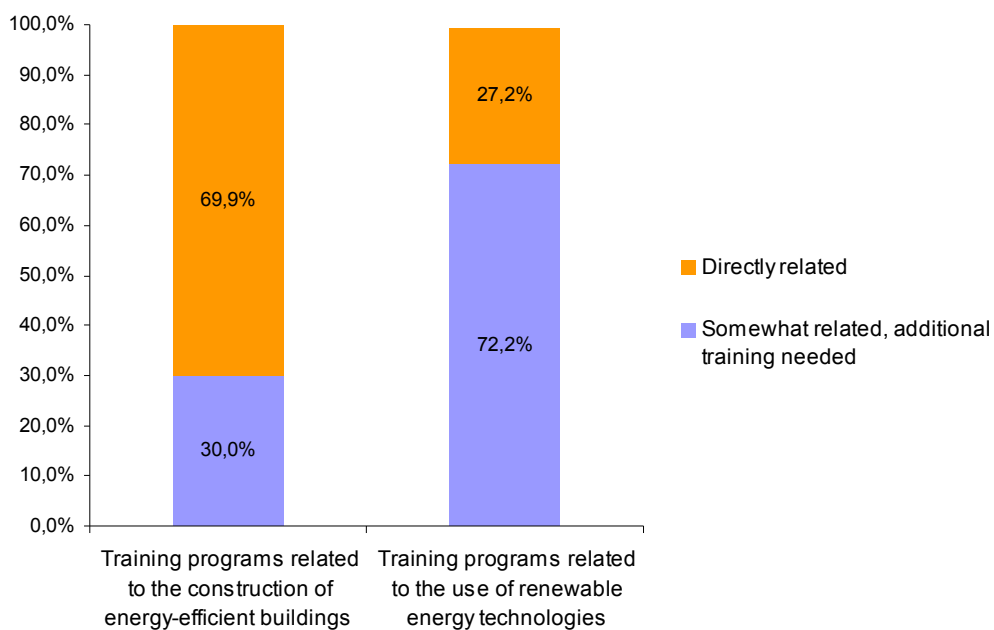


Fig. 6.7. Links of training programs with the construction of energy-efficient buildings and use of renewable energy technologies

The problem of the lack of professional knowledge in Lithuania has emerged about 20 years ago. In 1992 the Republican construction norms RSN 143-92 “Thermal technique of buildings’ partitions” were approved and obliged the construction of buildings with approximately 3 times better thermal properties than before. It was a big challenge for the Lithuanian construction industry, because of the change in the materials used, structural and technological solutions. Under the new requirements the thermal insulation materials with technical characteristics significantly different from previously used building materials had to be used in the building envelopes. Building envelope design has become much more complex, multi-layered, it has become necessary to combine different materials with different properties with each other, depending on physical processes in the buildings. This led to the need to re-train the construction process participants over the short period of time, to assimilate new building materials and technologies. It is particularly because of the lack of qualification, especially at the level of blue collar workforce, that many costly mistakes have been made, often unreasonably diminishing the benefits of advanced technologies. Although during the last 20 years the requirements for energy efficiency in buildings increased, but they were implemented out gradually, so that the labour market and vocational training system could be easily adapted to that, missing training programmes were upgraded for vocational training, new professions were introduced, such as thermal insulation fitter of buildings.

Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings and Lithuanian legislation for its implementation indicates that in a relatively short period of time it will be necessary to make significant changes to the requirements for building construction and engineering equipment. In order to maximize the chances of efficient energy use in buildings, the thermal properties of building envelopes should be improved by about twice; efficiency of building engineering systems should be increased, and all possibilities of renewable energy use should be utilised. The implementation of these objectives requires preparation not only for the engineering staff to learn new technological decision-making, but also the vocational training has to be prepared in order to properly prepare and retrain workers.

Since, as already mentioned, the requirements for thermal insulation properties of building envelopes started to be raised 20 years ago, the blue collar workforce training in this area is better prepared for new requirements, compared with the training for installation of renewable energy sources.

In order to clarify the situation how training institutions and companies are prepared to implement the requirements of Directive 2010/31/EU and the Lithuanian legislation for the construction of energy efficient houses, the survey of vocational educational institutions and construction companies was carried out.

According to the classification of occupations, workers engaged in the building engineering systems and renewable energy sources can be identified according to the same professions. The main occupations that are offered in vocational training institutions are often quite universal, so the trainee who has completed the entire program can work in a wide variety of jobs. One example is the “Plumber” profession, which, according to the training program description, is fairly universal (Table 6.10).

It can be seen from the curriculum description that the “plumber” can work with energy-efficient systems and renewable energy devices such as heat pumps, solar collectors, heat recovery systems, and upon acquiring additional knowledge, to install them independently.

The main curricula and professions related with building engineering systems and renewable energy sources are:

- Plumber;
- Pipe laying operator;
- Installer of building engineering equipment;
- Manufacturer and installer of ventilation and air conditioning systems;
- Locksmith installer of gas networks and gas appliances;
- Electrical installer;
- Electrical equipment installer;
- Electrician of electrical installation and maintenance;

- Tuner of electric and automation devices;
- Machinist of refrigeration devices;
- Electronics specialist of energy systems;
- Repairer of automation and electronic equipment.

Table 6.10. Example of the curriculum description from the AIKOS (Open Information, Counselling and Guidance System) data system

State code	440058211
ISCED code	42358
Level/type	Vocational training
Study area regulation	S358202, Plumber training standard
Area of education	Architecture and construction
Sub-field of education	Construction and civil engineering
Minimum education	Secondary education
Professional qualifications	Plumber
Admission year, form of studies, number of students accepted	2012, 1 y., full-time studies, 75
Training languages	Lithuanian
<p>The study program is designed to train plumbers who are able to install plumbing appliances, plumbing and sewer systems, indoor pipelines, central heating systems, working with tools, devices and equipment and use the newest materials and technology.</p> <p>To achieve these goals, the future plumbers in theoretical classes are taught about building construction and civil engineering systems, water, sewer, gas, heating system installation and maintenance techniques, subjects of materials, drafting and drawing, reading, locksmith operations, installation of system networks and valve assemblies, pipe preparation in mechanical and thermal methods, plastic and copper and steel pipe connection, threaded pipe connection method, sealing, installation, dismantling and repairing of water, sewer, gas, floor and air heating systems and appliances, electric and gas welding, plastics welding, hydraulic systems, testing and other methods, construction quality control, information technology, health and safety, economics and business fundamentals, etc.</p>	
<p>Qualification description</p> <p>Plumber’s qualifications is required in order to work in construction companies, plumbing companies, home communities.</p> <p>The plumber should be able to install plumbing appliances, plumbing and sanitation devices, indoor pipelines, central heating systems, to install, repair and maintain water supply and sewer pipes, heating pipes, water treatment, water, gas and heat meters, read drawings during the installation of pipelines and units, weld joints with gas, and test the entire system after welding – hydraulic units and others.</p>	

Source: AIKOS (Open Information, Counselling and Guidance System) data system (<http://www.aikos.smm.lt/>)

The content analysis of training programs related to energy-efficient construction showed that the content of the rare program is related to the topics of energy efficiency. For example, the training program “Building renovator” (approved in 2003) includes the topics related with heat preservation, which according to the course duration comprise about 15 per cent of the total theoretical duration of the course and about 86 per cent of practical training time (Table 6.11).

However, the analysis of newer training programs relating to the construction of energy-efficient buildings showed that the portion of related topics in the entire scope of the course is considerably lower. For example, the training program “Finisher” (approved in 2012) contains the topics related with conservation, which according to the course duration comprise about 5 per cent of the total theoretical duration of the course and about 5 per cent of practical training time.

The scope of analyzed training programs do not have very important topics related to new materials, products and technologies, the use of which might ensure the airtightness of the constructed building, reduce cold bridging areas, and improve the indoor climate parameters.

Table 6.11. Content analysis results of the Building Renovator's training program

Related topics	Theory, hours	Practice, hours	Comments
Parts of buildings	4	0	
Building materials (materials properties)	4	0	
Roofing defects, repairs, extra insulation, technology	16	56	
Building waterproofing materials and technologies	16	56	
External wall insulation, renovation and finishing materials and details	24	120	
Renovation of envelope	16	56	There is a theme of the indoor climate
Renovation of external finishing	16	56	
Interior finishing renovation	16	56	
TOTAL:	92 (604)	400 (464)	
The part of all topics in program	15,23 %	86,20 %	

Table 6.12. Content analysis results of the Finisher's training programme

Related topics	Theory, hours	Practice, hours	Comments
Building structure	2	0	
Wooden and metal frame installation for thermal insulation	0	10	
Building insulation with thermal insulation panels	0	10	
Insulation with thermal insulation panels technology	4	0	
Possible defects, their causes and repair techniques	1	3	
Classification of construction materials	2	0	
Physical, mechanical, chemical and technological properties of materials	3	0	
Thermal insulation materials and their fastening means	2	0	
Waterproofing materials	1	0	
TOTAL:	15 (321)	23 (504)	
The part of all topics in program	4,67 %	4,56 %	

According to the current training system, usually only the approved training programmes are publicly announced, the preparation and approval of which requires considerable amount of time. When new materials or technologies appear on the market (in this case it is true in terms of renewable energy production), the training of staff is usually organized by the representatives of manufacturers or suppliers as informal training. This is confirmed by the survey of involved vocational training institutions.

Competencies, training objectives and key competencies indicated in the validated vocational training standards. Standards are published on the website of the Qualifications and Vocational Training and Development Centre. The following vocational training standards are developed for professions in construction:

- S358203 Carpentry Training Standard (2004)
- S358209 Roofer Training Standard (2004 m.)
- S358205 Bricklayer / concrete layer Training Standard (2004)
- S358202 Plumber Training Standard (2004)
- S358206 Finisher (Builder) Training Standard (2004)

S358210 Road construction and maintenance worker Training Standard (2008)
 S558101 Geodesy Engineer Training Standard (2001)
 S558207 Construction Engineer Training Standard (2004)
 S558204 Building Engineering Systems Engineer Training Standard (2004)
 S558208 Road Engineer Training Standard (2004)
 S352201 Electrical equipment Installer Training Standard (2001)
 S352101 Welder Training Standard (2004)
 S352301 Automated systems operation mechatronics Training Standard (2004)
 S352302 Electronic equipment fitter and tuner Training Standard (2004)
 S352205 Ventilation and air conditioning systems manufacturer and installer Training Standard (2004)
 S552206 Electricity Engineer Training Standard (2004)
 S552304 Engineer of Mechatronic Systems Training Standard (2004)
 S552203 Thermal Energy Engineer Training Standard (2003)

The standards provide a wide competence profile, but little attention is paid to skills. For example, the finisher (builder) standard specifies that in order to perform the work of finisher successfully, the following key skills are required:

- physical stamina;
- ability to work at heights;
- ability to work individually and in a team;
- good attention concentration.

For the successful performance of the work of ventilation and air conditioning systems, the manufacturer and installer requires the following general skills and personal qualities:

- ability to work in a team and individually;
- ability to communicate with clients;
- diligence, thoroughness;
- initiative.

Hopefully in view of the new professional standard development methodology approved in 2012, existing standards should be updated and / or prepared new taking into account the upcoming changes in the construction and energy sectors.

Graphs in previous sections show that the majority of training is non-formal training. Without a doubt it leads to the conclusion that renewable energy technologies are still a novelty in the Lithuanian market (with bio-fuels being partial exemption), and therefore the vocational training is offered by the representatives of this technology. The portion of the formal continuing education shows that vocational training institutions are actively involved in this process.

Comparing the duration of initial, formal continuing and non-formal continuing education programs we can see that the non-formal continuing education programs are the shortest, being about 4 times shorter than the formal continuing education programs by training times and 30 times shorter than the original curriculum teaching time. These survey results are without doubt absolutely logical, since the initial training usually prepares the workforce of the main profession, whose knowledge and skills are very broad (as in the example with a plumber), meanwhile continuing formal and non-formal training is intended for specialization, i.e. provision of specific knowledge and skills required for specific materials, equipment or technology.

Comparing the indicated training programs by the relation between the practical training to the total training time, we can see that in the initial training programs, practical training takes up about a fifth of the total learning time, in formal continuing education programs the practical training takes up about half the learning time, and in non-formal continuing education programs the practical training takes over half of the total learning time. However, this conclusion is valid only as an average value, because some of the non-formal continuing education programs have no practical training at all and all training lasts only a few hours.

The tables 6.13 and 6.14 and diagrams 6.8 and 6.9 provide details of the questionnaire survey about duration of training programs related to energy-efficient buildings and renewable energy sources.

Table 6.13. Average training duration of training programs related to energy-efficient buildings

Average training duration	Average training duration by training forms		
	Initial training programs	Formal continuing education programs	Non-formal continuing education programs
Full training duration, hours	2243,15	721	78,18
Of them – practical training in a company, hours	501,35	427,29	65,5
Full training duration, weeks.	83,35	18	5,3
Of them – practical training in a company, weeks	14,29	10,86	2,5
Number of respondents who provided answers	17	4	12

Table 6.14. Average training duration of training programs related to renewable energy technologies

Average training duration	Average training duration by training forms		
	Initial training programs	Formal continuing education programs	Non-formal continuing education programs
Full training duration, hours	2604,44	582,4	87,38
Of them – practical training in a company, hours	568,89	239,6	64,83
Full training duration, weeks.	98,89	14,6	3,33
Of them – practical training in a company, weeks	14,22	9,67	2,6
Number of respondents who provided answers	8	4	5

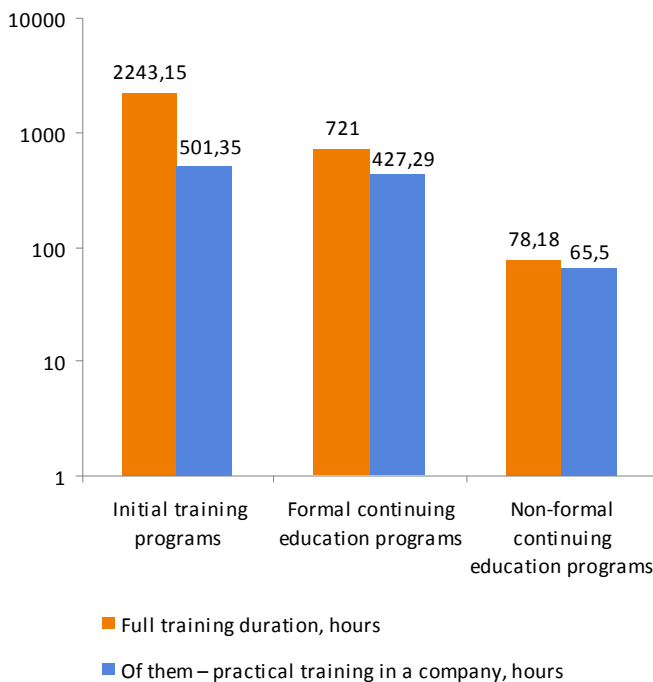


Fig. 6.8. Average training duration of programs related to energy-efficient buildings

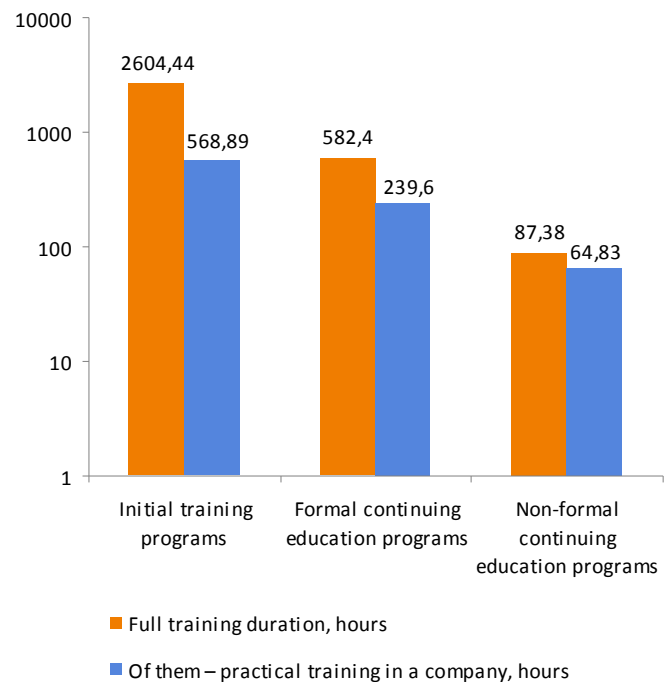


Fig. 6.9. Average duration of training programs related to renewable energy technologies

The following tables and graphs present the survey data about the funding of training programs related to the selection of energy-efficient buildings and renewable energy technologies. The obtained data show that the initial training programs are fully funded from the state funds; formal continuing education programs are funded in different ways, but for the most part at the employer's expense, they are followed by the students' own funds, then followed by EU funds and least funded programs are by public funds, non-formal continuing education programs for the most part are financed at the employer's expense.

Table 6.15. Funding sources of training programs related to the construction of energy-efficient buildings

Training funding source	Funding sources by training forms					
	Initial training programs (34)		Formal continuing education programs (8)		Non-formal continuing education programs (17)	
	number	per cent (per cent of all primary)	number	per cent (per cent of all formal)	number	per cent (per cent of all non-formal)
State funds	33	86,84	1	6,67	0	0
Employer's funds	2	5,26	5	33,33	17	80,95
Student's resources	1	2,63	2	13,33	2	9,52
EU program funds	2	5,26	7	46,67	2	9,52
Number of respondents who provided answers	17		4		12	

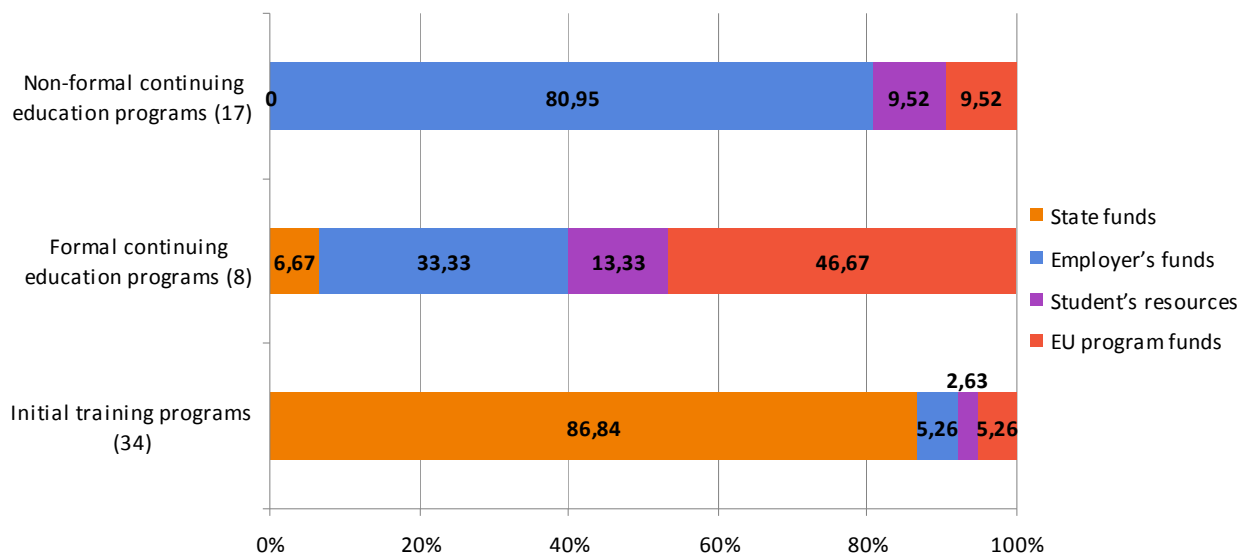


Fig. 6.10. Funding sources of training programs related to the construction of energy-efficient buildings

Table 6.16. Funding sources of training programs related to renewable energy technologies

Training funding source	Funding sources by training forms					
	Initial training programs (8)		Formal continuing education programs (5)		Non-formal continuing education programs (8)	
	number	per cent (per cent of all primary)	number	per cent (per cent of all formal)	number	per cent (per cent of all non-formal)
State funds	8	100	1	20	1	12,5
Employer's funds	0	0	4	80	7	87,5
Student's resources	0	0	3	60	0	0
EU program funds	0	0	2	40	0	0
Number of respondents who provided answers	7		4		5	

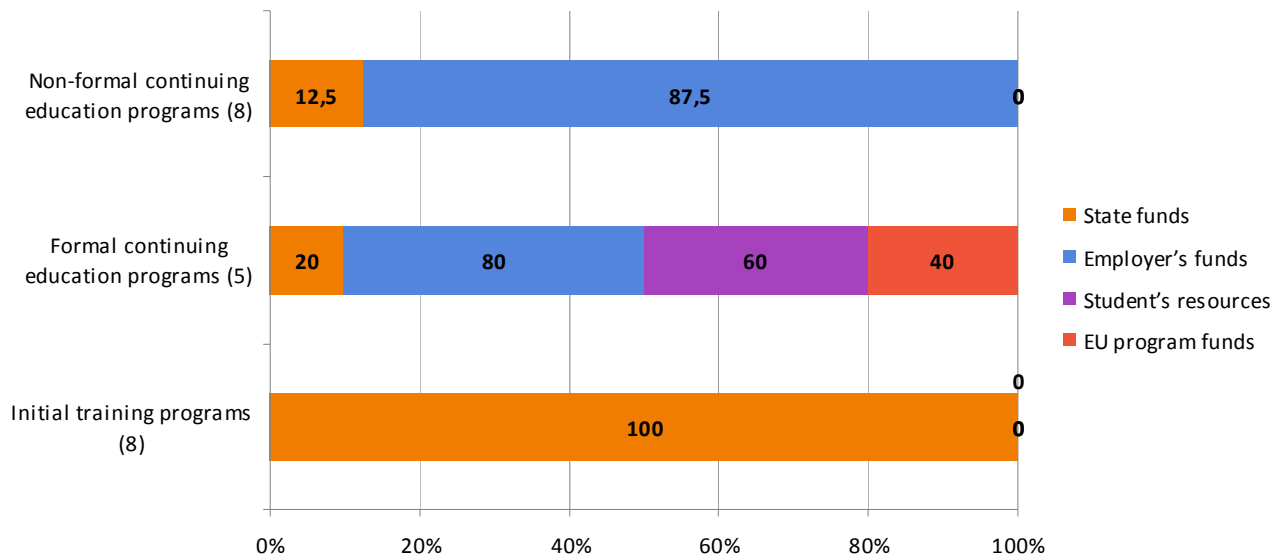


Fig. 6.11. Funding sources of training programs related to renewable energy technologies

To the question of the survey questionnaire for organizations engaged in training, on how much the training program is related to renewable energy technologies, the majority of respondents (72.7 per cent) indicated that it is slightly related, but additional training is required, and only about a quarter of the respondents indicated that this training program is directly related to renewable energy source technologies. Comparing the results of these answers with the responses of training programs related to energy-efficient home construction, where the responses were opposite, i.e. for the majority of respondents, the training programs were directly related to the construction of energy-efficient houses, we can see the conclusion that training on renewable energy source technologies is integrated into more general programmes for training of versatile professionals.

To survey question „How do you evaluate the conformity of the training program with the market demands?“ the majority of respondents indicated that conduct interviews with employers (75%) and students (62.5%). Some educational institutions (35%) conduct studies on how acquired expertise matching market needs (Fig. 6.12).

	Response Percent	Response Count
Training institutions themselves conduct studies on how acquired competency matching market needs	35.0%	14
Study subcontracted	5.0%	2
Training providers perform analysis of secondary sources	35.0%	14
Training providers conduct interviews with employers	75.0%	30
Training providers conduct interviews with graduate students	62.5%	25
Other (specify)	10.0%	4

Fig. 6.12. The ways to analyse the conformity of the training program with the market demands

To survey question „What percentage of blue collar workforce trained in your institution is working according to the acquired profession in the construction market?“ 71.4 per cent of respondents said that between 50 and 100 per cent of workers trained in the institution work according to the profession (Fig. 6.13).

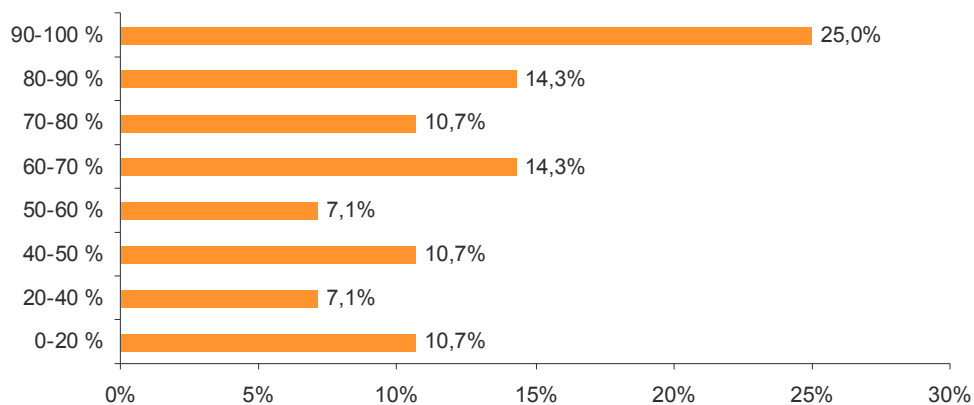


Fig. 6.13. Number of trained workers working according to the profession in the construction market

To the survey question „When, in your opinion, the demand for blue-collar workforce with the qualifications required for the construction of energy efficient buildings and efficient use of renewable sources of energy technologies will change in Lithuania?“ 63.2 per cent of respondents said that the demand for such workers is already growing (Fig. 6.14).

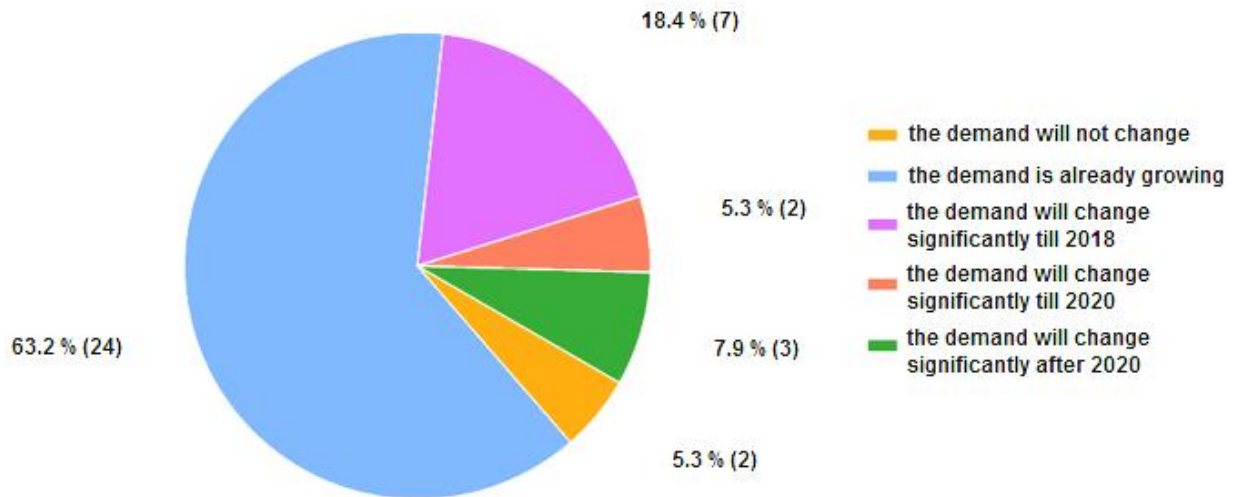


Fig. 6.14. The respondents' opinion on the need for change the staff having skills for the construction of energy efficient buildings and efficient use of renewable energy source technologies

Figure 6.15 shows the respondents' opinion on the need for change the staff having skills for the construction of energy efficient buildings and efficient use of renewable energy source technologies. We can see that the educational institutions more than the manufacturers and suppliers tend to believe that in Lithuania the demand for staff having skills for the construction of energy efficient buildings and efficient use of renewable energy source technologies is already growing.

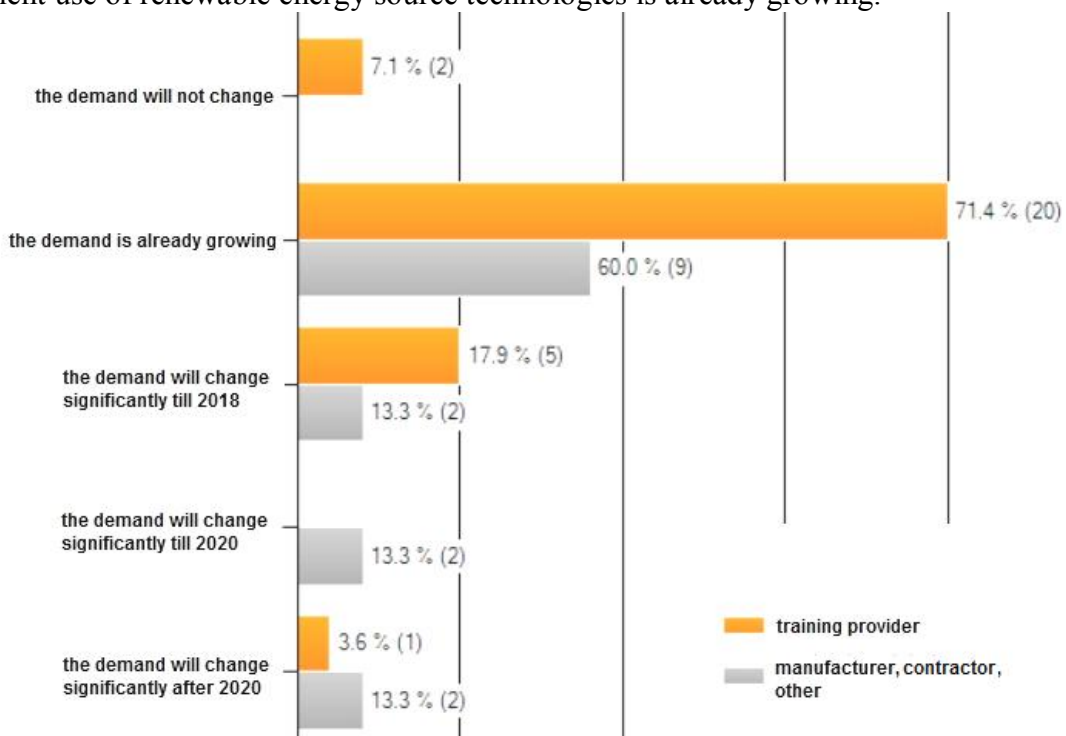


Fig. 6.15. Distribution of respondents' opinions on the need for training the staff having skills for the construction of energy efficient buildings and efficient use of renewable energy source technologies by the answers of educational institutions and other training providers (manufacturers, suppliers, contractors)

The questionnaire data answers of training providers to the question “Are you planning to update/create new training programs training programs related to the building of energy-efficient buildings and the use of renewable energy source technologies?” are given below in figure 6.16. The responses showed that about half of the training providers are planning to continue to upgrade and develop new training programs related to the building of energy-efficient buildings and the use of renewable energy source technologies.

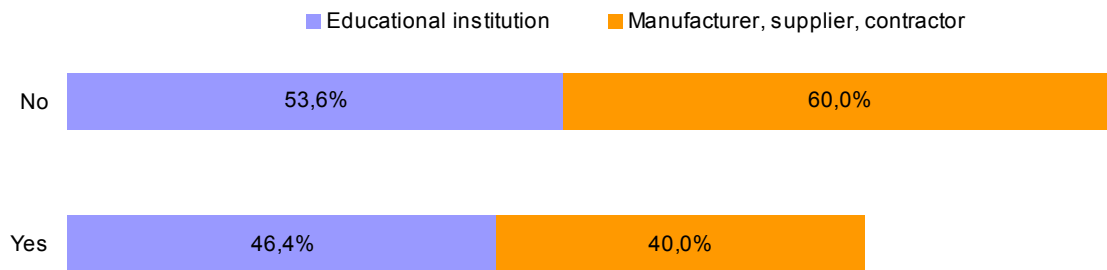


Fig. 6.16. The plans of training providers to update/create new training programs training programs related to the building of energy-efficient buildings and the use of renewable energy source technologies (per cent)

The tables below present the lists of planned training programs related to the construction of energy-efficient buildings and renewable energy technologies obtained from the questionnaire survey. The following tables shows how professional training providers response to labor market needs and are already preparing the missing programs for training of blue collar workers.

Table 6.17. The list of planned training programs related to renewable energy technologies obtained from the questionnaire survey

Title of the planned training program	Planned duration	Topics planned to include	Estimated number of persons to be trained	Planned to upgrade / Newly created
THE DEVELOPMENT OF PHOTOVOLTAIC ENERGY (title to be determined)	semester	Photovoltaic cell installation	Not defined	Newly created
USE OF RENEWABLE ENERGY SOURCES IN THE OF RENEWAL OF APARTMENT BLOCKS	up to 1 week	Solar collectors. Heat pumps. Geothermal heating etc.	50	Newly created
HEATING AND COOLING OF THE BUILDING SURFACES (floors, walls, ceilings)	up to 1 week	cooling	200	Planned to upgrade
INSTALLER OF BUILDING ENGINEERING EQUIPMENT	1448 (units were not specified)	1. Installation and maintenance of solar heating systems 2. Installation and maintenance of biofuel boilers 3. Installation of geothermal boilers	25	Planned to upgrade
ENGINEER OF ENERGY-EFFICIENT BUILDINGS	up to 1 week	Use of renewable sources in the energy system of the building	200	Newly created

Table 6.18. Planned training programs related to the construction of energy-efficient buildings

Title of the planned training program	Planned duration	Topics planned to include	Estimated number of persons to be trained	Planned to upgrade / Newly created
BUILDING RENOVATOR	semester (It is planned to lengthen the program and divide it into multiple modules)	Since the training duration is 15 weeks, this cannot ensure the objective of the program: to train highly skilled construction worker, able to carry out major building renovation tasks.	Uncertain	Planned to upgrade
BUILDING RENOVATOR'S TRAINING PROGRAM	2-3 years	Old building renovation and restoration. Authentic restoration of metal, masonry, wood constructions	25	Planned to upgrade
FINISHER (BUILDER)	2-3 years	Not yet known	200	Planned to upgrade
CEMBRIT NEW PRODUCTS	2-hour course	-	-	Newly created
IMPLEMENTATION OF ENERGY EFFICIENT (PASSIVE) HOUSE FROM TASK ASSIGNMENT TO THE COMPLETION OF CONSTRUCTION	Up to 1 week	1. Apartment block renovation problems. 2. Design of energy-efficient houses. 3. Construction of energy-efficient houses. 4. Technical supervision of energy-efficient houses. 5. Project management of energy-efficient houses.	350	Planned to upgrade
FUNDAMENTALS OF WORK WITH SAKRET FACADE INSULATION AND FINISHING SYSTEM MATERIALS	not indicated	New materials, prevention of defective construction work results	About 200 per year	Planned to upgrade
ROOFERS TRAINING PROGRAM	1, 3 year duration	Installation of solar cells on roof structures	25	Planned to upgrade
TRAINING PROGRAM OF BUILDING THERMAL INSULATOR	1 and 3 years	Latest thermal insulation technologies	25	Planned to upgrade
BUILDING THERMAL INSULATOR	year	Building thermal protection. Thermal insulation of buildings. Roof insulation	25	Newly created

Table 6.19. The anticipated demand for knowledge and skills of blue-collar workers related to energy-efficient buildings and technologies of renewable energy sources.

Need for knowledge	Demand for skills
<ul style="list-style-type: none"> ▪ Knowledge in envelope tightening technology solutions. ▪ New materials and products of envelope tightening. ▪ Requirements for work quality. Quality control envelope tightening. ▪ Fundamental knowledge in thermal physics. Heat and moisture transfer techniques in different environments. ▪ Knowledge of tightening, ventilation and air-quality requirements in buildings. ▪ Knowledge of efficient use of energy and energy consumption reduction measures and priorities. ▪ Knowledge of mutual compatibility of new materials and technologies. 	<ul style="list-style-type: none"> ▪ Ability to work with a new material; ▪ Ability to work with new equipment; ▪ Ability to use new technologies. ▪ Ability to perform proper sealing of joints between structure elements of envelope and engineering equipment. ▪ Ability to use the envelope sealing material or product. ▪ Ability to perform the quality control of partitioning tightness.

Conclusions

The analysis of training programs and questionnaire data of vocational training institutions shows that the vocational training institutions quite effectively respond to emerging market knowledge and skills demands and already preparing new training programs and complementing the existing ones. But clearly noticeable lag, particularly, in the initial training programs. Vocational training institutions are better prepared in question of construction of energy-efficient buildings comparing to renewable energy technologies. The question of energy efficiency in buildings in Lithuania was raised 20 years ago (around 1992), and in that regard requirements are constantly increasing, and vocational training institutions in many cases, already have a suitable training programs, training of personnel and training base, which only need to be updated and supplemented in accordance with the new requirements for energy efficient buildings. In the field of renewable energy technologies vocational education in many cases is less adapted, so the greater attention should be given to development of new programs and update and extension of existing. In all cases, in transfer of new materials and technologies important role has the non-formal education with participation of new materials and technology suppliers. At early beginning such consortiums could meet the educational demands of the labor market, then later the knowledge and skills to be transferred into curriculums of formal education.

6.5. Monitoring of market demands

To identify the market demand, the telephone survey and interviews of construction companies were conducted. 50 companies, who took part in the telephone survey and interviews, were selected and their representatives were asked questions clarifying the questionnaire survey. Questions included information on employee training, their experience in taking part in the construction of energy-efficient buildings and engineering equipment installation projects, preparation for the construction of energy efficient buildings, and other information.

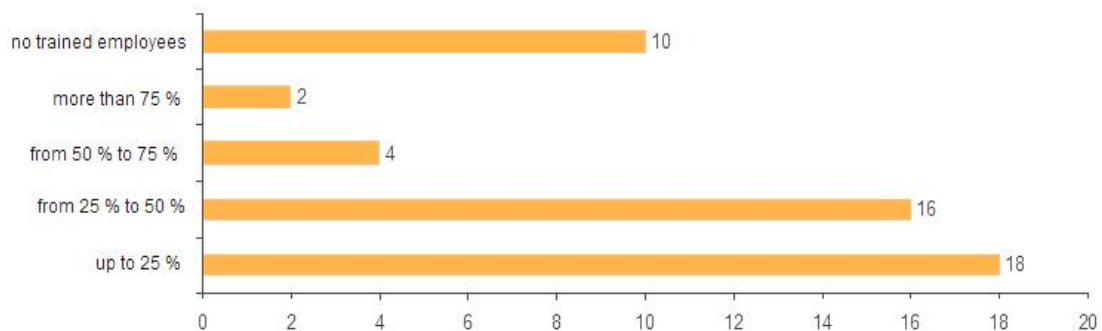


Fig. 6.17. The part (in percentage) of workers have been trained

The survey included interviews with 50 participants in the construction market. Most employers (36 per cent) responded (Fig. 6.17) by saying that the percentage of blue-collar workforce trained is up to 25 per cent. 32 per cent of respondents indicated that the blue-collar workforce trainees comprise from 25 per cent to 50 per cent of the company's employees. As many as 20 per cent noted that the company has not carried out the blue-collar workforce training.

62 per cent of respondents indicated that they had experience in the construction of energy-efficient buildings or deployment of engineering solutions in such buildings. In assessing the company's readiness according to the five score system in such construction or implementation of engineering solutions, the majority of respondents (43 per cent) indicated that the company is moderately prepared (3 points), 33 per cent of respondents said that they are well-prepared (4 points). It should be noted that as many as 24 per cent of the representatives evaluated the company's readiness for the construction of such buildings as poor or very poor (Fig. 6.18). The most critical about their activities or experience were the companies which had not been involved in energy-efficient building construction projects.

More optimistic about their readiness are companies that have participated in the projects of energy-efficient building construction. They assess their readiness as good or moderate (Fig. 6.19). More critical of their own work or experience were companies, which has not been involved in energy-efficient building construction projects. They tend to assess their readiness as moderate or poor (Fig. 6.20).

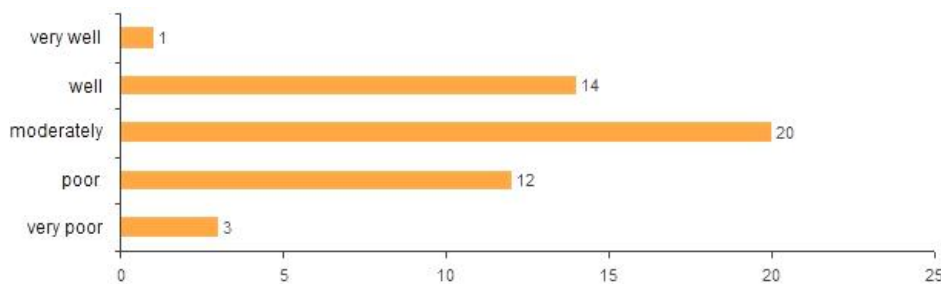


Fig. 6.18. Companies' assessment of their readiness to construct the energy-efficient buildings and implement the engineering solutions of renewable energy sources

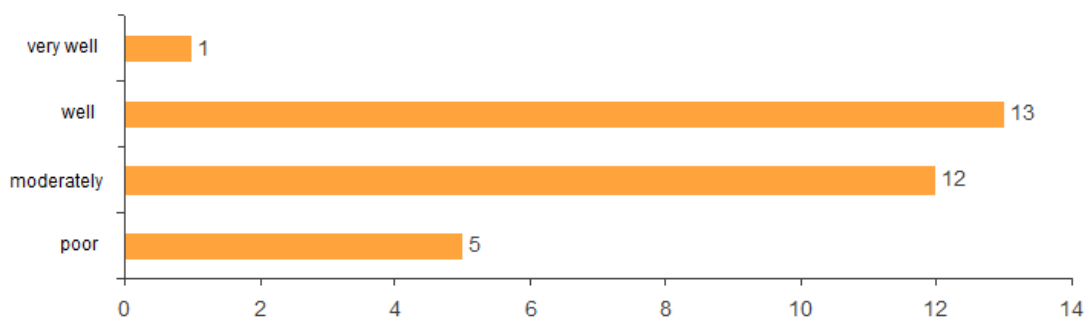


Fig. 6.19. The assessment of readiness to construct the energy-efficient buildings and implement the engineering solutions of renewable energy sources provided by companies, that were involved in such projects

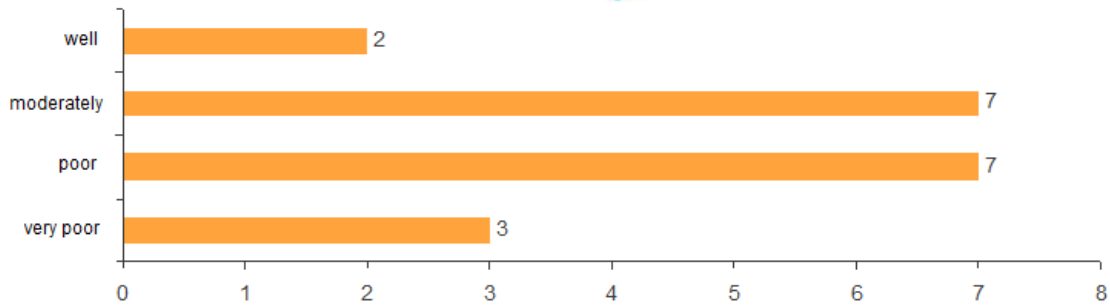


Fig. 6.20. The assessment of readiness to construct the energy-efficient buildings and implement the engineering solutions of renewable energy sources provided by companies, that were not involved in such projects

The main reasons that determined very good or good readiness of companies was the experience in management of implementation of such projects (52 per cent) or the company was a subcontractor in such projects (18 per cent). It should be noted that 18 per cent of the respondents mentioned their continuous interest in innovation, novelties and upgrade of their skills on a regular basis (Fig. 6.21). Companies emphasized that upon correct reorganizing of corporate culture, communication of the work vision, their employees should understand the objectives, therefore, will seek to improve and correctly implement knowledge in practice.

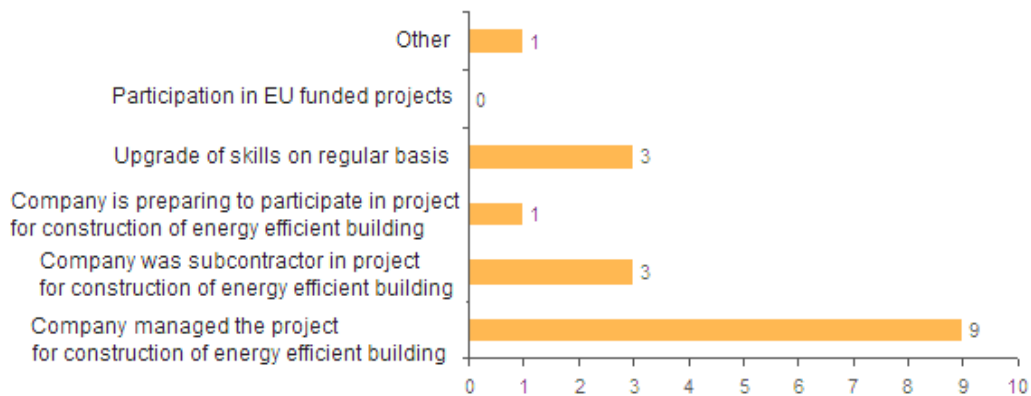


Fig. 6.21. The main reasons that determined very good or good preparedness of companies for the construction of energy-efficient buildings

As many as 80 per cent of business representatives said that the company will face a greater demand for workers in terms of energy efficiency. The reasons that have led to the response about the growth of demand is the fact that the majority of companies (42 per cent) are familiar with the directives and predicted the growth in demand for blue collar workforce. Also, 30 per cent of the companies pointed out the current lack of such professionals. It should be noted that 18 per cent of respondents chose other response option. The most frequent response options were (Fig. 6.22):

- Feel the growing customer interest and growth of the number of projects;
- Are interested in innovation and trying to implement them.

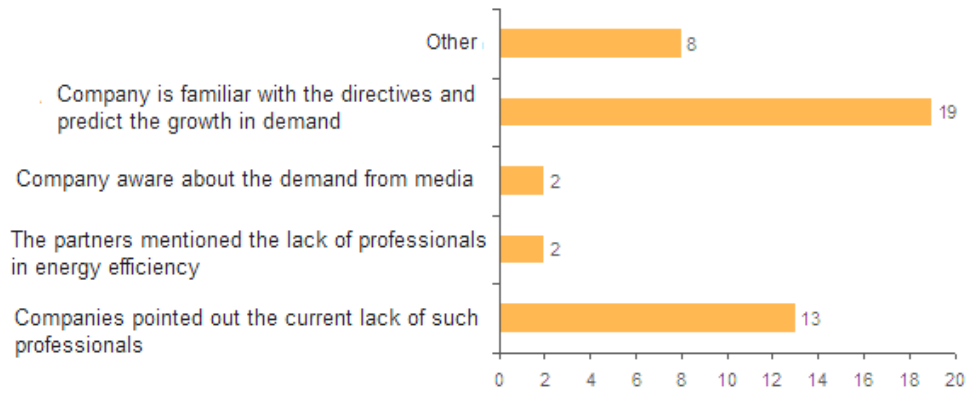


Fig. 6.22. Main reasons that have led to the response about the growth of demand for workers in terms of energy efficiency

In assessing the knowledge of workers who are already employed in the company and newly trained workers, who came to work in a company, the majority of respondents indicated (Fig. 6.23) that previously employed personnel lacks professional knowledge and skills (34 per cent) and the general work standards (20 per cent). Also, the old employees of the company (30 per cent) have lack of characters in all positions and the motivation to work. There were also the options stating that previously employed workers do not lack anything.

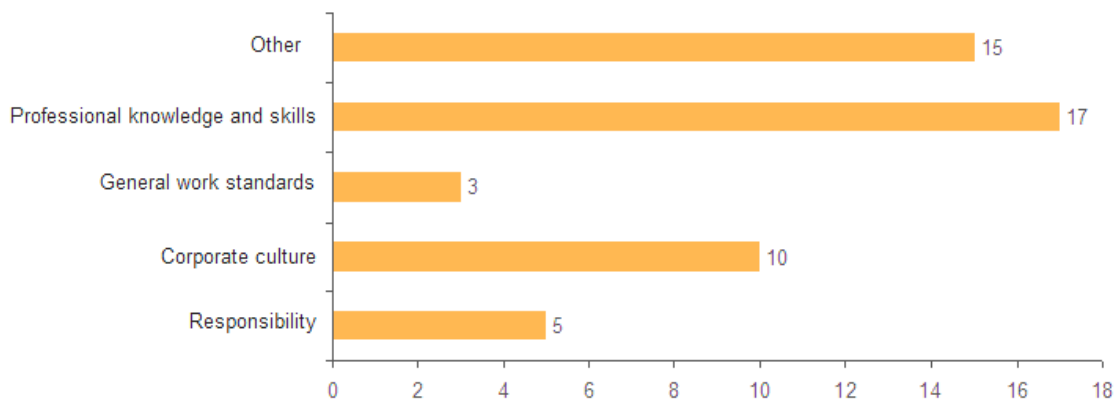


Fig. 6.23. Lacking characters for the employees employed in the companies

The newly trained blue-collar workforce who comes to work to the company is missing (Fig. 6.24) mostly professional skills (32 per cent) and other things (48 per cent) – such as experience, motivation, or all of the listed items.

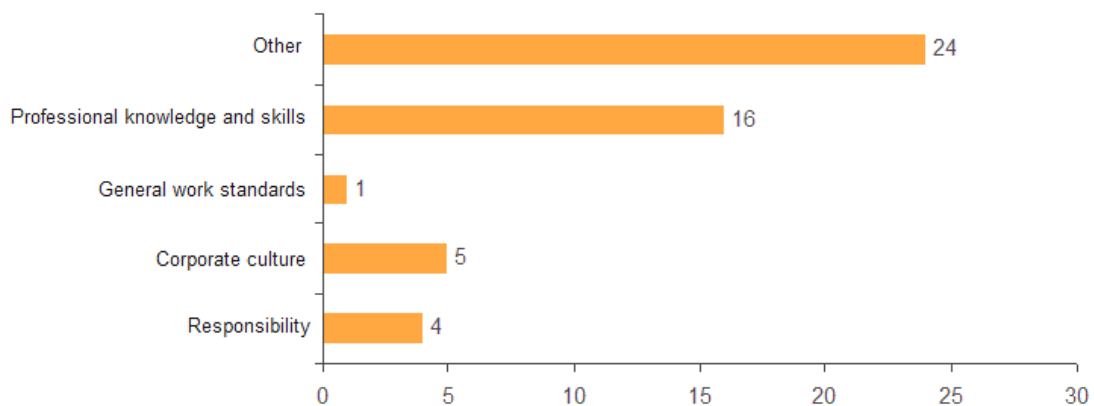


Fig. 6.24. Lacking characters for the the newly trained employees who comes to work to the company

The majority of respondents (68 per cent) indicated that emigration has a significant impact on the company's operations as it means the loss of skilled workforce. Usually the company workers leave to Norway, Denmark and Sweden as well as to Germany. There is a noticeable decrease in the numbers of departing to the United Kingdom. Only 30 per cent of surveyed companies' representatives stated that emigration is not relevant to their enterprise and has no impact on the company's activities (Fig. 6.25).

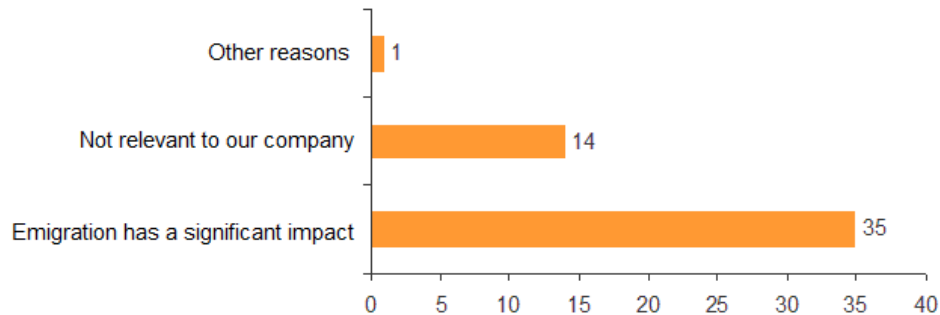


Fig. 6.25. The opinion on how emigration affect the efficient operation of company

Direct interviews and interviews via telephone were made with the selected construction enterprises. 50 enterprises were selected from those participated in questionnaire form filling to take part in a telephone interview. Their representatives were asked extra questions to specify their answers from the written questionnaire. The questions embraced the information about the trainings of the employees, the experience from the participation in an energy efficient building construction and engineering equipment installation projects, preparation to equip the energy efficient building and other information. The aim of the interview with the 10 selected enterprises was to clarify the topicality of the theme and significance of the untouched questions in the questionnaire. During the interviews the understanding of the existing employees competence and the choice of the training base and tools were discussed. The question was raised about how the leaders of the enterprises estimate the knowledge and skills of their employees. In an interview participants were asked about the assumptions for the new technology development.

Table 6.20. Interview with 10 representatives from the enterprises participated in survey

No.	Title of an enterprise	Date of an interview	Position	Name Surname
11.	Valkor enterprise, JSC	2012.10.18	CEO	Vytenis Staugautis
12.	Siemtecha, JSC	2012.10.19	CEO	Rimvydas Žilinskas
13.	YIT Technika, JSC	2012.10.19	CEO	Egidijus Šideikis
14.	Yglė, JSC	2012.10.24	CEO	Tomas Ustinavičius
15.	Veikmė, JSC	2012.10.25	CEO	Eugenijus Zaremba
16.	Tecos, JSC	2012.11.08	CEO	Dmitrij Balan
17.	Meleksas, JSC	2012.11.08	Energy Engineer	Jurgis Trimonis
18.	PA Group, JSC	2012.11.09	CEO	Audrius Butkus
19.	Dringsta, JSC	2012.11.08	CEO	Jonas Bukauskas
20.	ENSO ranga, JSC	2012.11.09	CEO	Albertas Bieliauskas

Current understanding of blue-collar workforce skills

Most of the company's representatives narrowly conceived their staff skills in the construction of energy-efficient buildings and exploitation of renewable energy source technologies. All interviewees rated their skills as good, as they met all project tasks. Only if the company did not carry out the energy efficiency related projects, it's staff preparedness was assessed poorly.

From the viewpoint of some of the respondents, the blue-collar workforce skills were assessed only within the narrow range of specialization in the company, linking the quality of work not with the knowledge of the employee but with the control of the work being done.

In large enterprises the implementation of new technology or solutions on the construction site is carried out under the supervision of manufacturers or suppliers of technologies, so the existing blue-collar workforce skills factor is often not even considered. It was assumed that these skills will be learned when the need arises in the course of construction.

Selection of educational resources

Most of the training is organized at the initiative of the suppliers of material or technological equipment and according to their requirements. In other cases, companies were limited with their own experience and supervision performed by controlling staff. When in survey the question was raised about the workforce training, the company ranked its own contribution to over 75 per cent, which means that blue-collar workforce skills before employment were not evaluated or were unacceptable for company.

Training of blue-collar workforce of construction companies is carried out in vocational training centres of with the participation of manufacturers' representatives on the construction site. In the companies having very narrow development of high technologies, all training is carried out only in the equipment manufacturer's facilities. Such companies are very critical about training in their field of activity, because they require only narrow specific knowledge of the technology used.

New staff evaluation

The market of new labour is seen by the companies highly critically, evaluating the existing skills and knowledge as poor, or perceiving the knowledge or experience as unable to meet the actual requirements. Therefore, the main focus is made on young workforce to be trained in-house according to the company's technology. Their learning process takes place during the construction process.

As the construction market is currently (2012) stable, the labour migration is relatively small. In the companies of smaller cities the emigration problem is less prominent compared to the big cities' companies.

Barriers to the development of technologies

The biggest barrier to the development of new technologies is the increased risk in payments for work performed and client's significant influence on the determination of the requirements for technological solutions. In some cases, the final construction/installation cost is more important factor than its future operating costs.

All interview participants linking the development of such technologies with the dissemination and client education on new technologies.

Larger companies link the development of such technologies only with the interference of the state regulation in carrying out the upgrade of public buildings. These objects might serve as a model and standard for other stakeholders.

Conclusion

Most of the construction companies fail to see the need for training, and to take advantage of already existing labour market supply. Lithuanian construction companies are small and limited in time and financial resources for training. Immature market of energy-efficient buildings and renewable energy source technologies does not pose a significant need for raising qualifications of personnel. However, enforcement of EU directives can change these provisions and it is necessary to prepare for it.

6.6. Related initiatives funded by the European Commission

EU structural assistance to Lithuania for 2007-2013 assigned by the European Social Fund, European Regional Development Fund and the Cohesion Fund accounts for more than 23 billion LTL. Support is provided by EU structural assistance strategy for 2007-2013 and specific action programs designed to implement the strategy:

- *Human Resources Development Program* (approved by the European Commission on 24 September, 2007) (13.8 per cent of EU structural funds).
- *Economic Growth Action Program* (approved by the European Commission on 30 July, 2007) (45.72 per cent of EU structural funds)
- *Cohesion Promotion Action Plan* (approved by the European Commission on 30 July, 2007) (39.08 per cent of EU structural funds)
- *Technical Assistance Program* (approved by the European Commission on 18 December, 2007) (1.4 per cent of EU structural)

The short descriptions of several projects funded under the mentioned programmes presented below.

Project: *Development of the System of VET Standards*, Nr. BPD2004-ESF-2.4.0-01-04/0156.

Qualifications and Vocational Training Development Centre

Project we site: <http://projektai.pmmc.lt/index.php?id=403>

The aim of the project is to develop a system of VET standards which would result in the increased correspondence between training and labour market needs and would create better conditions for lifelong learning.

Objectives of the project:

- To define training needs in agreed sectors of economy.
- To develop methodology for future skills analysis and test it in one sector of economy.
- To develop VET standards for initial secondary vocational education and training and for non-university higher education sector.

Results of the project:

- A programme for training of experts who are invited to work in groups established for the development of VET standards.
- 400 experts trained for the development of VET standards.
- 100 of VET standards developed.
- Training needs analysis carried out in 6 sectors of economy.
- A methodology for future skills analysis.
- A study of future skills analysis in one sector of economy.

Target groups:

- Vocational teachers.
- Experts.

Project: *Development and implementation of common quality assurance system in vocational education and training*, Nr. BPD2004-ESF-2.4.0-01-04/0043. Qualifications and Vocational Training Development Centre

Project we site: <http://projektai.pmmc.lt/index.php?id=446>

The aim of the project is to develop a modern quality assurance system which would cover both initial VET and continuing training.

Objectives of the project:

- To develop a model of quality assurance system for vocational education and training in Lithuania that would be in line with the ideas of “A common quality assurance framework for VET in Europe”.
- To implement internal quality management systems in vocational education and training

institutions;

- To develop external quality evaluation system for assessment of training programmes and VET institutions;
- To train human resources for implementation of the common quality assurance system;
- To test the external quality assurance system in IVET and CVT institutions.

Results of the project:

- A study on quality assurance in VET in Lithuania and EU countries;
- concept and model of quality assurance system in Lithuania;
- A Quality Standard – criteria and indicators;
- Teachers trained for implementation of quality assurance model;
- A study on internal quality management systems in vocational education and training institutions and examples of good practice;
- Methodical recommendations on the implementation of internal quality management system in vocational training institution;
- 20 lecturers trained to use the programme “The implementation of internal quality management system in vocational training institutions”;
- 250 vocational teachers trained for implementation of internal quality management system;
- Methodologies for external quality evaluation of vocational training programmes and institutions;
- Evaluators trained for external evaluation of the quality of training programmes.
- Evaluators trained for external quality evaluation of VET institutions.
- The plan for external evaluation of training programmes and VET institutions.
- Reports of evaluated vocational training institutions;
- Recommendations for ministries of Education and Sciences and Social Security and Labour.
- Etc.

Target groups:

- Vocational teachers.
- Evaluators.
- Experts.

Project: *Update of Strategic Competencies for Vocational Teachers: development of experience*, Nr. BPD2004-ESF-2.4.0-01-04/0049. Qualifications and Vocational Training Development Centre

Project website: <http://projektai.pmmc.lt/index.php?id=491>

The aim of the project is to develop a system of vocational teachers’ in-service training: to update strategic competencies for vocational teachers, to stimulate innovative vocational education and training to meet the needs of labour market. Strategic competencies have to correspond with good practice in science and technologies.

Objectives of the project:

- To establish strategic competencies for vocational teachers in concrete economical sectors;
- To develop modules for updating of strategic competencies for vocational teachers;
- To train vocational teachers according to developed modules.

Results of the project:

- To update strategic competencies of vocational teachers in 3 sectors of economy: transport, mechanics and metal work, agriculture.
- 18 training (technological and educational) modules developed;
- 150 vocational teachers trained (they will acquire strategic (technological) competencies);
- Improved qualification of 34 experts in the field of the development of modules and training according to the modules.

Target groups:

- Vocational teachers.
- Trainees of vocational schools (indirect target group).
- Employers (indirect target group).

Project: *Development of the model for provision of VET institutions with teaching and learning materials*, Nr. BPD2004-ESF-2.4.0-0.1-0.4/0132. Qualifications and Vocational Training Development Centre

Project we site: http://projektai.pmmc.lt/mokpriemones/index_en.html

The aim of the project is to create the modern teaching and learning materials for VET with the aim to promote the quality of vocational education and training and correspondence of training to the labour market needs.

Objectives of the project:

- To develop a model for provision of VET institutions with modern teaching and learning materials.
- To practice this model by creating, publishing and testing teaching and learning materials for the profession of motormechanicer.
- To provide all vocational schools (which are training motormechanicers) with the developed materials.

Results of the project:

- Methodical guidelines for the development of the model for provision of VET institutions with modern teaching and learning materials.
- Methodical guidelines for the analysis on the situation of provision of VET institutions with teaching and learning materials in Lithuania.
- A study on the situation of provision of VET institutions with teaching and learning materials in Lithuania.
- A description of the model for provision of VET institutions with modern teaching and learning materials.
- Methodical guidelines for the development of teaching and learning materials for training of motormechanicers.
- 80 vocational teachers trained to use the developed materials.
- 350 students trained using the developed materials.
- 31 vocational school provided with the developed materials.
- Etc.

Target groups:

- Vocational teachers.
- Students of vocational schools.

Other related projects:

Project: *Sectoral Partnership for Development of Qualifications Framework*. No. LLP-LDV-VETPRO-2012-LT-0736

Project we site: <http://www.kpmc.lt/Skelbimai/SecPa-informacija.pdf>

Project: *Creation of sectoral practical training center on the base of Vilnius Builders Training Centre*

Project we site:

<http://www.vsrc.lt/joomla/projektai/vprojects.html?start=11> <http://www.vsrc.lt/joomla/projektai/vprojects.html?start=11>

Project: *Green house*

Project we site: <http://www.vsrc.lt/joomla/projektai/vprojects.html?start=1>

Project: *Buildings, people and the environment*

Project we site: <http://www.vsrc.lt/joomla/projektai/vprojects.html?start=4>

Project: *Training of professional excellence of leaders and workers in construction industry*
Project we site: <http://www.statybininkai.lt/?id=4788>

Project: *Green and lean construction*
Project we site: <http://www.vsrc.lt/joomla/projektai/vprojects.html?start=5>

Project: *In support for apartment buildings' renovation program*
Project we site: <http://www.statybininkai.lt/?id=7612>

Project: *The Eenergy for Majors*
Project we site: www.energyformayors.eu,
<http://www.krea.lt/index.php?tema=energetikamerams&lnid=lt>

Project: *Establishing of the practical training centre of wood technologies and furniture making innovations in Kaunas Builders Training Centre*
Project we site: <http://www.src.kaunas.lm.lt/>

Project: *Establishing of the sectorial practical training centre of construction in Public Institution Vilnius Builders Training Centre*
Project we site: <http://www.vsrc.lt/>

Conclusion

One of the main active in Lithuania EC funding sources are the EU structural assistance to Lithuania for the period 2007-2013, and covers about 23 billion LTL support. Support distributed according to the national action programs, which include human resource development, economic growth, promotion of the cohesion and technical support. With energy efficiency field and qualification system related projects focus on lifelong learning, the national qualification standards development and implementation, skills development of vocational school students and administrative staff, performance improvement by establishment the centers of practical training at vocational schools. The projects that address environmental, energy conservation and building modernization problems, the implementation of renewable energy are also promoted.

7. The gaps between the current situation and needs of the sector, achieving the 2020 objectives

7.1. Forecasts of labour force in the construction sector

A. Vaitkevičius. UAB „Sistela“

V. Podvezko. Vilnius Gediminas Technical University

After the year 2020, all new buildings will have to be energy efficient, which means that all of the construction industry workforce has to be trained additionally. Formal and informal continuing education must respond to these changes, which means that curricula have to be updated, and supplemented with necessary knowledge and skills.

The need for professions in the construction sector up to the year 2020 was estimated according to the Lithuanian economic growth forecasts for the year 2020, trends of employment changes in the construction sector, the impact of EU support to the national economy. Migration of the construction sector labour, impact of unaccounted economic, number of graduates of educational institutions and other factors having significant impact on employment in the construction sector were not taken into account due to inconsistent and unavailable latest information.

In determining the need for professions in the construction sector the following data was used:

- Employer survey results
- Educational institutions' survey results
- Forecasts of the GDP growth for 2020
- Change in number of employed in the construction sector
- Forecasts of changes of construction sector part in GDP by the year 2020
- Distribution of students in vocational training schools by professions
- Vocational school graduates (enrolled, students) by professions
- Impact of the EU support

The assumptions for prediction of blue-collar workers demand in construction sector

The prediction of need for professions in the construction sector up to the year 2020 was done according to the Lithuanian economic growth forecasts for 2020, provided by the Ministry of Finance as projections of key economic indicators, as well as considering the trends of the main economic indicators in construction. The demand of blue-collar workers was reforecasted by applying expert evaluation and applying the mathematical model.

According to the Lithuanian Statistics the construction industry in 2012 (in the second quarter) had 944,000 employed persons. Target groups of the project – skilled workers and craftsmen and unskilled workers. In the second quarter of 2012 this group accounted for 55,700 workers (Table 7.1).

Table 7.1. Employed persons by occupational group in construction sector, thous.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 IIQ
	1	2	3	4	5	6	7	8	9	10	11	12	14
Total	83,7	84,8	93,2	107,1	116,2	132,5	148,7	170,9	166,5	122,6	93,3	93,7	94,4
Skilled workers and craftsmen	48,2	50,2	53,3	61,1	69,6	75,7	85,5	98,8	95,7	68,9	46,4	49,002	48,6
Unskilled workers	8,8	8,7	10,6	15,8	17,6	19,3	23,1	22,8	15,6	12,4	7,9	7,0	7,1

Source: Statistics Lithuania, 2012

In order to determine the extent to which construction companies are already prepared for the year 2020:

1. How do you assess the preparedness of the company's blue-collar workers for the construction of energy efficient buildings?
2. How do you assess the preparedness of the company's blue-collar workers to install the renewable energy source technologies?

According to survey answers the number of prepared for the **construction of energy-efficient buildings** is about 40 per cent. The assumption made that additional learning is required for about 60 per cent of the construction company workers in the target group.

The number of those prepared excellent and well for the **use of renewable energy source technologies** is about 30 per cent. The assumption made that additional learning is required for about 70 per cent of the construction company blue-collar workers in the target group.

Professions in Lithuania do not strictly divided in groups as related to construction of energy-efficient buildings and related to renewable energy technologies. Therefore, predicting the need for additional training it's appropriate to summarize the results for both groups. Summarizing the results for both groups, it could be assumed that additional training should have an average of 50% of the workers.

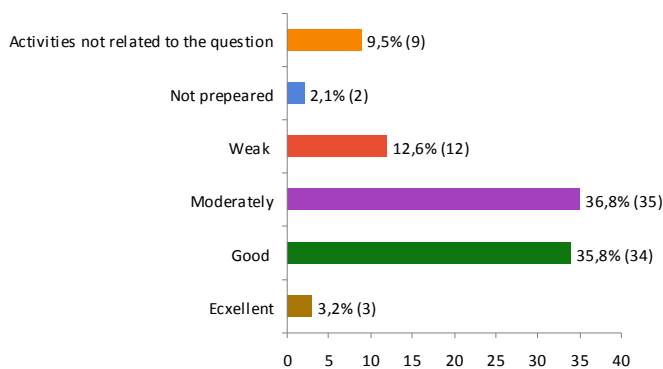


Fig. 7.1. Preparedness of the company blue-collar workers for the construction of energy efficient buildings

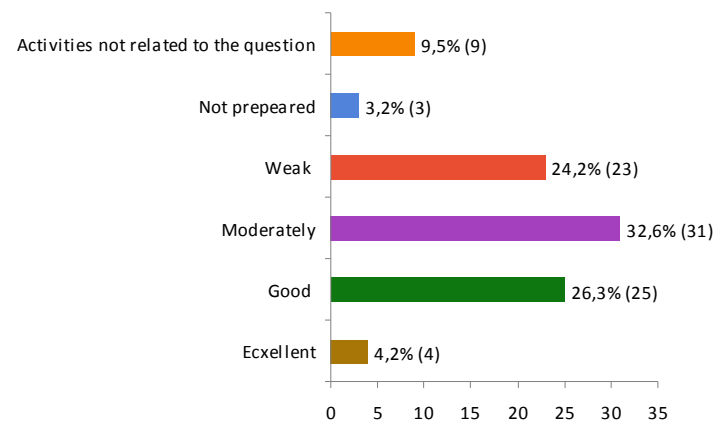


Fig. 7.2. Preparedness of the company blue-collar workers for the use of renewable energy technologies

The prediction of need for professions in the construction sector up to the year 2020 was done according to the Lithuanian economic growth forecasts for 2020, provided by the Ministry of Finance as projections of key economic indicators (Table 7.2). The forecast of the Lithuanian economic growth in 2020 was made on the assumption that the scope of the EU financial support for Lithuania during the new financial period of 2014-2020 will decrease by 14 per cent, while the structure of support will remain the same as in the current period. The forecast included the evaluation of three economic growth scenarios, differing by exogenous indicator assumptions. The **first – pessimistic – scenario** was based on the assumption that the economies of Lithuania's main trading partners (Russia, Germany, Poland) will not grow, and the dynamics of other neighboring economies was ignored. Under these assumptions, the average annual real GDP growth is dependent on Lithuania's internal developments, and will reach **2.5 per cent**. In the **second scenario** the assumptions on the growth of Lithuania's major trading partners, global growth forecasts over the medium term were applied, based on the data from experts and international institutions. In this, the **most likely scenario**, the average GDP growth rate in Lithuania in 2012-2020 might be **3 per cent**, and up to half of this increase would be due to the EU's financial support. In the **third scenario**, with optimistic assumptions (low Lithuanian export price increases and inflation rates and more rapid development projections of partners), i.e. disregarding the problems of neighboring economies causing doubts to experts, our country's economic growth could reach an average of **4 per cent** per year.

Table 7.2. Projections of Lithuanian Economic Indicators (September 2012)¹⁵

Makroekonominiai rodikliai Macroeconomic Indicators	2011	Projection 2012 September			
		2012	2013	2014	2015
Gross Domestic Product at current prices, LTL million	106019	110242	117156	125403	135390
nominal growth, percentage	11,5	4,0	6,3	7,0	8,0
Gross domestic product, chain-linked volume	80668	82682	85139	88038	91810
chain-linked volume growth, percentage	5,9	2,5	3,0	3,4	4,3
Average annual number of economically active population, acc. to labour force survey, Thous.	1619,7	1605,5	1595,7	1586,8	1570,2
Unemployment rate, acc. to labour force survey, per cent	15,4	13,8	12,8	11,5	9,8

Source: Update of Economic Development Scenario May Lead to Correction of Deficit Reduction Tasks. Projections of Lithuanian Economic Indicators (September 2012), The Ministry of Finance of the Republic of Lithuania.

http://www.finmin.lt/web/finmin/fm_2012rugsejis_projekcijos_issamiau#key

Table 7.3. Construction part in Gross domestic product

Indicators	Metai										
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP, LTL billion	48,879	52,351	57,232	62,997	72,401	83,227	99,229	111,920	92,032	95,323	106,369
Construction, LTL billion	2,582	2,938	3,565	4,110	5,085	7,053	10,001	11,261	5,486	5,047	6,251
Construction part in GDP, %	5,3	5,6	6,2	6,5	7,0	8,5	10,1	10,1	6,0	5,3	5,9

Source: Statistics Lithuania, 2012

The prediction of need for professions in the construction sector up to the year 2020 has been made by expert assessment of work extents and labour costs demand¹⁶. Estimates of work extents and labour cost demands are carried out with the assumption that the country's construction sector is dominated by the buildings according to the building purpose indicated in Table 7.4.

Table 7.4. Buildings structure by the purpose of building

Purpose of building	Weighting per cent	
	2012 – 2014	2015 – 2020
	According to the data of the Department of Statistics	According to expert assessment
Residential buildings	9,7	10,6
Office buildings	10,9	10,2
Industrial buildings	15,6	15,8
Commercial buildings	6,9	6,7
Engineering utility networks	29,1	29,5
Sewage disposal networks	9,9	10,0
Roads and streets	17,9	17,2
All structures	100	100

After assessing the survey results of employers and educational institutions, as well as with regard to the structure of buildings under construction of planned for construction, the following priority occupations in the construction sector were determined:

- Installers of prefabricated structures
- Joiners, carpenters

¹⁵ Evaluation of the impact of the EU structural funds on the economy, economic growth forecasts till the year 2020, www.esparama.lt/

¹⁶ A.Vaitkevičius. Forecasts of the demand of workers professions in the construction sector for 2020. Sistela, 2012.

- Roofers
- Plumbers
- Welders
- Electricians
- Painters
- Plasterers
- Tilers
- Facade installers, thermal insulation installers
- Bricklayers
- Locksmiths
- Concrete workers
- Heating system installers
- Engineering equipment installer
- Finishers
- Auxiliary workers

The expert assessment of professions demand in construction sector

In carrying out the estimates of professions demand by expert assessment the building projects characteristic for each purpose of buildings were analysed. By using Lithuanian normative standards (according to the cost ratios of work materials and machinery) work extents in person hours was calculated and the annual demand for the blue collar workers of main professions was estimated.

The annual demand for the blue collar workforce in construction was calculated according to three scenarios, i.e. the pessimistic, the most likely and the optimistic. These three forecasting scenarios were decided according to the estimated construction scope growth. In addition, in the formation of the Forecast, possible changes in the structure of buildings were assessed by experts. Starting with 2015, there should be a rise in the relative weight of residential buildings in the total scope of the work. Also, taking into account the development of new technologies and renewable energy sources, as well as building energy efficiency requirements, the partial change in the blue collar professions is forecasted by extending the requirements for basic qualifications.

It should be noted that predictions can not be based on number of buildings to be modernised in projections, since most of them are privately owned (individual owners of separates flats in dwelling) and therefore due to little support it is hard to predict the future of modernization process.

For the estimates of professions demand, the annual domestic construction volume in million litas excl. VAT, including new construction, reconstruction, repair and other works, also the construction work carried out outside the country on own facilities, was assumed. The scope of work in 2012 is projected with 3 per cent growth of the construction volumes comparying with previous year.

Table 7.5. The annual scope of construction work (LTL million) according to the projections of Lithuanian Economic Indicators

	The annual scope of construction work, LTL million				
	2012	2013	2015	2018	2020
Pessimistic scenario (The annual growth 2,5%)	7083,0	7260,0	7628,0	8215,0	8630,0
Most likely scenario (The annual growth 3,0%)	7083,0	7296,0	7740,0	8457,0	8973,0
Optimistic scenario (The annual growth 4,0%)	7083,0	7367,0	7968,0	8963,0	9694,0

In estimating the annual scope of work it was assumed that in the pessimistic scenario, the scope of work will grow by 2.5 per cent every year, in the most likely scenario – 3 per cent and in case of optimistic assumptions – 4 per cent every year.

Considering the construction development trends, the forecasted scope of work, as well as the changes in the ongoing structure of work, the prepared assessment till 2020 provides the quantitative grows of the basic professions of blue collar workforce and structural changes in occupations directly related to the implementation of innovative solutions, advanced methods in construction.

The annual predicted demand for the blue collar workforce in construction calculated according to three scenarios, i.e. the pessimistic, the most likely and the optimistic, presented in Table 7.6.

Tables 7.7 – 7.9 provide the annual predicted demand for the blue collar workforce in construction by occupation.

Table 7.6. The annual predicted demand for blue collar workforce in construction

	Annual demand for blue collar workers				
	2012	2013	2015	2018	2020
Optimistic scenario	57375	58809	62256	67047	70434
Most likely scenario	57375	59097	63170	69030	73233
Pessimistic scenario	57375	59676	65031	73152	79118

Table 7.7. The predicted demand for blue collar workers (Pessimistic scenario)

Occupations	Year				
	2012	2013	2015	2018	2020
	Predicted scope of construction work, LTL million				
	7083,0	7260,0	7628,0	8215,0	8630,0
The predicted demand of blue collar worker					
Prefabricated structure installers	6004	6154	6489	6988	7341
Joiners, carpenters	3184	3263	3502	3772	3962
Roofers	1278	1310	1441	1552	1631
Plumbers	7884	8081	8598	9260	9728
Welders	1460	1496	1585	1707	1793
Electricians	6362	6521	6914	7446	7822
Painters	2060	2111	2227	2398	2520
Plasterers	1492	1529	1628	1753	1842
Tilers	1444	1480	1574	1695	1780
Facade installers, thermal insulators	3196	3276	3461	3727	3916
Bricklayers	2058	2109	2295	2472	2597
Locksmiths	638	653	682	734	771
Concrete workers	5039	5165	5451	5871	6167
Heating system installers	1199	1229	1309	1410	1481
Engineering equipment installer	6042	6193	6566	7071	7428
Finishers	608	623	648	697	733
Auxiliary workers	2986	3061	3090	3328	3496
Prefabricated structure installers	4443	4554	4795	5164	5425
TOTAL	57375	58809	62256	67047	70434

Table 7.8. The predicted demand for blue collar workers (Most likely scenario)

Occupations	Year				
	2012	2013	2015	2018	2020
	Predicted scope of construction work, LTL million				
	7083,0	7296,0	7740,0	8457,0	8973,0
	The predicted demand of blue collar worker				
Prefabricated structure installers	6004	6184	6584	7195	7633
Joiners, carpenters	3184	3279	3554	3883	4120
Roofers	1278	1317	1463	1598	1696
Plumbers	7884	8120	8725	9534	10114
Welders	1460	1504	1608	1757	1864
Electricians	6362	6553	7016	7666	8133
Painters	2060	2121	2260	2469	2620
Plasterers	1492	1536	1652	1805	1915
Tilers	1444	1487	1597	1745	1851
Facade installers, thermal insulators	3196	3292	3512	3838	4071
Bricklayers	2058	2120	2329	2545	2700
Locksmiths	638	657	692	756	802
Concrete workers	5039	5190	5531	6044	6412
Heating system installers	1199	1235	1328	1452	1540
Engineering equipment installer	6042	6223	6662	7280	7723
Finishers	608	626	657	718	762
Auxiliary workers	2986	3076	3136	3427	3635
Prefabricated structure installers	4443	4577	4866	5317	5641
TOTAL	57375	59097	63170	69030	73233

Table 7.9. The predicted demand for blue collar workers (Optimistic scenario)

Occupations	Year				
	2012	2013	2015	2018	2020
	Predicted scope of construction work, LTL million				
	7083,0	7367,0	7968,0	8963,0	9694,0
	The predicted demand of blue collar worker				
Prefabricated structure installers	6004	6245	6778	7624	8246
Joiners, carpenters	3184	3311	3658	4115	4451
Roofers	1278	1330	1506	1694	1832
Plumbers	7884	8200	8982	10103	10927
Welders	1460	1518	1656	1862	2014
Electricians	6362	6617	7222	8124	8787
Painters	2060	2142	2326	2617	2830
Plasterers	1492	1551	1701	1913	2069
Tilers	1444	1502	1644	1849	2000
Facade installers, thermal insulators	3196	3324	3615	4067	4398
Bricklayers	2058	2141	2398	2697	2917
Locksmiths	638	663	712	801	866
Concrete workers	5039	5241	5694	6405	6928
Heating system installers	1199	1247	1368	1538	1664
Engineering equipment installer	6042	6284	6858	7715	8344
Finishers	608	632	676	761	823
Auxiliary workers	2986	3106	3228	3631	3927
Prefabricated structure installers	4443	4621	5009	5634	6094
TOTAL	57375	59676	65031	73152	79118

Table 7.10. Annual predicted demand for blue collar workers (ecspert assessment)

Annual predicted demand for blue collar workers (expert assessment)									
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Pesimistinis scenarijus	57375	58927	60541	62166	63799	65441	67092	68751	70420
Tikėtinas scenarijus	57375	59212	61131	63077	65051	67052	69079	71134	73217
Optimistinis scenarijus	57375	59787	63323	64933	67618	70377	73209	76116	79098

Table 7.11. The annual increase in demand for workers up to 2020

The annual increase in demand for workers (expert assessment)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total 2013-2020
Optimistic scenario	1552	1614	1625	1633	1642	1651	1659	1669	13045
Most likely scenario	1837	1919	1946	1974	2001	2027	2055	2083	15842
Pessimistic scenario	2412	3536	1610	2685	2759	2832	2907	2982	21723

Table 7.12. Annual predicted number of blue collar workers to be trained

The annual predicted number of blue collar workers to be trained (expert assessment)										
	2013	2014	2015	2016	2017	2018	2019	2020	Total to be trained 2012 - 2020	50% of predicted number to be trained*
Optimistic scenario	7366	8980	8991	8999	9008	9017	9025	9035	70421	35211
Most likely scenario	7402	9321	9348	9376	9403	9429	9457	9485	73221	36611
Pessimistic scenario	7473	11009	9083	10158	10232	10305	10380	10455	79095	39548

* assumption that additional training should have an average of 50% of the workers (survey results)

Expert evaluation results show that by the year 2020 according to optimistic scenario a 35,211 workers will need an additional training, according to most likely scenario a 36,611 workers and respectively a 39548 workers in pessimistic scenario will need an additional training. How many workers will be trained each year will depend on many unpredictable factors and may not correspond to the expected numbers.

Mathematical model to forecast the demand of employed in the construction sector

The prediction model is base on n year observation results - statistical data or expert assessments (t_i, y_i) - the Y values of the relevant year T (Table 7.13); $i = 1, 2, \dots, n$.

Table 7.13. Table of statistical data

T	t_1	t_2	...	t_n
Y	y_1	y_2	...	y_n

The aim of forecasting is to determine the Y values $y_i = Y(t_i)$ during the observation period n , i.e. when $i > n$.

At the beginning the curve - the mathematical relationship (equation) $y = Y(t)$ is determining. The difined mathematical relationship (equation) should give the best (most accurate) description of dependency in observed period from t_1 till t_n .

This task can be solved using the method of **least squares**, with condition that the equations are linear in the respect of unknown coefficients a_0, a_1, \dots . The method of least squares is a standard approach

to the approximate solution of overdetermined systems, i.e., sets of equations in which there are more equations than unknowns. "Least squares" means that the overall solution minimizes the sum of the squares of the errors made in the results of every single equation.

The set of equations consists but not limited of:

linear regression

$$y = a_0 + a_1 t, \tag{1}$$

hyperbolic curve

$$y = a_0 + \frac{a_1}{t}, \tag{2}$$

logarithmic curve

$$y = a_0 + a_1 \cdot \ln t, \tag{3}$$

exponential curve

$$y = a_0 + a_1 \cdot e^t, \tag{4}$$

parabola curve

$$y = a_0 + a_1 x + a_2 x^2 \tag{5}$$

The equation coefficients of the line (1), the nearest to n points (t_i, y_i) , obtained from the system of least-squares method:

$$\begin{cases} na_0 + a_1 \sum_{i=1}^n t_i = \sum_{i=1}^n y_i, \\ a_0 \sum_{i=1}^n t_i + a_1 \sum_{i=1}^n t_i^2 = \sum_{i=1}^n t_i y_i \end{cases} \tag{6}$$

The equation coefficients of the hyperbolic (2), logarithmic (3) and exponential (4) curves, the nearest to n points (t_i, y_i) , obtained from the (6) system, were t_i changed respectively by expressions $\frac{1}{t_i}$, $\ln t_i$ and e^{t_i} .

The equation coefficients of the parabola curve (5), the nearest to n points (t_i, y_i) , obtained from the system of three linear equations in respect of the coefficients a_0, a_1, a_2 .

For every (1) – (5) curve mean square error is calculating:

$$S_y = \sqrt{\frac{\sum_{i=1}^n (y_i^{teor} - y_i)^2}{n - k}} \tag{7}$$

here k – the number of unknown coefficients of the curve equation, i.e. $k = 3$ in case of parabola, $k = 2$ in other cases; y_i^{teor} - value calculated from the corresponding function (1) – (5).

The best suitable, i.e. closest to points (t_i, y_i) , curve among selected is the one, that has the smallest value of the mean square error.

The values of forecasted years t_{n+1}, t_{n+1}, \dots interposed to selected curve (function) $y = Y(t)$ instead of t and forecasted values Y_{n+1}, Y_{n+1}, \dots obtained.

The functions of mathematical model by occupation to forecast the demand of employed in the construction sector are presented in Table 7.14.

Table 7.14. Diagram functions to determine the demand for workers by occupation

Prefabricated structure installers	Pessimistic scenario (PS)	$Y=5845.20 + 154.76 t + 1.26 t^2$
	Most likely scenario (LS)	$Y=5817.70 + 181.46 t + 2.24 t^2$
	Optimistic scenario (OS)	$Y=5764.06 + 233.45 t + 4.68 t^2$
Joiners, carpenters	Pessimistic scenario (PS)	$Y=3065.37 + 110.65 t - 1.25 t^2$
	Most likely scenario (LS)	$Y=3050.61 + 125.03 t - 0.72 t^2$
	Optimistic scenario (OS)	$Y=3021.39 + 152.94 t + 0.63 t^2$
Roofers	Pessimistic scenario (PS)	$Y=1211.08 + 60.68 t - 1.58 t^2$
	Most likely scenario (LS)	$Y=1204.77 + 66.94 t - 1.40 t^2$
	Optimistic scenario (OS)	$Y=1192.27 + 78.75 t - 0.88 t^2$
Plumbers	Pessimistic scenario (PS)	$Y=7632.45 + 239.19 t - 0.75 t^2$
	Most likely scenario (LS)	$Y=7595.04 + 275.23 t + 0.47 t^2$
	Optimistic scenario (OS)	$Y=7523.61 + 344.11 t + 3.73 t^2$
Welders	Pessimistic scenario (PS)	$Y=1417.145 + 41.02 t + 0.079 t^2$
	Most likely scenario (LS)	$Y=1410.97 + 47.33 t + 0.33 t^2$
	Optimistic scenario (OS)	$Y=1397.19 + 60.32 t + 0.90 t^2$
Electricians	Pessimistic scenario (PS)	$Y=6172.43 + 181.81 t + 0.14 t^2$
	Most likely scenario (LS)	$Y=6143.04 + 210.44 t + 1.16 t^2$
	Optimistic scenario (OS)	$Y=6085.60 + 265.64 t + 3.80 t^2$
Painters	Pessimistic scenario (PS)	$Y=2005.30 + 53.15 t + 0.44 t^2$
	Most likely scenario (LS)	$Y=1995.51 + 52.54 t + 0.76 t^2$
	Optimistic scenario (OS)	$Y=1976.89 + 80.49 t + 1.59 t^2$
Plasterers	Pessimistic scenario (PS)	$Y=1443.96 + 45.56 t - 0.16 t^2$
	Most likely scenario (LS)	$Y=1436.64 + 52.45 t + 0.07 t^2$
	Optimistic scenario (OS)	$Y=1422.80 + 65.71 t + 0.67 t^2$
Tilers	Pessimistic scenario (PS)	$Y=1398.12 + 43.63 t - 0.14 t^2$
	Most likely scenario (LS)	$Y=1391.51 + 49.98 t + 0.11 t^2$
	Optimistic scenario (OS)	$Y=1378.74 + 62.45 t + 0.72 t^2$
Facade installers, thermal insulators	Pessimistic scenario (PS)	$Y=3107.99 + 85.36 t + 0.48 t^2$
	Most likely scenario (LS)	$Y=3092.65 + 100.13 t + 0.945 t^2$
	Optimistic scenario (OS)	$Y=3063.94 + 127.73 t + 2.27 t^2$
Bricklayers	Pessimistic scenario (PS)	$Y=1963.91 + 86.08 t - 1.78 t^2$
	Most likely scenario (LS)	$Y=1954.19 + 95.68 t - 1.45 t^2$
	Optimistic scenario (OS)	$Y=1934.74 + 114.29 t - 0.605 t^2$
Locksmiths	Pessimistic scenario (PS)	$Y=624.94 + 12.97 t + 0.36 t^2$
	Most likely scenario (LS)	$Y=622.41 + 15.74 t + 0.47 t^2$
	Optimistic scenario (OS)	$Y=616.65 + 21.15 t + 0.73 t^2$
Concrete workers	Pessimistic scenario (PS)	$Y=4902.71 + 132.38 t + 0.89 t^2$
	Most likely scenario (LS)	$Y=4879.77 + 154.69 t + 1.72 t^2$
	Optimistic scenario (OS)	$Y=4834.65 + 198.30 t + 3.79 t^2$
Heating system installers	Pessimistic scenario (PS)	$Y=1159.81 + 37.12 t - 0.165 t^2$
	Most likely scenario (LS)	$Y=1154.28 + 42.48 t + 0.036 t^2$
	Optimistic scenario (OS)	$Y=1143.32 + 53.08 t + 0.52 t^2$
Engineering equipment installer	Pessimistic scenario (PS)	$Y=5862.10 + 172.57 t + 0.135 t^2$
	Most likely scenario (LS)	$Y=5834.24 + 199.52 t + 1.125 t^2$
	Optimistic scenario (OS)	$Y=5779.59 + 252.13 t + 3.62 t^2$
Finishers	Pessimistic scenario (PS)	$Y=597.28 + 11.18 t + 0.43 t^2$
	Most likely scenario (LS)	$Y=594.54 + 13.79 t + 0.54 t^2$
	Optimistic scenario (OS)	$Y=589.15 + 18.935 t + 0.79 t^2$
Auxiliary workers	Pessimistic scenario (PS)	$Y=2983.63 + 12.96 t + 4.93 t^2$
	Most likely scenario (LS)	$Y=2970.30 + 26.11 t + 5.35 t^2$
	Optimistic scenario (OS)	$Y=2945.51 + 50.55 t + 6.54 t^2$
Prefabricated structure installers	Pessimistic scenario (PS)	$Y=4329.35 + 111.28 t + 1.16 t^2$
	Most likely scenario (LS)	$Y=4309.11 + 131.26 t + 1.85 t^2$
	Optimistic scenario (OS)	$Y=4269.17 + 169.56 t + 3.68 t^2$

Table 7.15. Forecasted demand for blue collar workers (mathematical model)

		Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
		Predicted scope of construction work, LTL million								
Pessimistic scenario (PS)		7083	7260	7442	7628	7819	8015	8218	8420	8630
Most likely scenario (LS)		7083	7295	7514	7739	7972	8212	8458	8712	8972
Optimistic scenario (OS)		7083	7366	7660	7967	8287	8619	8965	9323	9693
		Forecasted demand for blue collar workers (mathematical model)								
Prefabricated structure installers	PS	6004	6160	6321	6484	6551	6819	6990	7164	7340
	LS	6004	6190	6382	6579	6781	6987	7198	7413	7632
	OS	6004	6250	6507	6773	7048	7333	7628	7931	8245
Joiners, carpenters	PS	3184	3282	3386	3488	3587	3684	3779	3871	3960
	LS	3184	3298	3419	3539	3658	3775	3891	4005	4118
	OS	3184	3330	3486	3643	3802	3962	4123	4285	4449
Roofers	PS	1278	1326	1379	1428	1475	1518	1558	1595	1629
	LS	1278	1333	1393	1450	1504	1556	1605	1651	1694
	OS	1278	1346	1421	1493	1564	1633	1700	1766	1830
Plumbers	PS	7884	8102	8343	8577	8810	9041	9270	9498	9725
	LS	7884	8147	8425	8704	8983	9263	9545	9827	10110
	OS	7884	8227	8590	8960	9337	9723	10115	10515	10923
Welders	PS	1460	1499	1541	1582	1624	1666	1708	1750	1793
	LS	1460	1507	1556	1606	1656	1707	1758	1811	1864
	OS	1460	1521	1586	1653	1721	1792	1864	1938	2013
Electricians	PS	6362	6537	6719	6902	7085	7268	7452	7636	7820
	LS	6362	6569	6785	7003	7224	7447	7673	7901	8131
	OS	6362	6632	6917	7209	7509	7816	8131	8454	8784
Painters	PS	2060	2113	2169	2225	2282	2340	2399	2459	2520
	LS	2060	2141	2190	2258	2327	2398	2470	2544	2620
	OS	2060	2144	2233	2324	2419	2517	2618	2722	2830
Plasterers	PS	1492	1534	1579	1624	1668	1712	1755	1798	1841
	LS	1492	1542	1595	1648	1701	1754	1807	1861	1914
	OS	1492	1557	1626	1696	1768	1841	1915	1991	2068
Tilers	PS	1444	1485	1528	1570	1613	1655	1697	1738	1779
	LS	1444	1499	1542	1593	1644	1695	1747	1799	1850
	OS	1444	1507	1573	1640	1709	1779	1851	1925	1999
Facade installers, thermal insulators	PS	3196	3281	3368	3457	3547	3637	3729	3822	3915
	LS	3196	3297	3402	3508	3617	3727	3840	3954	4070
	OS	3196	3328	3468	3611	3759	3912	4069	4231	4397
Bricklayers	PS	2058	2129	2206	2280	2350	2416	2479	2539	2595
	LS	2058	2140	2228	2314	2396	2476	2553	2627	2698
	OS	2058	2161	2272	2383	2491	2599	2705	2810	2914
Locksmiths	PS	638	652	667	683	699	716	734	752	771
	LS	638	656	674	693	713	734	756	778	802
	OS	638	662	687	713	741	770	800	833	866
Concrete workers	PS	5034	5171	5308	5447	5587	5729	5873	6019	6166
	LS	5034	5196	5359	5526	5696	5870	6047	6227	6411
	OS	5034	5246	5464	5687	5921	6161	6409	6664	6927
Heating system installers	PS	1199	1233	1270	1306	1341	1377	1412	1446	1481
	LS	1199	1239	1282	1325	1368	1410	1453	1496	1540
	OS	1199	1252	1307	1364	1422	1481	1540	1601	1663
Engineering equipment installer	PS	6042	6208	6381	6555	6728	6902	7077	7251	7426
	LS	6042	6238	6443	6650	6860	7072	7286	7502	7721
	OS	6042	6298	6569	6846	7131	7223	7722	8028	8342
Finishers	PS	608	621	635	649	664	680	697	714	733
	LS	608	624	641	658	677	697	717	739	762
	OS	608	630	653	677	703	731	760	791	823
Auxiliary workers	PS	2986	3029	3067	3114	3172	3239	3316	3403	3500

	Year									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	
	LS	2986	3044	3097	3160	3225	3320	3415	3522	3639
	OS	2986	3073	3156	3252	3362	3484	3620	3769	3930
Prefabricated structure installers	PS	4443	4557	4674	4793	4915	5039	5165	5294	5425
	LS	4443	4579	4720	4864	5012	5163	5319	5478	5640
	OS	4443	4623	4811	5006	5209	5419	5636	5861	6093
Total	PS	57372	58919	60541	62164	63698	65438	67090	68749	70419
	LS	57372	59239	61133	63078	65042	67051	69080	70835	73216
	OS	57372	59787	62326	64930	67616	70176	73206	76115	79096

Table 7.16. Annual forecasted demand for blue collar workers (mathematical model)

Metinis darbininkų poreikis (matematini modelis)									
	2013	2014	2015	2016	2017	2018	2019	2020	
Pessimistic scenario (PS)	58919	60541	62164	63698	65438	67090	68749	70419	
Most likely scenario (LS)	59239	61133	63078	65042	67051	69080	70835	73216	
Optimistic scenario (OS)	59787	62326	64930	67616	70176	73206	76115	79096	

Table 7.17. The annual increase in demand for workers up to 2020

The annual increase in demand for workers (mathematical model)									
	2013	2014	2015	2016	2017	2018	2019	2020	Total 2013-2020
Pessimistic scenario (PS)	1547	1622	1623	1534	1740	1652	1659	1670	13047
Most likely scenario (LS)	1867	1894	1945	1964	2009	2029	1755	2381	15844
Optimistic scenario (OS)	2415	2539	2604	2686	2560	3030	2909	2981	21724

Table 7.18. Annual forecasted number of blue collar workers to be trained

The annual predicted number of blue collar workers to be trained (mathematical model)										
	2013	2014	2015	2016	2017	2018	2019	2020	Total to be trained 2013 - 2020	50% of predicted number to be trained*
Pessimistic scenario	7365	8987	8988	8899	9105	9017	9024	9035	70419	35210
Most likely scenario	7405	9299	9350	9369	9414	9434	9160	9786	73216	36608
Optimistic scenario	7473	10012	10077	10159	10033	10503	10382	10454	79096	39548

* assumption that additional training should have an average of 50% of the workers (survey results)

The results of revised forecast by a mathematical model shows that the by the year 2020 according to optimistic scenario a 35210 workers will need an additional training, according to most likely scenario a 36608 workers and respectively a 39548 workers in pessimistic scenario will need an additional training. How many workers will be trained each year will depend on many unpredictable factors and may not correspond to the forecasted numbers.

Conclusion

Since most of the construction occupations workers must pass extra training, formal and non-formal continuing education need to respond to the potential increase in demand for training and should prepare. This means training programs need to be updated, supplemented by appropriate topics covering necessary knowledge and skills, training facilities upgraded, teachers to be prepared (if necessary, trained additionally). Only then, retraining of workers can be started. Expert evaluation and results mathematical model indicate that by the year 2020 up to 39,000 workers can be trained.

7.2. Forecast of demand for skills and qualifications

Since the majority of blue collar workforce in construction should be retrained, the formal and informal continuing education has to respond to the potential increase in demand for training and prepare accordingly. This means that training programs need to be updated, supplemented with appropriate topics to acquire necessary knowledge and skills, training facilities must be prepared and teachers must be ready (where it is necessary to train them additionally).

We base the evaluation of the demand for skills, occupations and qualifications on the survey results of sector employers and training institutions in the construction sector, telephone survey of construction companies and interview findings and the vocational education curriculum content analyzes carried out (see section 6.4).

In order to ensure the implementation of the European Union's targets for 2020, both the construction industry representatives and experts have pointed out the need for the following skills and knowledge for the construction sector working-class occupations:

- Knowledge of construction sector legislation.
- Fundamental knowledge in thermal physics. Heat and moisture transfer techniques in different environments.
- Knowledge of air tightness, ventilation and air-quality requirements in buildings.
- Knowledge of energy efficiency and priority measures to reduce the energy consumption.
- Knowledge of mutual compatibility of new materials and technology.
- Knowledge in envelope air tightening technologies. Knowledge about the latest envelope sealing materials and products.
- Knowledge of requirements for the work quality. Knowledge of envelope tightness quality control methods. Knowledge of quality control of envelope insulation system surface durability.
- The ability to install a airtight envelope and choose an effective wall insulation system by reducing the risk of cold bridging, choose appropriate materials and technologies.
- The ability to work with a new material and apply new technologies and equipment.
- The ability to install various energy efficiency systems and to determine which system is best suited for a variety of buildings.
- The ability to work with new equipment, properly install, balance and launch them for work.
- Ability to perform proper sealing of partitioning design elements and engineering equipment joints (sockets, switches and other cavities).
- Ability to use the envelope sealing material or product.
- Ability to perform the quality control of envelope tightness.

Questions given in the construction sector company survey about deficient occupations:

- When the need for qualifications required for the construction of energy efficient buildings and renewable sources of energy efficient technologies will appear?
- What are the lacking occupations of blue-collar workforce with skills needed for the construction of energy efficient buildings and efficient use of renewable energy source technologies?
- If you forecast the growth in demand for such blue collar workforce, who do you think will meet this demand in your company?
- Are you planning internal training in preparation for the construction of energy efficient buildings and renewable energy technologies in the construction/modernization of buildings?

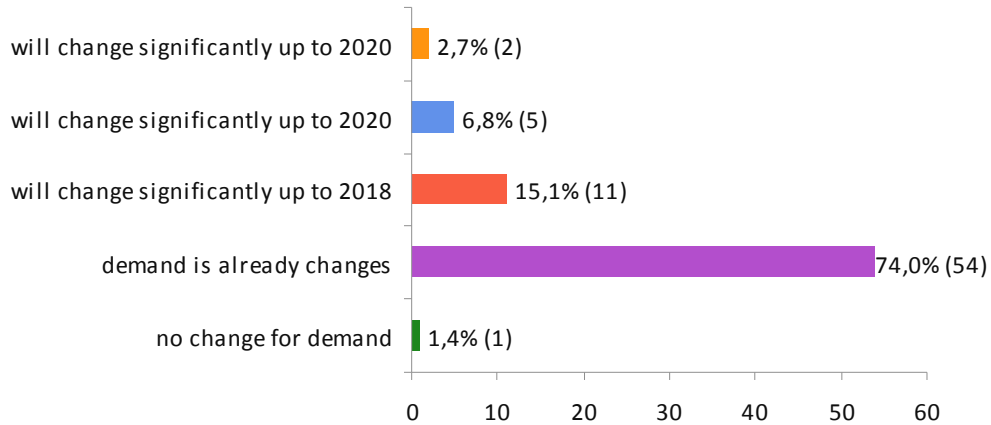


Fig. 7.1. The opinion of companies about the change in demand for qualifications required for the construction of energy efficient buildings and renewable sources of energy efficient technologies

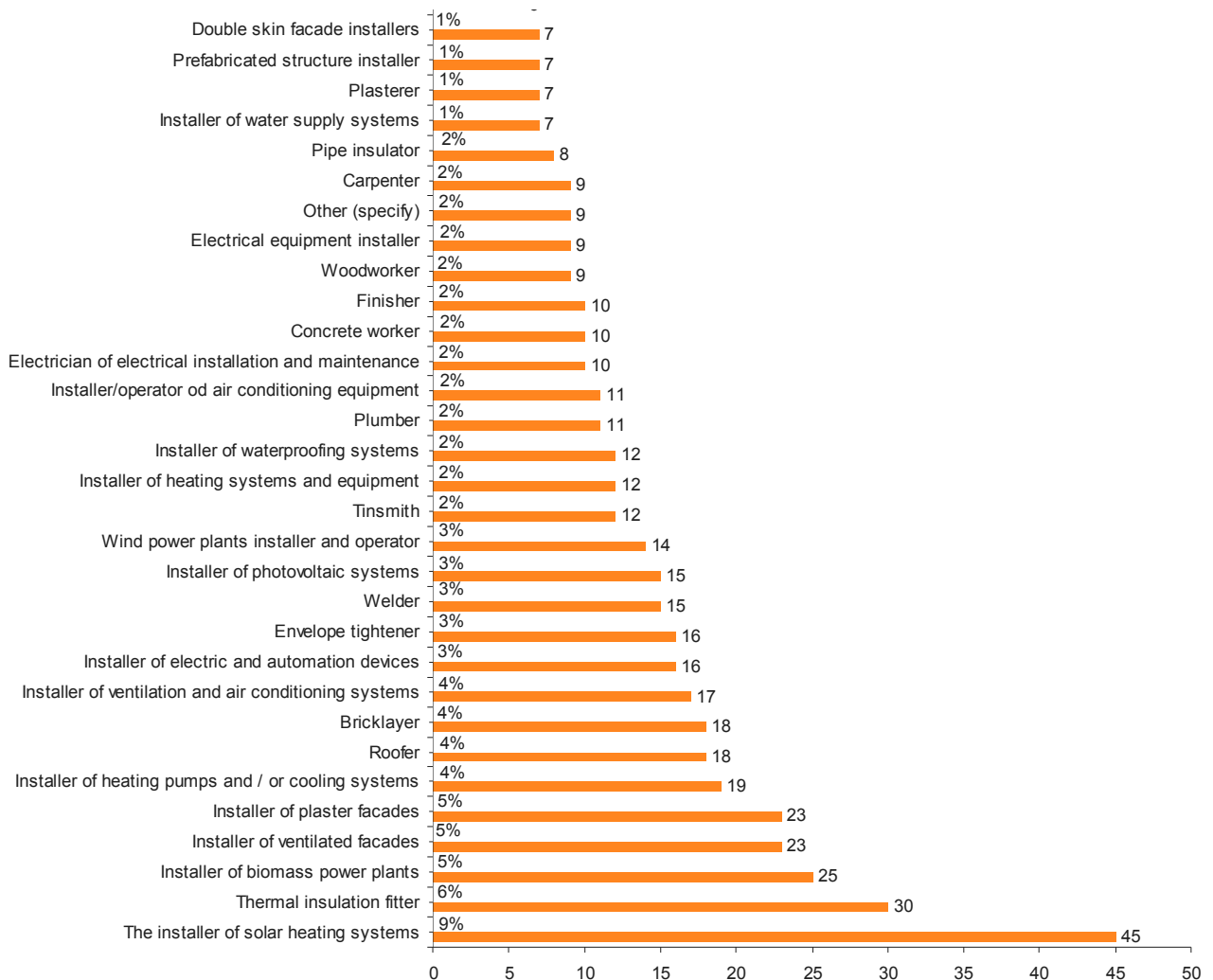


Fig. 7.2. The lacking occupations of blue-collar workforce with skills needed for the construction of energy efficient buildings and efficient use of renewable energy source technologies

Employers in survey noted the occupations of workers that are currently in demand in the market (listed in the order of priority):

- Installer of solar heating system
- Thermal insulation fitter
- Installer of biomass power plants
- Installer of ventilated facades
- Installer of plaster facades
- Installer of heating pumps and / or cooling systems
- Roofer
- Bricklayer

The majority of the respondents will satisfy the demand for understaffed occupations through additional training for blue-collar workforce and the choice of trained skilled workforce from the market (Fig. 7.3).

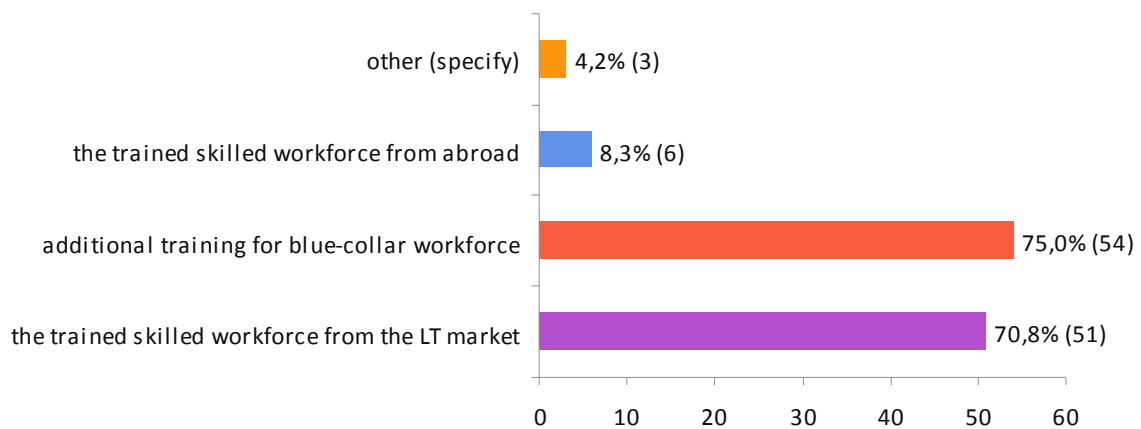


Fig. 7.3. Means to satisfy the demand for understaffed occupations in company

Most of the surveyed companies do not plan to organize internal training of workforce for the construction of energy efficient buildings and renewable energy technologies for the construction/modernization of buildings (Fig. 7.4). It was noticed that majority of companies do not participate in EU funded project aimed to prepare to construct the energy efficient buildings and prepare for the efficient use of renewable energy source technologies. Only 11 construction companies noted that implement or had already finished relevant projects.

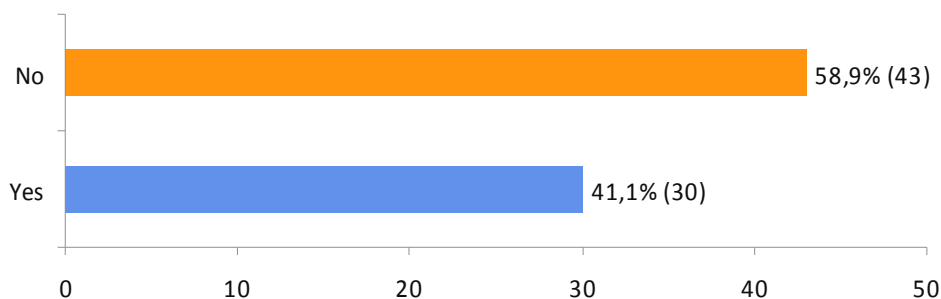


Fig. 7.4. Company's plans to organize the internal trainings in preparation for the construction of energy efficient buildings and renewable energy technologies in the construction / modernization of buildings

7.3. Forecast of training demand

The training demand forecast is based on the information from Labour Exchange and the construction sector survey. According to the Labour Exchange, most demanded professions on the market are welders, finishers, concrete workers, painters, electricians, roofers and builders. The local labour market does not satisfy the demand for all most popular professions of workers. During the first quarter of 2012, the number of work permits granted for foreigners welders accounted for 10 per cent of all work permits in Lithuania. More information on the construction industry workforce and migration can be found in sections 3.4 and 5.5 of this Report.

Questions given in the construction sector company survey about the planned training:

- What are the lacking occupations of blue collar workforce with skills needed for the construction of energy efficient buildings and efficient use of renewable energy source technologies?
- Which professions will be trained during internal training?
- What, in your opinion, duration of internal training program would be effective?

In order to determine the correlation of respondents' answers to the questions, the marked professions are listed in the matrix, on the X-axis with the answer to the question “Which professions will be trained during internal training?” and on the Y-axis with the answer to the question “What are the lacking occupations of workers with skills needed for the construction of energy efficient buildings and efficient use of renewable energy source technologies?”.

The result of the analysis showed that the most marked profession groups in both questions are the ventilated facades installer, plastered facade installer, heat pump and/or cooling system installer, installer of solar thermal systems for hot water production, fitter of building thermal insulation, installer of solar heating systems, automation and electronic systems installer (see table 7.16).

Table 7.16. Demanding occupations

No	Occupation	X	Y
1	Installer of solar thermal systems for hot water production	11,48%	11,67%
2	Installer of ventilated facades	9,84%	5,00%
3	Installer of plastered facade	9,84%	4,17%
4	Installer of heat pump and/or cooling system	9,84%	3,33%
5	Fitter of building thermal insulation	6,56%	5,83%

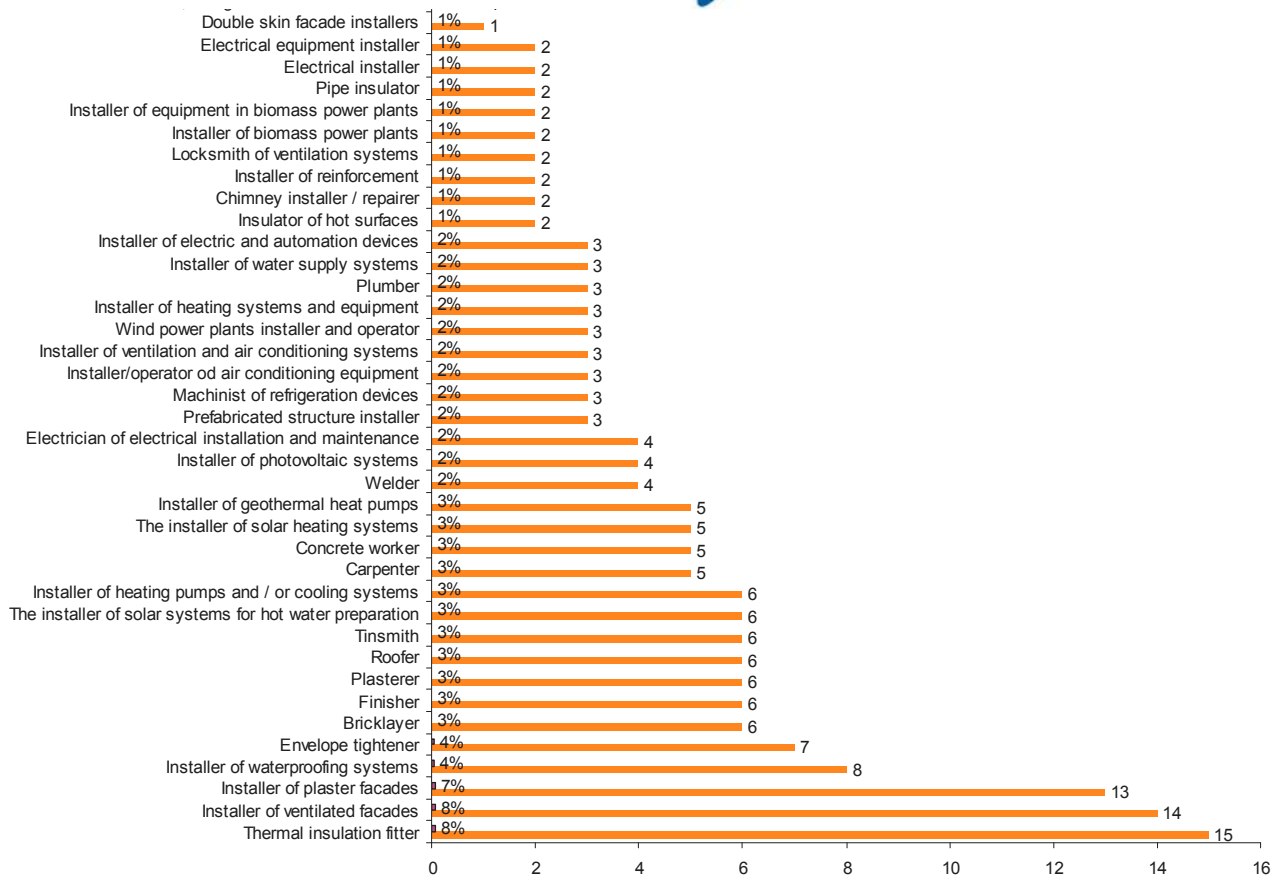


Fig. 7.5. Planned internal trainings to gain professions

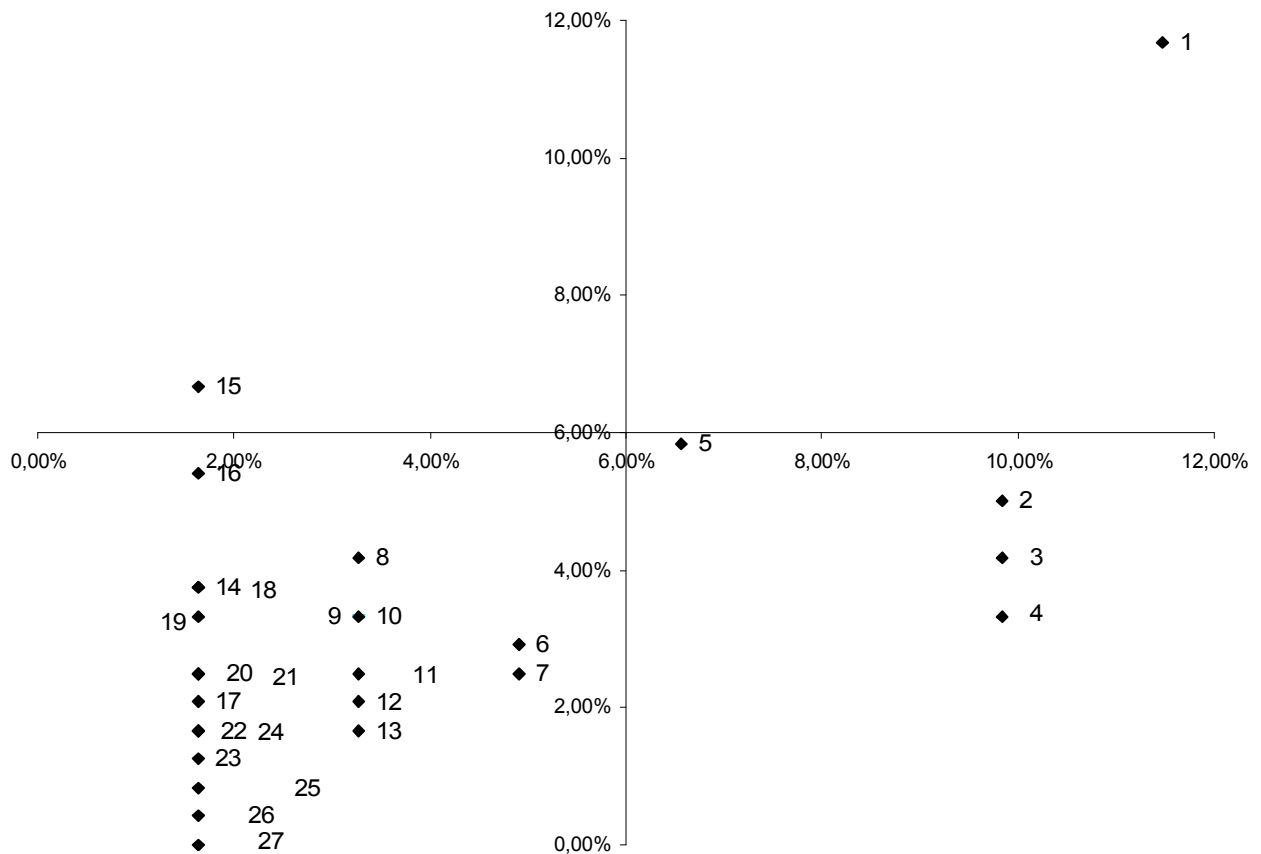


Fig. 7.6. Lacking occupations and planned internal trainings

Table 7.17. The numbering of occupations used in matrix

1	The installer of solar systems for hot water preparation	10	Installer of photovoltaic systems	19	Installer of heating systems and equipment
2	Installer of ventilated facades	11	Finisher	20	Plumber
3	Installer of plaster facades	12	Envelope tightener	21	Tinsmith
4	Installer of heating pumps and / or cooling systems	13	Electrician of electrical installation and maintenance	22	Carpenter
5	Thermal insulation fitter	14	Wind power plants installer and operator	23	Plasterer
6	Bricklayer	15	Installer of biomass power plants	24	Concrete worker
7	Installer of waterproofing systems	16	Installer of electric and automation devices	25	Installer of water supply systems
8	Installer of ventilation and air conditioning systems	17	Pipe insulator	26	Machinist of refrigeration devices
9	Welder	18	Roofer		

The majority of respondents indicated that the effective duration of training in the company could be 2-5 days.

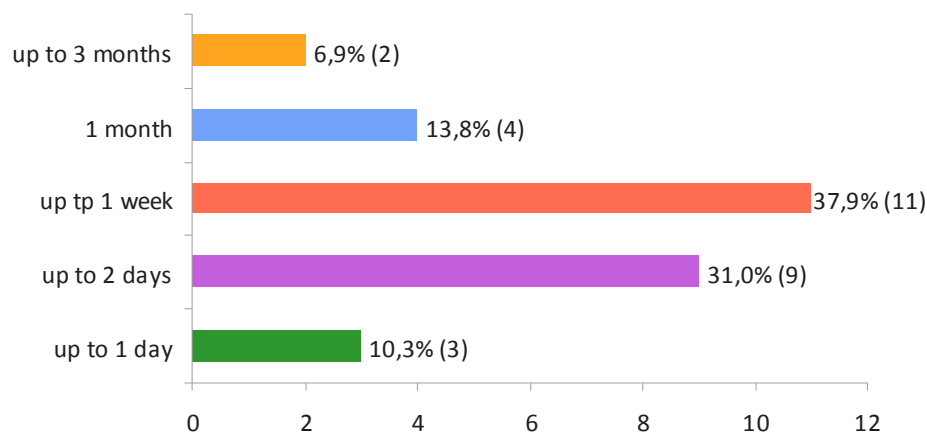


Fig. 7.7. Opinion of companies on the effective duration of training

Table 7.18. The summarised results of analysis on demanding professions*

Understaffed professions	Planned training	Most demanded professions in the construction sector	Most financed professions in the construction sector
Fitter of building thermal insulation	Installer of ventilated facades	Finisher	Welder
The installer of solar systems for hot water preparation	Installer of plastered facades	Fitter of building thermal insulation	Finisher
Installer of electric and automation devices	Installer of heating pumps and / or cooling systems	Welder	Fitter of building thermal insulation
Installer of ventilated facades	The installer of solar systems for hot water preparation	Bricklayer	
Installer of plastered facades	Fitter of building thermal insulation	Woodworker	
Roofer	Bricklayer	Installer of facades	
Wind power plants installer and operator	Installer of waterproofing systems	Building renovator\ Plasterer	
		Tiler	

* Professions listed in priority order

Training needs can be predicted on the basis of the provisions of the Directive 2010/31/EU that the requirements for almost zero-energy buildings and renewable energy resources development by the year 2020 will reach predetermined level and therefore relevant workers will have to be further trained or retrained.

Are all workers will take special training will depend on the training mandatory nature. If the training will be optional (no special requirements for the system of qualifications), a relatively large part of employees will gain the necessary skills and knowledge in practice from the more skilled coworkers (as confirmed by surveys of employers). Some employers give priority to the non-external training and qualification in the workplace, for example, giving the attitude of the young workers as the unskilled, which reaches the appropriate qualifications only by working in enterprise.

Employers' survey data also show that the majority of employers think that effective duration of additional training is 2 to 5 days, so it is not related to deep uptake of fundamental knowledge, but only filling out a small missing gap.

The possible political solution for requirements of qualification to construct energy-efficient buildings should be provided. It may also be requirements for an company or other legal entity taking over responsibility for the quality of work (for example, workers employed under patents, construction managers (masters) in enterprises, technical professionals). Survey data showed that not all construction companies fully understand the importance of workers qualifications, as well as do not trust the external training valuing more work practice on construction site. In this case, if the respective qualification requirements will not be provided, motivation for worker training may not be sufficient.

There is need to pay attention to the fact that realy energy-efficient buildings can be built only through application of such work techniques that ensure exceptionally high quality of buildings and engineering systems. As the result can be ensured building tightness, excellent surface insulation (protection from environmental influences, eliminated cold bridges and so on.), efficient integration and work of HVAC systems (cooling, heating) throughout the building life cycle. Requirements of for the building's energy efficiency and economic feasibility of these requirements related to the building's lifetime (in long term period) and therefore the requirements for qualification should be reviewed, and the construction warranty period should be extended.

Conclusions

Recently the mostly financed trainings in labor market are the welder, decorator and building thermal insulation professions. The top ten demanded are bricklayer, carpenter, façade insulator, plasterer and tile fitter professions. The survey respondents predict that the demanded will be professions whose activities are related to the thermal insulation works, installation of facades, installment of building metering systems, solar heating systems and wind energy systems installation. Companies, taking into account market trends in planning appropriate training foresee that the effective length of training is up to 5 working days. Survey data showed that not all construction companies fully understand the importance of qualifications, as well as do not trust the external training valuing more work practice on construction site. Training demand can not be identified precisely, because it concerns not only to the predictable factors (Directive provisions), but also unpredictable political decisions. Demand for training will be determined by market participants' reaction to more stringent requirements for buildings, work and workers' skills. The political solution for qualification requirements to construct energy-efficient buildings should be provided, including not only requirements for the workers on site, but the certification requirements for managing and engineering staff as well as construction companies.

7.4. Forecast for the demand of monitoring measures

Implementation of requirements of Directive 2010/31/EC of the European Parliament and of the Council of 19 May 2010 on the energy efficiency of buildings undoubtedly will require new knowledge in all links of the construction process (design, supply, construction, operation) and levels (workers, craftsmen, engineers, construction managers, managers). With regard to the vocational training level, many areas of blue collar workforce in construction will need additional training related to the specifics of the implementation of new requirements for buildings, and the introduction of new topics in vocational training programs. Considering that the experience for the implementation of new requirements for buildings is virtually non-existent (currently only a few pilot projects are implemented which are not enough to declare a reliable experience), the monitoring of ongoing situation as well as data collection and analysis of the need for appropriate measures will be very important in the future.

Implementation of the directive objectives can be significantly affected by development imbalances in the construction sector, which can be caused by changing political decisions as to provide or not to provide support for related projects (such as the subsidy of renewable energy sources, renovation of buildings), the general global economy and Lithuanian economy, economic situation of the neighboring countries, emigration of workers from the country, and other.

In view of the construction industry development forecast, the need for additional training and updates of training programs, the monitoring must be carried out constantly to show the relationship between the need for knowledge and their delivery. Out of the monitoring activities related with the objectives of this project in Lithuania we can mention the monitoring of the education system carried out by the Centre of Information Technologies in Education which was governed by Order of the Minister of Education and Science of the Republic of Lithuania “On the approval of the state education indicator monitoring” (30 December 2005). State education monitoring indicators are grouped by the component of the education system they characterise: educational context, provision and organization, staff, students, participation in education, teaching and learning processes, learning outcomes, education implications or monitoring of the educational system (meta indicators). These indicators related to the project include:

- enterprise expenditure on continuing vocational training as part of the general price of labour (per cent);
- number of hours for vocational education courses per 1000 working hours (in all enterprises; in companies organising vocational training courses);
- ratio between the funds used and planned for the up-skill of qualification of vocational school teachers;
- share of persons who have acquired basic/secondary education/vocational qualification and persons continuing studies in the same year and distribution in the education system (per cent);
- share of persons employed according the professional qualification within a year after its acquisition (per cent);
- share of vocational training graduates registered in the Labour exchange (per cent).

Currently the new version of a similar order was approved: “On the approval of the state (strategic) education monitoring indicators”. Data of education monitoring indicators are published on the website: <http://www.svis.smm.lt/svis/node/5>.

Conclusion

It is important to note that the specified education monitoring does not meet the needs of the project, as it covers only very generalized education indicators. The successful implementation of Directive 2010/31/EU should require the collection of additional data on the situation on the labour market in construction, in particular, information relating to the implementation of Directive, the gap between the knowledge and skills, readiness of professional training institutions to provide the necessary knowledge for the represented various professions.

8. Barriers related to the qualification of the building workforce which may hinder the country's achievement of the 2020 targets in the building sector

In order to determine what barriers may appear in achieving the objectives of 2020, related with the data on training, teachers and the need for skilled workforce, the respondents of the survey were asked following questions:

- What factors, in your opinion, could be most efficient in stopping/ delaying the preparations for the construction of energy efficient buildings?
- What measures, in your opinion, might speed up the preparations for the construction of energy efficient buildings?

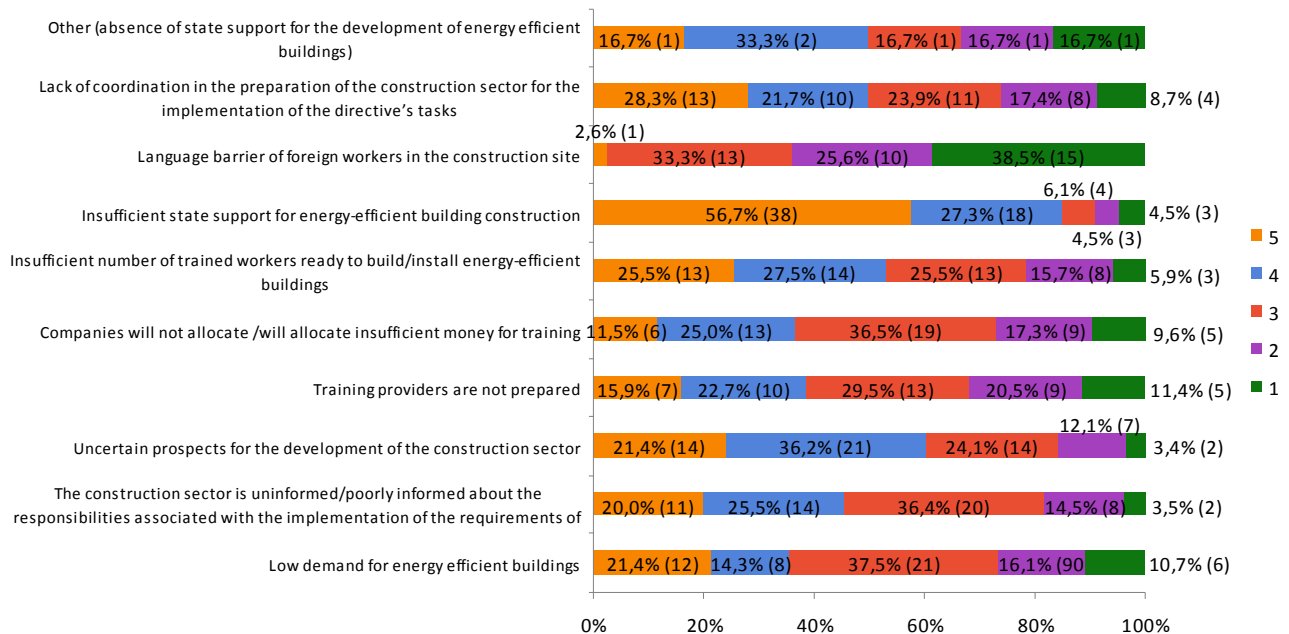


Fig. 8.1. The opinion of respondents on most efficient factors in stopping/ delaying the preparations for the construction of energy efficient buildings (the 5th rank marks the most important factor)

The factors that respondents believe most hinder/impede the preparation for the construction of energy efficient buildings are as follows (written in the order of importance):

- Low demand for energy efficient buildings
- The construction sector is uninformed/poorly informed about the responsibilities associated with the implementation of the requirements of directives
- Uncertain prospects for the development of the construction sector
- Training providers are not prepared
- Companies will not allocate /will allocate insufficient money for training
- Insufficient number of trained workers ready to build/install energy-efficient buildings
- Insufficient state support for energy-efficient building construction
- Language barrier of foreign workers in the construction site
- Lack of coordination in the preparation of the construction sector for the implementation of the directive's tasks
- Other (absence of state support for the development of energy efficient buildings)

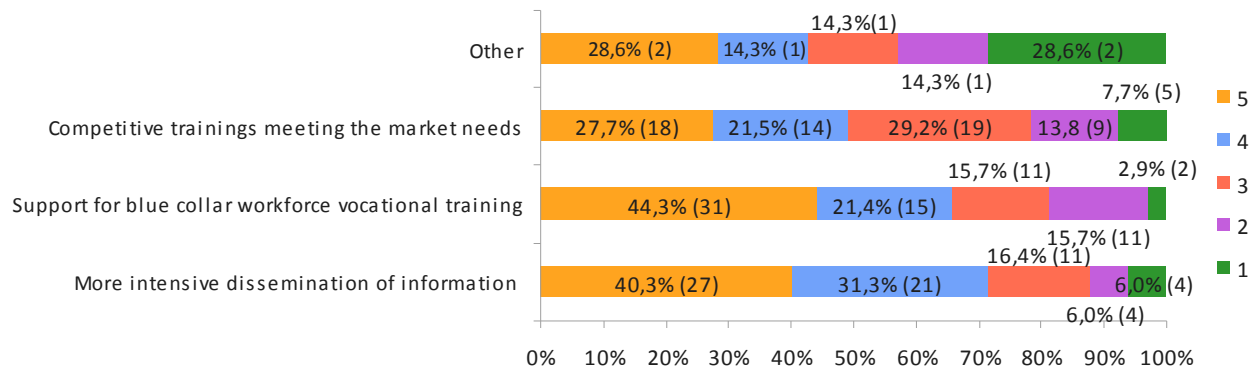


Fig. 8.2. The opinion of respondents on measures that speed up the preparations for the construction of energy efficient buildings (the 5th rank marks the most important factor)

The most important measures that, in the opinion of the respondents, might speed up the preparation for the construction of energy efficient buildings, are as follows:

- More intensive dissemination of information
- Support for blue collar workforce vocational training

Next section analyses in more detail the issues related to funding, lack of knowledge and information, and preparation of training institutions.

8.1. Financing

Teaching funds for formal training allocated from the state budget, the state budget subsidies for municipal budgets and (or) Employment Fund through the Government approved calculation methodology of training costs per pupil.

Companies, institutions, farm workers' continuing vocational training funded by enterprises, institutions, farms or pupils. The legally set order states that company, institution or farm training can be funded upon a the state budget funds.

The main EU financial support goal in EU Structural Assistance Strategy in Lithuania (approved by the European Commission in 2007, April 26) for 2007-2013 is rapidly improve conditions for investment, work and live in Lithuania, the economic benefits of growth should reach all citizens of Lithuania. Action programs help implement the strategy goals and objectives.

By the Resolution of Government of the Republic of Lithuania issued in 2007, October 17, No. 1139 (a new version of the Resolution No. 938, issued in 2012-07-18), in the implementation of of European Union structural support strategy and action programs for 2007-2013 years the responsibilities and functions between institutions were distributed.

Operational management of programs carried out by institutions whose responsibilities and functions of laid down in regulations and devoted to the Action Programme.

One of the institutions carrying out action program administration - the European Social Fund Agency. The Lithuanian ESF programme aims to address labour force shortages by mobilising available human resources and upgrading skills and qualifications. This includes investment in the neediest sections of society: people in areas of high unemployment and those who have been out of work for over a year. Helping workers adapt to new market conditions by providing tailored training schemes is therefore key – as is improving the quality and accessibility of this training.

Agency during the period of 2007–2013 implementing following priorities:

Priority 1: High-quality employment and social inclusion

- Helping workers and companies adapt to changing market conditions
- Upgrading skills and access to the labour market, thus boosting social inclusion

Priority 2: Lifelong learning

- Developing an institutional framework for lifelong learning and improving the quality and accessibility of these services

Priority 3: Increasing the competence of researchers and scientists

- Upgrading the qualifications of scientists, doctoral students and other researchers involved in research and development
- Promoting the mobility of researchers and students at both domestic and international levels and between the public and private sector
- Increasing the number of researchers and lowering their average age

Priority 4: Administrative capacity-building and improving efficiency in public administration

- Improving human resources management and administrative capacities in civil service
- Improving performance management, better implementation of EU initiatives and improving the structure of public administration
- Increasing the quality of economic activity regulation and improving the provision of public services to business and citizens

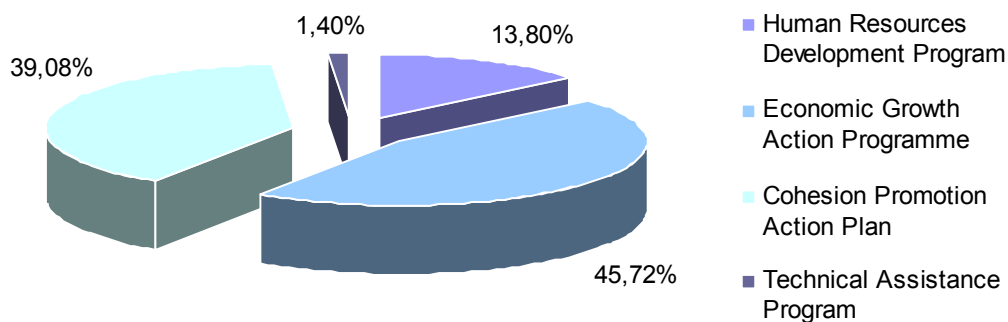


Fig. 8.3 pav. Distribution of EU structural fund for priority measures in period 2007 – 2013

Human Resources Development Program designated for all working-age residents of Lithuania, since investments in the Lithuanian people's knowledge, skills, activity and entrepreneurship ensure a long-term economic growth. This program funded by 13.8 percent of EU structural funds.

Another program, which is widely used in vocational training institutions - Leonardo da Vinci program designated for the cooperation between EU countries, support and promote the development of vocational training. The program's main goal - to join the various European institutions in different countries, including all levels of vocational training institutions, local government bodies, employers' organizations and other civil society organizations to develop future training policy.

Education Exchanges Support Foundation is a Lithuanian national agency responsible for implementing EU Lifelong Learning Programme plus a number of other EU and national programmes and projects within the field of education and training. Education Exchanges Support Foundation manages the following actions of Leonardo da Vinci programme in Lithuania:

- **Preparatory visits.** Preparatory visits provide an opportunity for education and training institutions to cooperate with their European counterparts in view of submitting future applications under the Leonardo da Vinci sectoral programme (Mobility; Partnerships; and Transfer of Innovation).
- **IVT (Mobility for Trainees in Initial Vocational Training).** The action aims at the support of transnational mobility of persons undergoing initial vocational education and training. The action supports participants in training and further training activities in the acquisition and the use of knowledge, skills and qualifications to facilitate personal development.
- **PLM (Mobility for People in the Labour Market).** The action aims at the support of transnational mobility of workers, selfemployed or people available for employment (including graduates) undergoing a training period abroad in a vocational training context. This measure gives an opportunity to improve skills and accumulate professional knowledge, deepen skills, to

performs a traineeship in businesses, access to other training innovations, new technologies, to exchange experiences with colleagues.

- **VETPRO (Professionals in vocational education and training).** A Mobility project for Professionals in Vocational Education and Training focuses on the transfer, improvement and update of competences and/or of innovative methods and practices in the field of vocational training. Individual trainers, teachers or other persons responsible for Vocational training issues exchange experiences with their counterparts in other countries with the aim of mutual learning.
- **Partnership.** A Leonardo da Vinci Partnership is a framework for small-scale co-operation activities between organisations working in the field of vocational education and training ("VET") which will be cooperating on themes of mutual interest to the participating organisations. Partnerships could also be used to continue to co-operate on results achieved in a previous project or be a first step towards a mobility or transfer of innovation project.
- **Transfer of Innovation.** The aim of the Leonardo da Vinci Multilateral Projects 'Transfer of Innovation' is to improve the quality and attractiveness of the European VET system by adapting an integrating innovative content or result from previous Leonardo da Vinci Projects, or from other innovative projects into public and /or private vocational training systems and companies at the national, local, regional, or sectoral level.

The results of employer survey show that the skills deficiency is usually solved by sending workers on short-term training courses organized by other organizations. Quite a few companies provide training within the company. Others prefer other ways of improving workers' qualifications, i.e. by sending to professional bodies to train, by choosing skilled workers from the market or by giving possibility for workers to improve their skills at their own expense (Figure 8.4.).

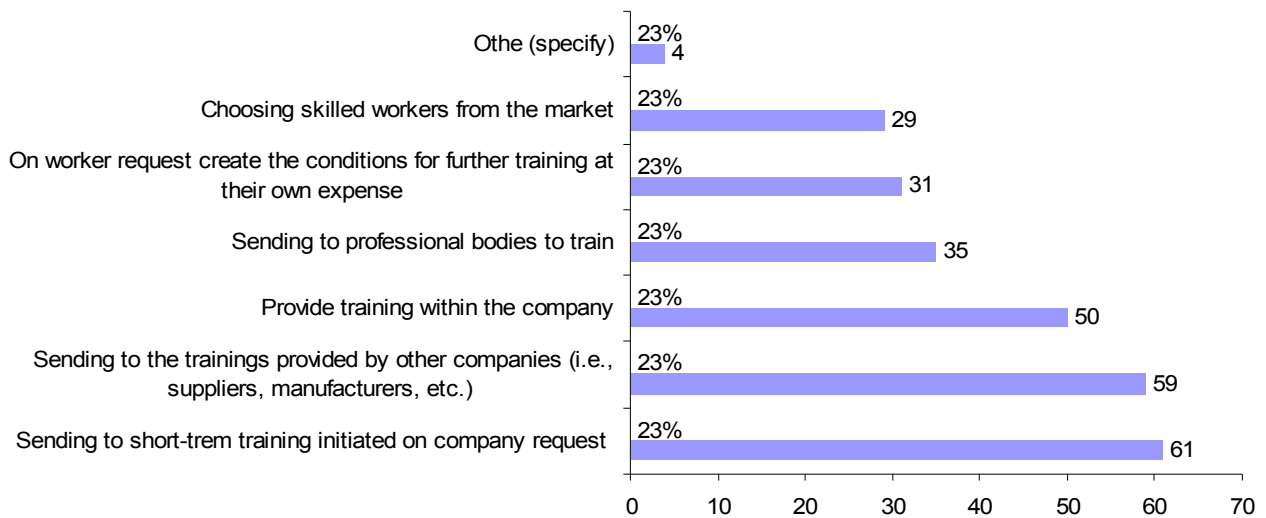


Fig. 8.4. The conditions for workers in companies to improve their qualification

Data of VET providers survey show that the student's preparation under the primary education programs, funded only by state funds. Student's preparation under the formal continuing education programs funded in different ways, but for the most part by the employer's expense, the student's own funds, then goes the EU funding programs and finally by public funds. Training in non-formal continuing education program largely funded by the employer's expense.

Training prices vary greatly, the price is usually calculated for every case. Generally training cost per person (when training takes place in group of 12-15 persons) are 5-15 LTL/hour. Price depends on:

- total training time (one hour training cost is usually lower for lengthy training);
- the materials used;
- training intensity (proportion of theoretical, practical, and self-studies);
- training frequency.

In each survey responses to questions relating to the financing of training and the demanding occupations correlate: respondents noted a similar professional priorities. Priority occupations in the

construction sector (respondents ranks occupations by importance): 1) welder, 2), finisher, and 3) thermal insulator of buildings (see figure 8.5).

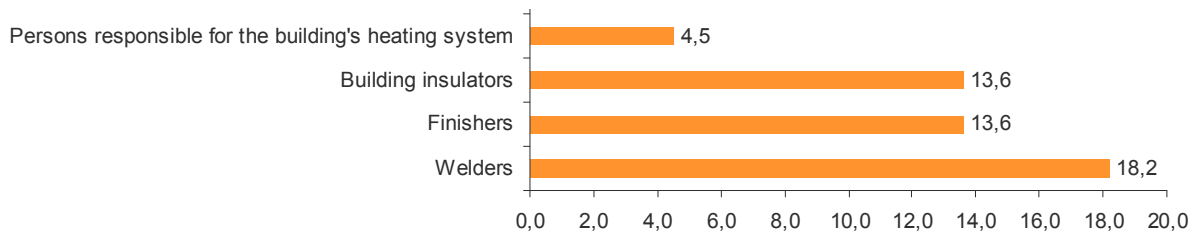


Fig. 8.5. Training priorities of blue-collar workers in construction sector (demanding occupations by importance)

Most popular occupations (mostly funded professions) in the construction sector (written by priority): 1) finisher, 2) thermal insulator of buildings, and 3) welder.

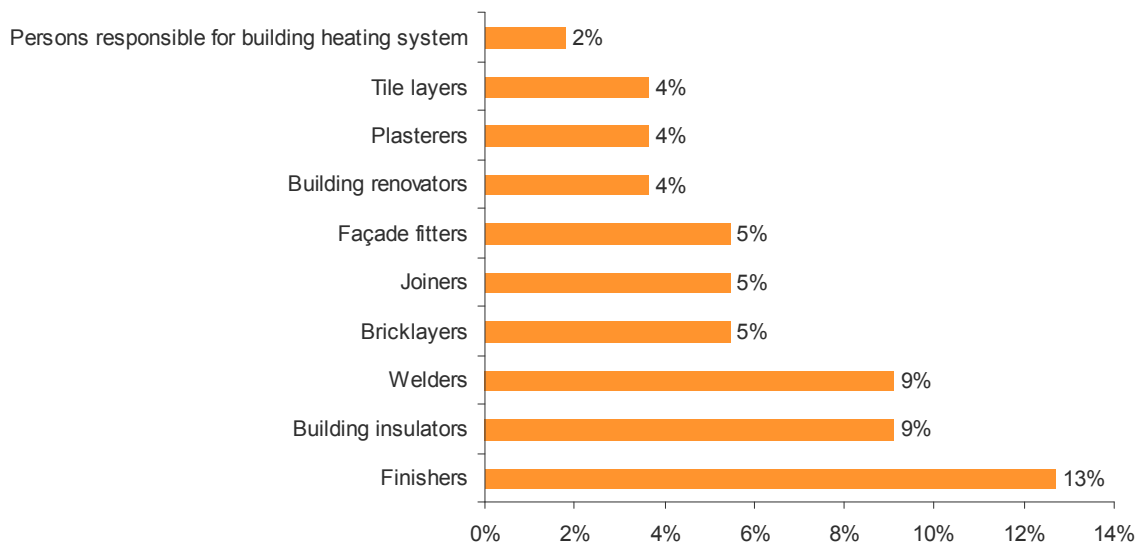


Fig. 8.4. The demand for trainings in construction sector (demanding occupations by financing priorities)

Conclusion

Minimum data, obtained from a survey carried out, showed that formal training in Lithuania funded by the government, a formal continuing training funded by the employer, student and EU support, and non-formal education by 87% funded by business. The employer survey identifies the main employer-funded professional preferences: namely, finisher, thermal insulator of buildings and welders, and in area of engineering systems: namely, installers of renewables, metering systems, plumbing, electrical equipment and systems installers. The formal training program must meet the requirements for qualification described in the professional standard, but for now these professional standards are under development. Also unclear the funding arrangements for an informal curriculum development. Under current legislation, costs related to the curriculum development and adaptation are not eligible, therefore not supported.

8.2. Knowledge and information

Lithuanian construction sector is dominated by small and micro-companies with a staff of up to 49 employees. These aspects are main limit of companies time and financial resources towards the improvement of workers' skills and development of new technologies and innovation.

The assessment of the Lithuanian construction companies readiness for the construction of energy efficient buildings found that most companies are prepared on average.

The biggest obstacle to the development of new technologies referred to as increased payment risk in the Lithuanian market and intervention in the requirements of technological solutions usually made by clients. One major obstacle is application of lowest price requirement in purchase process, as in this case, only the final building/equipment price becomes the most important factor than its further operating costs, quality, durability, or other important long-term characteristics. All interview participants linked the development of more efficient technologies with the necessary education of clients covering information on new technologies.

It should be noted that larger companies mention the potential for the development of more efficient and innovative technologies only by the intervention of state regulation and support, such as the renovation of public buildings or implementation of various demonstration projects. These objects will serve as an example and standard for other groups of clients.

The companies highly critical of the new labor market, assessing the existing staff skills and knowledge as poor or evaluate skills of experienced staff as not reflecting the actual requirements. Therefore, the main focus is made on young workers to be trained within the company on the basis of the company's technology. Their learning process goes during the course of construction.

Most construction companies predict growth in demand for workers with regard to energy efficiency. However, the main reasons that determined the response to the growth in demand is the fact that most companies are aware of the EU Directives (Fig. 8.5), their implementation, and are also feeling the growing clients interest.

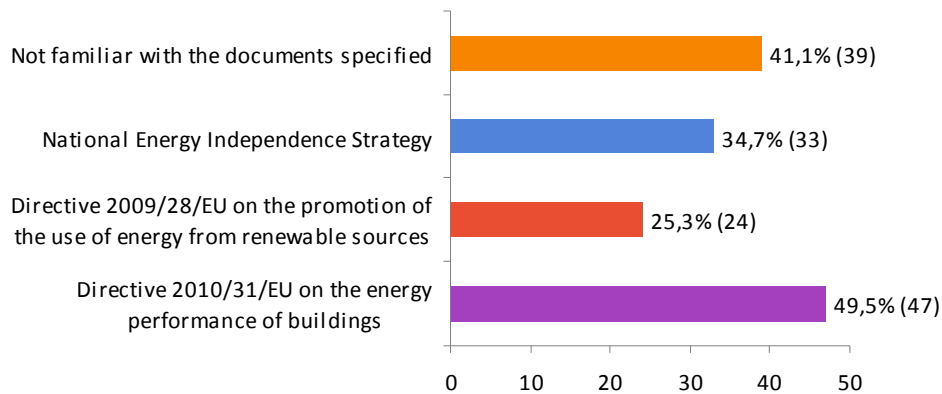


Fig. 8.5. The assesment of knowledge level n construction companies (survey data)

Companies specializing in energy-efficient building construction noted that Lithuania has not yet fully developed market for energy-efficient buildings and renewable energy sources technology, and today there are no any significant need for improvements of the qualifications and skills of such workers. But if demand for energy efficient buildings will increase the current readiness, general knowledge of technology and practical experience is clearly insufficient.

Companies sees a big problem for high-skilled emigration or transfer to the individual activities that in Lithuania is particularly useful because of its low tax base. The taxation of individual activity differ from the company employed workers by almost twice. However, there are no actual numbers of how many and what occupations in construction emigrate or work individually.

Study carried out showed that in order to increase the attractiveness of vocational education and quality it is necessary to:

- strengthen vocational training and higher education links;
- strengthen links with employers;
- to raise professional status and competence of teachers;
- to improve the content of vocational training.

8.3. Preparedness of educational institutions

Currently, Lithuania has 79 vocational training institutions, training over 46 thousand students. Vocational training is free, and advanced students are paid scholarships. 20 training programs of initial vocational education providing professional qualification, 36 training programs of continuing vocational education, 9 of them ensuring the right to perform work or function, have already prepared. The following vocational training standards are developed for professions in construction:

- Carpentry Training Standard (2004)
- Roofer Training Standard (2004)
- Bricklayer / concrete layer Training Standard (2004)
- Plumber Training Standard (2004)
- Finisher (Builder) Training Standard (2004)
- Road construction and maintenance worker Training Standard (2008)
- Geodesy Engineer Training Standard (2001)
- Construction Engineer Training Standard (2004)
- Building Engineering Systems Engineer Training Standard (2004)
- Road Engineer Training Standard (2004)
- Electrical equipment Installer Training Standard (2001)
- Welder Training Standard (2004)
- Automated systems operation mechatronics Training Standard (2004)
- Electronic equipment fitter and tuner Training Standard (2004)
- Ventilation and air conditioning systems manufacturer and installer Training Standard (2004)
- Electricity Engineer Training Standard (2004)
- Engineer of Mechatronic Systems Training Standard (2004)
- Thermal Energy Engineer Training Standard (2003)

The pedagogical staff of vocational training institutions is presented in table 8.1. Tables 8.2 and 8.3 presentsa respectively the qualification categories of general education teachers and qualification categories of teachers of profession. The data provided in the registry of Centre of Information Technologies in Education is not up to date and do not provide the necessary criteria, therefore the objective conclusion on the quality of preparedness of staff of vocational training institutions could not be stated.

Improvement of teacher’s skills. During an academic year, teachers shall allocate 5 days for improvement of their skills. Every municipality has a teacher education centre, in which teachers can improve their qualification. These services are also provided by various private institutions.

There is a system implemented for the appraisal of teachers. The Regulations of the Appraisal of Teachers specify four teacher qualification categories: teacher, senior teacher, teacher-supervisor, and teacher-expert. Teachers or specialists in assisting the student can undergo appraisal at their own choice and in accordance with the procedure established in the Regulations, and pursue acquisition of any qualification category in one or several subjects (education fields, vocational training programmes).

Table 8.1. The pedagogical staff of vocational training institutions (October, 2010)

Pedagogical staff	Number of pedagogical staff		Education of pedagogical staff					Experience of pedagogical staff				Qualification categories of pedagogical staff			
	Total	women	higher	of it pedagogical college	of it pedagogical secondary			up to 5 years	5 - 9 years	10-14 years	15 years and more	teacher	senior teacher	teacher supervisor	teacher expert
A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Total	3962	2698	3203	2263	592	195	167	568	558	393	2443	532	1793	585	51
director	74	20	74	50				5	2	9	58	4	19	14	
deputy directors, heads of divisions	266	175	260	193	6			15	17	28	206	8	127	60	12
teachers	1172	963	1134	1026	25	16	13	134	140	109	789	146	604	251	11
profession teachers	2142	1313	1525	829	479	145	138	374	341	215	1212	337	935	239	27
tutors, mentors of dormitories	116	103	70	56	41	23	5	14	17	5	80	16	43	2	
social teachers	75	69	73	63	1	1	1	9	25	10	31	8	29	6	
special teachers	10	10	10	7				2	4	1	3		1		
psychologists	10	8	10	7				2	1	2	5	x	x	x	x
supervisors	40	33	39	30	1	1		2	6	5	27	4	18	13	1
heads of laboratories	5	4	2	1	1		2	1	1		3		2		
driving instructors	52		6	1	38	9	8	10	4	9	29	9	15		

Source: Centre of Information Technologies in Education (<http://www.svis.smm.lt/svis/>)

Table 8.2. Qualification categories of general education teachers

Qualification categories	Total	Of them having pedagogical experience		
		up to 10 years	10-14 years	15 years and more
	1	2	3	4
Uncertified	166	116	13	37
Teachers	141	89	16	36
Senior teacher	603	62	65	476
Teacher supervisor	251	7	15	229
Teacher expert	11			11
Certified total	1006	158	96	752

Source: Centre of Information Technologies in Education (<http://www.svis.smm.lt/svis/>)

Table 8.3. Qualification categories of teachers of profession

Qualification categories	Total	Of them having pedagogical experience		
		up to 10 years	10-14 years	15 years and more
	1	2	3	4
Uncertified	605	442	55	108
Teachers	337	156	30	151
Senior teacher	934	104	99	731
Teacher supervisor	238	12	20	206
Teacher expert	28		1	27
Certified total	1537	272	150	1115

Situation in vocational training system has been assessed on the basis of information gathered during the project focus group meetings with representatives of training institutions. Vocational training system are familiar with the EU Directives (fig. 8.6). Currently intensive preparations for change are undergoing. Practical training centers of construction sector have been established (7), sector skills development of professions teachers is in process, training tools developed for the modular construction industry training programs. Investments have already made in training facilities (this also reflected in the survey), the training of personnel and renewal of training materials.

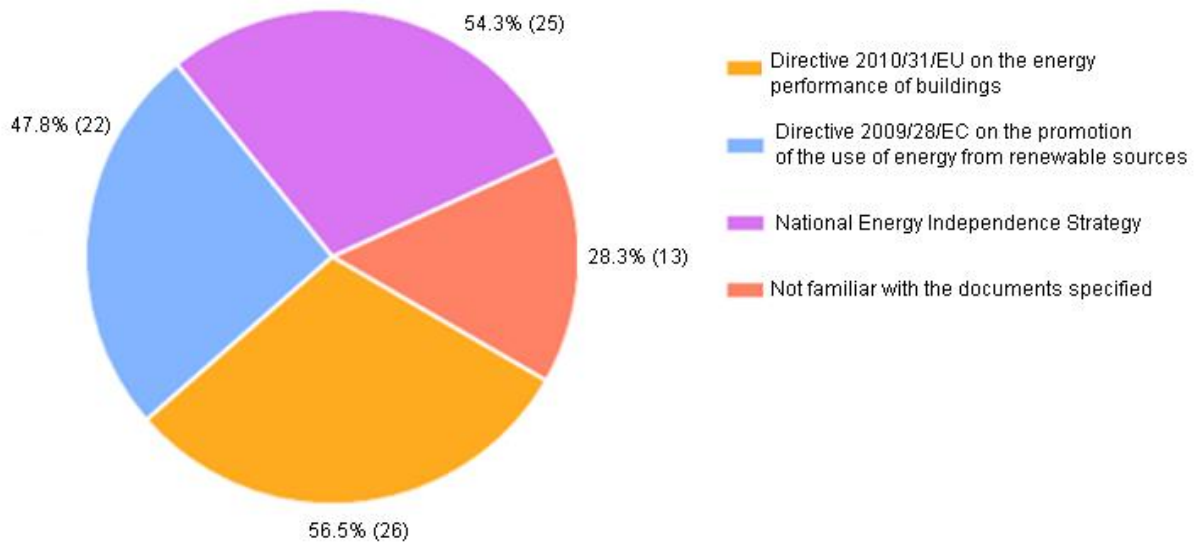


Fig. 8.6. The level of awareness of training institutions (survey data)

However, training institutions practically hesitant to update and develop training programs because the standards of most demanded occupations are not yet prepared/or updated. To date, this is the weakest link in the chain of the Lithuanian vocational training market.

Several recommendations of educational institutions provided during focus group meetings:

- Many of the professional standards are out of date, part of the occupations standards not yet prepared. In the development of professional standards along with the QVTDC should work professional associations. There is a need for a greater influence of the bodies representing employers.
- It is necessary to encourage employers' initiative because the current requirements are not consistent with the provided funds.
- It is necessary to facilitate the teacher training.
- It is appropriate to change the model of use of the training funds (part of the structural funds). It is necessary not to create artificial requirements in the allocation of funds.
- The area of energy efficiency it is appropriate to form the credit system that will work so that the final user of training has access to credit and his readiness is seen according to this.

Within the scope of the project, it is necessary to develop proposals to the model in the second stage of the formation of roadmap.

Preparedness of educational institutions was measured by the respondents' answers to the questions in the survey of training institutions and employers:

- How much your training institution is willing to conduct training programs related to the building of energy-efficient buildings and the use of renewable energy source technologies?
- What vocational training of workers is mostly funded? (in the survey of educational institutions)
- What are the occupations with skills needed for the efficient use of renewable energy sources and technologies, that currently are undersupplied on the market? (in the survey of employers)
- Which professions (or skills) will be trained during the internal training? (in the survey of employers)

More than half of the respondents indicated that they are partially prepared to carry out training programs related to the construction of energy-efficient buildings and the use of renewable energy source technologies, or need a small investment and/or improvements to eliminate minor inconsistencies, therefore the respondents believe that such a discrepancy can be quickly eliminated and will not affect the quality of teaching (see fig. 8.7 and 8.8).

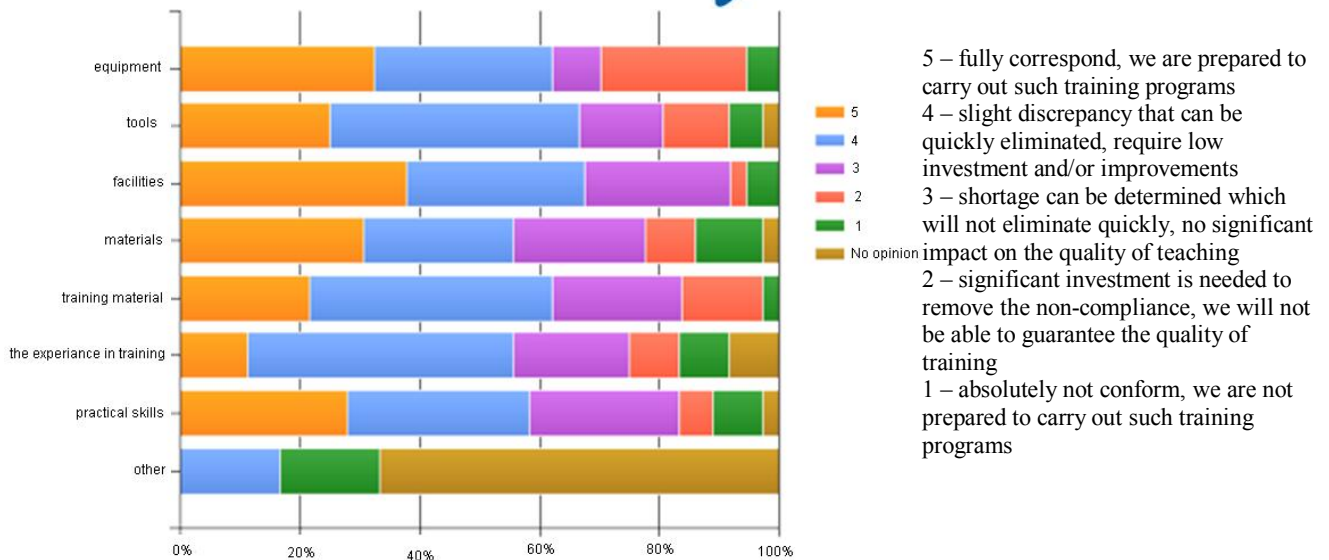


Fig. 8.7. Readiness of educational institutions to conduct training programs related to the construction of energy-efficient buildings and sources of renewable energy technologies

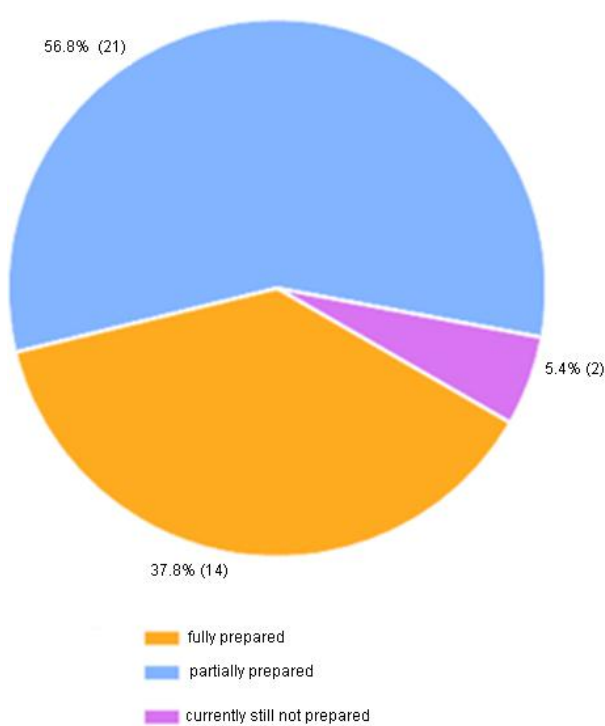


Fig. 8.8. Preparedness of educational institution personnel for the requirements of the planned programs

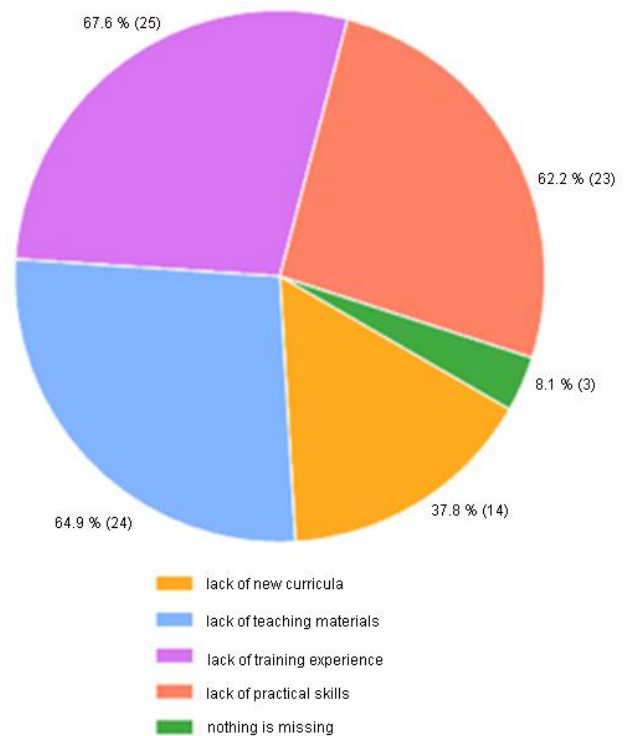


Fig. 8.9. Lacking areas of vocational training for the training of workers in accordance with training programs for the construction of energy efficient buildings and efficient use of renewable sources of energy technologies

Answering the survey question “What, in your opinion, the blue collar workforce training lacks most in accordance with training programs for the construction of energy efficient buildings and efficient use of renewable sources of energy technologies?” the majority of respondents stated that they lack of such training experience (67.6 per cent), teaching materials (64.9 per cent) and practical skills (62.2 per cent). A high percentage of respondents (37.8 per cent) mentioned new curricula.

Although the majority of respondents indicated that the demand for blue collar workforce with skills for the construction of energy efficient buildings and the efficient use of renewable energy source technologies is already growing and there is a lack of teaching material and new or revised training programs, but they are not in a hurry to up-skill training programs (see fig. 8.10).

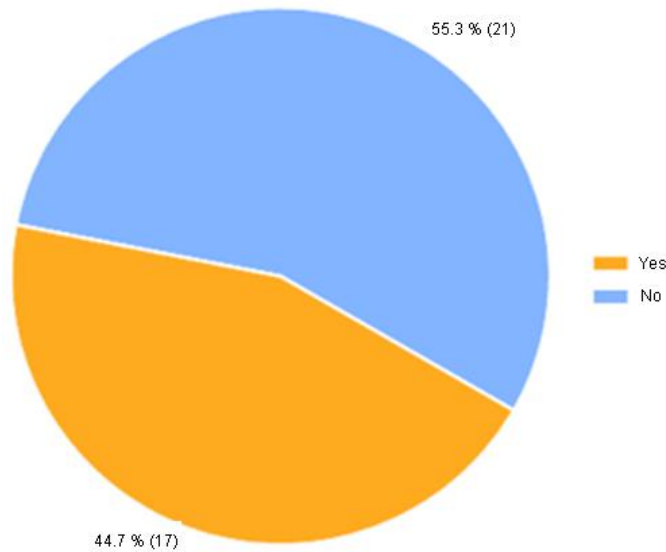


Fig. 8.10. Plans of respondents to update/create new training programs related to the preparedness for construction of energy-efficient buildings and the use of renewable energy source technologies

Conclusions

The above examples show that training providers are ready to transfer foreign experience in initial and continuing vocational education and training programs, to carry out dissemination of projects implemented. Although about half of the respondents indicated that they are fully prepared to carry out training programs related to the construction of energy-efficient buildings and the use of renewable energy source technologies, or need a small investment and/or improvements to eliminate minor inconsistencies, but at the same time the majority of respondents indicated that they lack of such training experience (67.6%), teaching materials (64.9%) and practical skills (62.2%). A high percentage of respondents (37.8 per cent) mentioned new curricula. Although the majority of respondents indicated that the demand for blue collar workforce with skills for the construction of energy efficient buildings and the efficient use of renewable energy source technologies is already growing and there is a lack of teaching material and new or revised training programs, but they are not in a hurry to up-skill training programs.

8.4. Other obstacles

Summarising the results of analysis in the first phase of the project the following main obstacles for achieving the 2020 objectives in relation to training, teachers and labor market preparation for the construction of energy efficient buildings, can be distinguished:

- Vocational training system in the construction sector is fragmented, focuses mostly on the processes and regulation, rather than the 2020 targets and training. The renewal and adaptation process of existing curricula and training standards is slow. There are also vocational training providers, who are not sufficiently aware of the impending changes in the requirements for buildings. The training process is not enough equipment (do not correspond to the latest technological developments). There is a lack of highly qualified teachers.

- The negative impact of the crisis for the construction sector. The crisis increased labor migration abroad, decreases the number of high-skilled workers in the local market. The arrived from abroad workers receive qualification and emigrate once again.
- Lack of knowledge in small and medium-sized enterprises on energy savings and future changes related to the 2020 objectives. In the local market the demand for renewable energy systems and energy efficient buildings is low, poor experience installing such systems in buildings. A large gap between energy efficiency theory and practice.
- Poor quality of construction works due to the selection of contractors under the lowest price criterion. As a result, it is unclear whether the building passive and active energy saving measures will be implemented with high quality. The selection of contractors for the construction of energy efficient buildings should be based on the economically most advantageous tender evaluation methodology.
- There is no demo projects in construction of energy-efficient buildings, limited data on best practice, little research in this area, lack of true (checked) solutions. There is a doubt whether the solutions proposed by the designers for energy-efficient buildings after construction will give the expected effect. And if the expected effect is not achieved, then who will take responsibility for this?
- Lack of state support for promotion and construction of energy-efficient buildings. Lack of coordination in the construction sector in preparation for implementation of the directive's tasks. At that moment the market is not ready to take over the Directive No. 2010/31/EU (EPBD) on the energy performance in buildings.

9. Conclusions and recommendations

Lithuanian legislation is currently sufficient for the implementation of the Directive 2010/31/EU on the energy performance of buildings. Relevant Lithuanian legislation provides guidelines for the implementation of the Directive in stages by 2020, to create conditions for the construction of energy-efficient buildings in terms of energy saving potential, the use of renewable energy resources, environmental conservation and cost-effectiveness.

In order to increase the energy efficiency of buildings in view of the requirements of Directive on the energy performance 2010/31/EU, provisions were adopted in the Lithuanian legislation that since 2020 the heat loss through the walls of the buildings designed and constructed in Lithuania should be reduced by about half, the heat losses due to infiltration will be reduced to a minimum, as very stringent requirements are set for building air tightness. This requirement will be verified by mandatory building air tightness test. The use of ventilation systems with heat recovery will be binding for effective use of energy. The mandatory renewable energy sources will have to be used for the building energy balance. It is envisaged that by 2020, renewable energy resources will account for no less than 23 per cent of final energy consumption.

The study revealed that Lithuania is currently experiencing problems in implementing the Energy Efficiency Action Plan. The main problems related to energy-saving purposes originate in the household sector, which failed to implement the apartment block modernisation program. Despite recent positive trend and the previous growth of the number of renovated buildings, it is not realistic to achieve the expected results by 2020. Only the growing motivation of apartment block residents in participation of the dwelling renovation could radically change the course of events. Cautiousness to initiate such projects can still be seen, and there is not enough good experience. Residents are most wary of long-term liabilities to banks (taking loans for housing renovation), therefore it is necessary to consider additional project funding models where apartment dwellers might avoid such obligations.

About 60 per cent of apartment blocks in Lithuania were built over the last four decades of the last century, they were mainly brick and typical panel apartment buildings. Thermal characteristics of exterior envelopes in these houses are poor. Heating energy consumption in apartment buildings constructed in accordance with construction technical standards and legislation in force before 1993 are about 5,000 GWh per year. Lithuania has a big potential for building modernization, but because of unfavourable political support for people, buildings are upgraded slowly. Therefore, it must be concluded that the process of modernization will not have significant impact on the demand for blue-collar workers in the construction sector in the future.

It can be stated that the requirements of Directive 2010/31/EU on energy performance of buildings to gradually increase the energy efficiency of buildings are carried out during the transitional period, as the increasing number of buildings is being built using less energy than the mandatory minimum energy performance requirements, but on the other hand, currently there are no buildings fully meeting the “near-zero-energy” building definition (in Lithuanian legislation it corresponds to the definition of a “near-zero-energy” building, subject to A++ energy efficiency class requirements), i.e. such buildings, which will be designed and built after 2020. As a result, it is difficult to identify the qualification deficiencies associated with the construction of such buildings.

The construction sector has about 5 thousand enterprises, 39 % of them specialize in the construction. Small and micro enterprises (the number of employees does not exceed 49 people) predominate in the sector. Approximately 100 thousand employees are working in a construction sector. The main part of them is in a subsector of construction of buildings and their parts (about 68 %). Skilled workers and craftsmen form approximately 50 % of a sector of workforce. According to the data of Lithuanian Labour Exchange, the most demanding professions in the construction sector on the first half of 2012 were welders, finishers, concreters, painters, electricians, roofers and builders.

Local labour market is not able to satisfy the need for all the employees of the most demanding professions; therefore, employees from abroad are occupying the workplaces. For example, during the first quarter of 2012 the permissions for the foreigners to work as welders formed 10 % of all permissions to work in the Republic of Lithuania.

During the economic crisis, when the construction industry shrunk, some redundant construction workers emigrated, others began to work independently, in the shade, without paying taxes. There is a trend that the number of skilled workers is growing in the shade. Shade creates as much as a quarter of the country's GDP, while the shadow cannot quickly shrink because of significant tax burden and slow recovery of the economy.

During the crisis construction companies survived from public sector contracts. Construction companies that had such orders attracted skilled workforce from bankrupt companies. Survival during the crisis was not only due to the good relationship with suppliers and subcontractors, that enabled to offer the best prices to them and win tenders, but also managerial skills, market analysis, and prudence in choosing orders. In 2010, because of large-scale projects the construction market experienced severe labour shortages, companies have attempted to invite workers from abroad, but this endeavour failed and remained only at the experimental level.

Construction industry representatives did not see negative trends in the market in the beginning of 2012, but at the end of the year the optimism was suppressed by the latest GDP forecasts. The forecasts of the European Centre for the Development of Vocational Training (CEDEFOP) forecast are not optimistic, according to the data of the Centre employment in the construction sector in 2020 compared with 2010 will increase by only 1.04 per cent.

Most of the construction companies fail to see the need for training, and to take advantage of already existing labour market supply. Lithuanian construction companies are small and limited in time and financial resources for training. Immature market of energy-efficient buildings and renewable energy source technologies does not pose a significant need for raising qualifications of personnel. However, enforcement of EU directives can change these provisions and it is necessary to prepare for it.

Recently the mostly financed trainings in labor market are the welder, decorator and building thermal insulation professions. In the top ten demanded are bricklayer, carpenter, façade insulator, plasterer and tile fitter professions. The survey respondents predict that the demanded will be professions whose activities are related to the thermal insulation works, installation of facades, installment of building metering systems, solar heating systems and wind energy systems installation. Companies, taking into account market trends in planning appropriate training foresee that the effective length of training is up to 5 working days. Survey data showed that not all construction companies fully understand the importance of qualifications' upgrade, as well as do not trust the external training valuing more work practice on construction site. Training demand can not be identified precisely, because it concerns not only to the predictable factors (Directive provisions), but also unpredictable political decisions. Demand for training will be determined by market participants' reaction to more stringent requirements for buildings, work and workers' skills. The political solution for qualification requirements to construct energy-efficient buildings should be provided, including not only requirements for the workers on site, but the certification requirements for managing and engineering staff as well as for construction companies.

However, a national qualification and certification system for workers in the construction sector not yet developed, particularly in relation to construction of energy efficient buildings (including almost non energy using buildings). Few prime steps have been made to change the situation: on the second of February 2012 the Government has approved the requirements for the institutions responsible for the competence estimation and the description of their accreditation order. However, so far, only the estimation and assessment of the qualification of the welders and workers, participating in the activity connected with the equipment and systems, which contain gas and cause the Greenhouse Effect, are being made. While accomplishing the growing requests from directives concerning to an

environmental protection, workplace safety and other the list of corresponding specialists should broaden.

Information about a continuous non-informal vocational training of the employees is dissipated and at this day is not presented in a single document or study. Furthermore, it is not clear which programme is still operating, because all the sectors were affected by crisis. It is also thought that in the last three years there have not been any efficient investments made into the creation of the training programmes for the builders, who could potentially participate into the construction of the energy efficient buildings. Moreover, there is no system for the accreditation programmes of the tutors.

It is important to note that the specified education monitoring does not meet the needs of the project, as it covers only very generalized education indicators. The successful implementation of Directive 2010/31/EU should require the collection of additional data on the situation on the labour market in construction, in particular, information relating to the implementation of Directive, the gap between the knowledge and skills, readiness of professional training institutions to provide the necessary knowledge for the represented various professions.

The analysis of training programs and questionnaire data of vocational training institutions shows that the vocational training institutions quite effectively respond to emerging market knowledge and skills demands and already preparing new training programs and complementing the existing ones. But clearly noticeable lag, particularly, in the initial training programs. The survey revealed that vocational training institutions are better prepared in question of construction of energy-efficient buildings comparing to renewable energy technologies. The question of energy efficiency in buildings in Lithuania was raised 20 years ago (around 1992), and in that regard requirements are constantly increasing, and vocational training institutions in many cases, already have a suitable training programs, training of personnel and training base, which only need to be updated and supplemented in accordance with the new requirements for energy efficient buildings. In the field of renewable energy technologies the transfer of new materials and technologies is important. In this regard the important role has the non-formal education with participation of new materials and technology suppliers. At early beginning such consortiums could meet the educational demands of the labor market, then later the knowledge and skills to be transferred into a curriculums of formal education.

By accomplishing the indications of a long life learning drawn in the regulations of the State's education strategy 2003–2012 and in Long Life Learning assurance strategy, significant efforts were made to improve the system of the vocational training. Moreover, the actions to set the links between LTQF and EQF were fulfilled, new methods for the preparation of a professional standards and the conception for the modular vocational training system have been approved. In addition, recommendations were given to improve the programmes of vocational training and the system of a quality assurance. Professional standards were approbated and the modular programmes have been estimated with a participation of the sectoral committees. However, up to now, the biggest deficiency in a vocational training system is the training standards that are not yet renewed.

So far, there are a number of obstacles for the implementation of the "2020 goals" in Lithuanian market. Lack of knowledge in small and medium-sized enterprises on energy savings and future changes related to the 2020 objectives. In the local market the demand for renewable energy systems and energy efficient buildings is low, poor experience installing such systems in buildings. A large gap between energy efficiency theory and practice. There is no demo projects in construction of energy-efficient buildings, limited data on best practice, little research in this area, lack of true (checked) solutions. Lack of state support for promotion and construction of energy-efficient buildings. Lack of coordination in the construction sector in preparation for implementation of the directive's tasks. At that moment the market is not ready to take over the Directive No. 2010/31/EU (EPBD) on the energy performance in buildings.

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11. Glossary

The European Qualifications Framework (EQF) – a common European reference framework to relate different countries' national qualifications systems, to better understand and compare the qualifications levels of different countries and different education and training systems. (http://ec.europa.eu/education/lifelong-learning-policy/eqf_en.htm)

Skills – the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments). (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

Skill – an appropriate aptitude and/or ability to perform actions of a certain intellectual and/or physical nature in a specific area of activity developed as a result of learning. (*Laužackas, R. Profesinio rengimo terminų aiškinamasis žodynas. Terminology of Vocational Education and Training, 2005*)

Pre-vocational education (*Ikiprofesinis mokymas*) is training and practical activity, restoring and recreating learning motivation, helping trainees to understand the meaning of work, to get acquainted with current occupations, developing key competences and providing knowledge how to acquire an occupation. (*Description of Procedure for Pre-Vocational Training, 2007*)

Competence – the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

Competence (*kompetencija*) is competence to perform a certain activity on the basis of the entirety of acquired knowledge, skills, abilities and values. (*Law on the amendment of the Law on Education, 2011*)

Qualification – a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

Qualification is the totality of person's possessed competences or professional experience and possessed competences necessary for a certain activity, recognised in accordance with the procedure laid down by legal acts of the Republic of Lithuania. (*Law on the amendment of the Law on Education, 2011*)

Lithuanian Qualifications Framework – a system of levels of qualifications set in the Republic of Lithuania and based on the competences necessary for person's activities (*Law on the amendment of the Law on Education, 2011*)

Learning outcomes – statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

National qualifications framework – an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved, which aims to integrate and coordinate national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

National qualifications system – all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. This includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

Initial vocational education and training (*pirminis profesinis mokymas*) is vocational education and training for the acquisition of initial qualification. (*Law on the amendment of the Law on Vocational Education and Training, 2007*)

Vocational education and training – education and training carried out according to vocational training programmes, helping a person to acquire and improve a qualification. (*Law on the Amendment of the Law on Vocational Education and Training, 2007*)

Sector – a grouping of professional activities on the basis of their main economic function, product, service or technology. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

Continuing vocational education and training (*tęstinis profesinis mokymas*) is vocational training for upgrading the existing vocational qualification or for acquisition of another one. (*Law on the amendment of the Law on Vocational Education and Training, 2007*)

Knowledge – the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual. (*Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning (2008/C 111/01)*)

ANNEX

„Qualification pass“ issued by National Energy Training Centre

Skirstomųjų elektros tinklų montuotojo (elektriko) praktinio mokymo pasas



Paso savininkas

Vardas, pavardė _____

Telefonas _____

Praktinio mokymo instruktorius

Vardas, pavardė _____

Telefonas _____

Mokymo įstaiga

Respublikinis energetikų mokymo centras

Telefonas _____



The cover of „Qualification pass“

Elektros tinklų montuotojo darbų saugos įgūdžiai	Jvykdyta	Pakartota	Pakartota
Praktiškai apmokytas saugiai dirbti pagal Saugos eksploatuojant elektros įrenginius taisyklių reikalavimus			
Praktiškai apmokytas dirbti pagal darbų saugos reikalavimus			
Laikydamsis saugos reikalavimų atliko ugnies darbus			
Praktiškai apmokytas saugaus darbo keliuose reikalavimų			
Instruktuotas darbo su kėlimo mechanizmais klausimais ir turi reikiamus dokumentus leidžiančius dirbti su jais			
Instruktuotas darbo su žmonių kėlimo mechanizmais klausimais ir turi reikiamus dokumentus leidžiančius dirbti su jais			
Instruktuotas ekstremalių situacijų padarinių likvidavimo klausimais			
Instruktuotas vykdyti darbus ant kopėčių ir pastolių			
Instruktuotas apie pavojingus/kenksmingus faktorius susijusius su darbų atlikimu ir jų išvengimo priemonės (būdus)			
Instruktuotas rizikos darbo vietoje įvertinimo klausimais			
Instruktuotas individualių apsaugos priemonių ir įrenginių klausimais			
Instruktuotas mechaninio pjūklo panaudojimo įvairiuose darbų etapuose ir jo techninės priežiūros klausimais			
Instruktuotas krūmapjovės naudojimo ir techninės priežiūros klausimais			

Puslapis 1 / 16



The first page of the „Qualification pass“

BUILD UP Skills

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

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

BUILD UP Skills has two phases:

- I. First, the objective is to set up national qualification platforms and roadmaps to successfully train the building workforce in order to meet the targets for 2020 and beyond.
- II. Based on these roadmaps, the second step is to facilitate the introduction of new and/or the upgrading of existing qualification and training schemes.

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

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