BUILD UP SKILLS
ENERGY TRAINING FOR BUILDERS

BUILD UP Skills – Republic of Macedonia –

ANALYSIS OF THE NATIONAL STATUS QUO

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Executive Summary

1. The planed contribution of the building sector in meeting the energy targets in Republic of Macedonia is 36,13 % (24,08% householders and 12,05% commercial and services sector). The private building stock amounts to 28.67 million m^2 and the largest share was constructed from 1946 to 1970. This means that 30% of the private building stock is more than 30 years old, while 48% of the building stock is over 25 years old. The public building stock amounts to 6.5 million m^2, of which 5.7 million m^2 are heated. Out of them, 59% were built before 1970, 30% between 1971 and 1990 and only 11% after 1990.

2. The average specific energy consumption in the public buildings is 214 kWh/m^2, while the average energy costs amounts 18.7 EURO per 1m^2. The energy savings, by implementation of the EE measures in the building sector at a national level, are estimated at 12.59 ktoe by 2012 and 85.74 ktoe by 2020. The building sector is estimated to contribute with 1.660 ktCO_2 saved by 2020.

3. The achievement of the national energy targets requires a reconstruction of 1.153.000 m^2 per year.

    - 828.000 m^2/ year (private building stock), (2,9 % annual rate of reconstruction)

    - 325.000 m^2/ year (public buildings). (5 % annual rate of reconstruction)

4. Financial needs for these required reconstructions are estimated to 215 million Euros per year: 190 million Euros for the introduction of the EE measures in the private building stock and 25 million Euros per year for the public buildings.

5. The timeframe required for the reconstruction of the existing building stock in order to implement EE & RES measures will increase the labor demand to a new 10,000 on-site construction workers. The labor demand for new construction workers, following the last three years' trends, will amounts 39,000 workers. The total gross workforce demand from 2012 to 2020 will be from at least 49,000 up to 53,400 workers, (in case the GDP in the construction sector continue to grow at a annual rate of 3.5%). The additional workforce demand can be provided from unemployed people (12.978 with construction qualifications) and 300 newcomers from secondary schools.

6. The Training needs for the direct work force relates to both categories: the current workforce and the new additional workers. However, the Training curriculum (which should be combination of theoretical and practical part) shall be adopted for each category separately. The numbers for training needs (from 9600 to 16020 trained workers) shall depend from: market demand for new or retrofit of buildings to implement EE and RES measures; The Role of Government to include mandatory the EE-RES criteria in the process of Green public procurement; and the Rules for mandatory certification of the companies-organizations and individual workers and experts, regarding implementation of the EU Directives.

7. Due to the high fragmentation of the construction enterprises, it is difficult to follow the gap in the workers' skills for the implementation of the EE and RES measures. The biggest market share is represented by enterprises with one to nine workers and these make up 79.8%. The last two years have seen a decrease in the number of enterprises with more than 50 workers, while the number of micro-enterprises (from one to nine workers) and of small enterprises (from 10 to 49 workers) has gone up.

The construction enterprises are not specialized for EE and RES. Likewise, there's no data about the level of specialization of the different groups of enterprises: building construction, construction material manufacturers, crafts companies, and enterprises specialized in EE and RES.

8. The training for the implementation of the EE and RES measures for the workers who are directly involved in construction refers to the following areas (*Categories of construction work for EE of buildings*)

Construction Work Categories for EE in Buildings			
Description of work		Occupations – National Qualification	EE Measures
Exterior	Construction Work	7111 – Construction workers for buildings	Use of new materials with a low heat transfer coefficient
		7112 - Bricklayers and other related construction occupations	
		7113 - Stonecutter, stonemason and carver	
		9313 – Blue collar workers in building construction	
	Roofing Work	7115 - Carpenters and joiners	Roof insulation
		7121 – Roofers	
		7213.1 - Whitesmith, craftsman	
	Facade works	7123 - Plasterers	Exterior wall insulation
		7124 – Insulation workers	
	Doors and Windows, Glass facades and Glazing	7125 – Glaziers	Replacement or change of the window size, change of glass
Energy Infrastructure	Interior Walls and Floors	7122 - Finishers of Interior Walls and Floors	Insulation of walls, floor and perimeter
		7124.1 – Thermal insulation worker	
	Electrical Engineering	3113.1 – Electrician for installation and equipment	Installation of energy management systems
		7411 – Electricians in buildings and similar occupations	
	Heating, Ventilation and Air-Conditioning Systems	7133 – Heating, ventilation and air-conditioning installer	Reconstruction of the heating system, pipe insulation, control system. Mechanical ventilation with heat recovery, pipe insulation, control system
		7127.2 – Heating, ventilation and air-conditioning installer, craftsman	
Energy Supply	Geothermal Systems	7412 – Electric mechanics and wiremen 7412.4 - Electrical fitters on power machines and devices 7412.6 – Fitter of electric machines and equipment 7412.9 - Power electrical mechanic 7412.10 - Power electrical mechanic, specialized 7412.25 – Electrical Fitter 7412.26 – Electrical Mechanic 7412.27 – Operation and maintenance of electric appliances and equipment	Installation of geothermal systems
	Biomass Systems		Installation of biomass systems
	Solar systems for hot water and electricity		Installation of systems for sanitary hot water with the use of solar energy
	Wind turbines		Installation of wind turbines
	Combined Heat and Power Facilities		Construction of combined heat and power facilities

9. According to the National Classification of Vocations, in the Republic of Macedonia, there are 23 occupation groups with a total of 113 detailed described occupations related to the building sector. Of these, 79 on site construction occupations are directly involved in the EE and RES measures (Appendix 4).

10. Meeting the indicative national EE targets, will require a minimum of 9,600 and a maximum of 16,020 on-site construction workers which are classified into 23 occupations, and they need EE and RES training for upgrading skills. This number of workers that needs training for EE and RES qualification refers to 7..300 - 12.500 current workforce and 2.300-3.520 to the new additional workers to enter the labour market.

    The need for skills refers to the following categories of construction work:

    - *Building envelope:* roof, windows and doors with thermal insulation for less energy loss
    - *Energy supply* – interior walls and floors, electrical engineering, thermal engineering (heating, ventilation), replacement of the appliances for less consumption of energy and introduction of EE systems
    - *Energy sources* – geothermal systems, biomass systems, solar collectors, photovoltaic systems, wind turbines, combined heat and power facilities (introduction of new renewable energy sources)

11. The training forms for acquiring additional skills related to EE and RES in these categories of construction workers will be additionally specified. According to the National Classification of Education Standards, the training has to be designed in two levels: assistant craftsman and craftsman. The National System for Vocational Education and Training was established in 2011 as well as corresponding institutions for its implementation. The authorized institutions are of little experience and capacity to verify EE and RES programmes. There is also no strategy on green working places and the introduction of education in secondary schools for EE and RES.

12. The accreditation and certification system contains rulebooks on the verification of programmes and authorized institutions for the organization of adult training. The verification process of the programmes and institutions lasts from 6 up to 9 months. So far, there have been three programmes verified in the Republic of Macedonia: training for carpenters, plasterers and façade workers. Only eight institutions have been verified for holding technical training. There is also no information on the interest shown or number of participants that go through these programmes each year. Only the programme for electricians has training aimed at installation of solar energy and floor heating.

13. There is training available outside of the vocational education and training system, which is held by the equipment and construction material manufacturers, as well as by authorized institutions for adult training. The training courses are usually organized as one or two-day seminars, as weekly trainings (consisting of 5 daily seminars) or in the form of courses (40 hours in a period of 32 months).

14. The barriers/obstacles for the building capacity of the workers who are direct participants in the construction process can be found in the EE legislation, regulation of the construction sector market, education system capacities and the institutions which deliver these trainings.

15. An extensive grey market, is estimated to be between 20% and 45% of GDP, that is not captured by official statistics., Based on the above, the opinion of the Expert group is that minimum 9.000 to 12.000 workers (20-30% from official labour force in building industry) are engaged in un-formal activities.

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1. Introduction

Around 40% of the energy used in the EU is related to the use of energy in buildings. Considerable share of this energy could be saved by using simple and efficient EE measures. Therefore, the construction sector should have large contribution in achieving the EU 2020 energy targets by providing an appropriate education and training in the field of energy efficiency for engineers and on-site construction workers

This is where the project Build Up Skills MK comes in, in order to help in the process of achiving these targets in the Republic of Macedonia. The project is a part of the European Agency for Competitiveness and Innovation (EACI), with an overall goal to provide implementation of the energy efficiency measures by the construction sector in order to achieve 20% energy savings and 20 % usage of RES until 2020.

In the Republic of Macedonia the implementation of this project is run by 5 institutions: The Economic Chamber of the Republic of Macedonia as the leading partner, the Energy Agency for the Republic of Macedonia, Faculty of Electrical Engineering and Information Technologies, ZBK Kreacija and the Construction sector Institute Makedonija, all from Skopje and all included as partners in the project.

The project consortium submitted an application to the European Agency for Competitiveness and Innovation at the call for project proposals within the Intelligent Energy Programme. The implementation of this project started on June 6th, 2012, upon signing of the contract with EACI.

The specific objectives of the project are:

- Defining the capacity and number of workers, who are direct participants in the building sector, so as to meet the requirements for the implementation of the EU strategy 20/20/20 by 2020;
- Identifying the existing weaknesses in the skills of the direct construction workers;
- Setting up a strategy for additional skills of the workers through the national system for informal education;

The report aims at achieving the first two specific objectives analyzing the following areas: construction sector characteristics in Macedonia; national energy policies and strategies in building sector; statistics in energy and building sector; national VET system and existing gaps in skills related to EE and RES needs.

This document has been developed as a part of package 2 – Analysis of the National Status-Quo in the Building Sector and is supposed to provide initial information on the design of a Roadmap for achieving the set goals. The Action Plan will be developed by EARM while the first draft version by ZBK Kreacija.

The draft Roadmap, will be reviewed / approved / accepted by the National Qualification Platform for training of the workers in the building sector. The final endorsement will be given by the Government of the Republic of Macedonia upon the proposal of the project Steering Committee.

2. Objectives and Methodology

2.1 The Report purpose

This report represents an analysis of the National Status Quo of the capacity and is giving the number of blue collar workforce in the building sector of the Republic of Macedonia, as a comprehensive review of their existing skills, training and acquired qualifications. This report also gives the opportunity to anticipate future skill needs in order to meet the national energy targets in the construction sector.

2.2 Research Objectives

The research consists of two core strands:

1. Building Sector Analysis:

An analysis of the building sector in the Republic of Macedonia, including the overall building stock, energy efficiency implementation, renewable contribution and national policies and strategies relating to the building sector.

2. Skills Analysis:

A review and analysis of the continuing informal education system in order to meet the needs of the construction sector, national policy and strategies relating to green skills and jobs and quantified research into the current workforce in the sector.

The objectives of the analysis are to:

- Present the characteristics of the construction sector in the RM, including national policies and strategies to contribute to the EU 2020 energy targets by 2020; and statistics and data relating to historic, current and anticipated energy characteristics of the buildings and energy sector and workforce;
- Establish a system of the required training degree, particularly in relation to EE and RES;
- Establish the current skills, training and qualifications, particularly in relation to EE and RES;
- Explore the extent of alignment of current skills demand versus current VET supply, including the identification of skills gaps, qualifications needs and barriers to the demand/supply of training;
- Develop a definition of the energy savings and renewable energy contributions to the building sector;
- Analyze all data gathered to explore the various drivers and necessary responses by the building sector by 2020, thus providing a starting point for the Roadmap.
- Identify a list of capacity issues that will impact the ability of the sector to contribute towards the national energy targets.

2.3 Scope of the Research

The core initiative of Build Up Skills focuses on a specific target group: on-site workers, craftsmen and installers of the building sector. Whilst the European Commission recognizes the strategic importance of other occupations such as architects, civil and electrical engineers, energy assessors and advisors, these roles have been deemed to be out of scope for this current study, because the European Commission considers that there is an urgent need for qualified workers at an operational level who have the capability to handle the entire range of issues surrounding the installation and maintenance of energy efficiency and renewable energy systems in buildings of all types and ages.

2.4 Research Method

Relevant data using a mix of quantitative and qualitative methodologies were collected and analyzed, in order to ensure robust and detailed information. In summary, the approach consisted of:

- Desk research (on-going throughout the project) into the characteristics of the building sector, national policies and strategies, skills needs and education gaps, building and energy sector statistics, existing training provision and gaps, and barriers in relation to meeting the EU 2020 targets;
- Telephone interviews and direct meetings with the industry stakeholders;
- A survey of 100 relevant companies from the building sector with the use of a structured questionnaire;
- Mapping of training institutions currently available in the RM relating to EE and RES.

Institutions involved in data providing were: Ministries and national bodies: National statistic bureau: International organization and donors reports and members of National qualification platform.

3. Characterization of the Building Sector in the Republic of Macedonia

This chapter consists of a brief quantitative description of the affairs in the construction sector (historical information on this sector, contribution to the national economy, participants to the market and main actors in the value chain of the construction sector, market trends and forecasts, main factors of change to the sector, information on the migrant workers, informal economy).

Most of the statistic data related to construction and the construction sector has been presented for the period of 2007-2011 and the data that could not be extracted from the data base was obtained from reports of national institutions and relevant experts (cited as data sources).

3.1. Historical information on the Macedonian building sector

The construction is an old and acknowledged profession. Traditionally, in the Balkans this profession dates as far back as the Middle ages when some regions established their own "schools" for the construction of individual houses, as well as construction of various public buildings such as churches, monasteries, schools, health institutions, administrative buildings, military facilities etc.

The regions where agriculture was not much developed (due to the low quality of the land or other natural circumstances) were always a source of qualified and skilled workforce in the construction sector of the Republic of Macedonia. Since in Republic of Macedonia the construction of buildings was not as high, these craftsmen could easily find jobs in other countries of the Balkans and beyond. This trend continued in the 20th century as well.

After the Second World War, the development of the sector can be divided into three stages: first up to 1963, second up to 1990 and third from 1990 to present day. Construction flourished after 1963, right after the disastrous earthquake in Skopje. Major construction initiative was undertaken at this period in order to make up for the destroyed building stock in Skopje, resulting in repairs of over 20,000 apartments and the construction of more than 80,000 apartments[1].

From 1963 to 1990 only the construction sector consisted of a 45,000 workers. An additional 10,000 to 12,000 workers were hired for activities complementary to construction. If to this the share of the grey economy in the construction sector is added, then for certain it can be said that around 70,000 workers were continuously active[2], which is the most prolific period of construction in the Republic of Macedonia. According to the type and number of constructed buildings[3] a higher degree of construction was registered in:

1. Hydro-construction (dams and embankments) from 1966 to 1971;
2. Construction sector Construction (roads) from 1977 to 1980;
3. Building Construction

[1] State Statistical Office of Republic of Macedonia (2012), various publications
[2] Interviews with relevant parties, members of the Economic Chamber of the Republic of Macedonia, 2012
[3] Economic Chamber of the Republic of Macedonia (2011), Information on the construction operation in the country and abroad, p. 2

- Apartment construction – the busiest period was from 1953 to 1984 with an average of around 8,266 apartments per year, more precisely 12,335 apartments per year from 1977 to 1980 and 11,545 apartments a year from 1981 to 1984.

- Industrial and commercial buildings – most of these were built from 1981-1984 with around 1.263.000m^2 of built area.

In the given period most of the construction companies managed to hire the required staff and provide the necessary machinery. A contributing factor to this was the establishment of the Faculties of Construction sector, Architecture, Electrical Engineering and Mechanical Engineering in Skopje, which produced quality staff of higher education. Also, 35 secondary schools in the Republic of Macedonia managed to produce technical staff of secondary education as well as highly qualified blue collar workers.

The third stage began with the fall of the SFR of Yugoslavia in 1991, when the Macedonian construction fell into a long crisis. It had to withstand many blows, such as lost markets within the ex republics and abroad (Russia, the Middle East, the Czech Republic, Germany), low degree of capital investment in infrastructure, dubious privatizations, poor orientation of the market and the funding mechanisms etc. The negative impact was also seen in the natural (retirement) and enforced (redundancies, bankruptcy, liquidation of companies) decrease of the workforce. Some of the larger Macedonian construction companies, each with 12,000 to 18,000 workers had to be restructured into joint stock companies by letting go many of the previous staff.

The privatization process, which lasted from 1996 to 2001, included 120 companies with around 32,140 employees and a capital of around 120 million Euros.

In the last years, from 1995 to present day, there have been numerous signs of consolidation in the construction, mostly with the participation of Macedonian construction companies from the building sector in the construction of apartments (private and welfare), private seasonal, industrial facilities and construction of several buildings from the public sector (activities in the local municipalities, sports, cultural and other facilities), the construction of the central urban area of Skopje (Skopje 2014 Project) etc. The vitality of the sector is sustained by the small companies (of 20 to 50 permanent employees), companies specialized in specific market segments (residences, luxury apartments, adaptation of clubs etc). The larger companies of before, with over 10,000 employees have become much more adjusted to the market with a maximum of 500 to 1000 employees.

All in all, the construction sector with its related occupations offers work for 40,000 employees. Only in the building sector in the RM, there are over 25,000 employees (not considering the fitting and final works).

In all of its development stages, construction depended on the scope and structure of investments as well as on the participation of the construction companies from abroad.

After 1990, the number of construction companies began to rise. This growth continued with the privatization process, which occurred as a result of the increased number of small and medium companies. For example, in 1990 there were 317 companies registered, whereas in 2012 there were 4,400 such companies.

The workforce is a huge potential in Macedonian construction and around 56% has been hired in the building construction, 15.5% in construction sector construction and 18.5% in fitting and final works.

From the total number of employees in construction, 8 -10% are engineers, 15% are technicians, while 75% are skilled and low-skilled workers. The last category consists mostly of people over the age of 50.

The companies are also well equipped with the corresponding machinery and equipment, but with a big amortization and usage, as far as 60%.

Today Macedonia has a highly developed construction industry of international recognition due to its expert staff and the use of modern construction technology, especially in hydro-construction. Our country is one of the main providers of construction work in Eastern Europe, the Middle East and Russia. In recent years, the construction companies and blue collars have mostly been active in the markets of the Russian Federation, Ukraine, Kazakhstan, Uzbekistan, Turkmenistan, EU countries (Czech Republic, Germany and Bulgaria), Libya, Iraq, Kuwait, Algeria, Israel, Serbia and Albania.

3.2. The Building Sector's Contribution to the National Economy

In the last 10 years the share of the Value Added in GDP in construction ranges from 5.1% to 7.9%. In period of increased investment, this share has gone as far as 12 to 13%. Currently, the VAT in this sector ranges from 480 to 520 million Euros per year, which is 6% of the GDP. If we take into account the Value Added in the informal sector, which comes as a result of the construction of private buildings which have not been registered in the State Statistical Office, then the total contribution towards the national economy is estimated at 700 million Euros or around 7% of the GDP.

From recently, the GDP growth rate in construction has been higher than the GDP growth rate and for the last three years it's been 3.4%.

Table 1. GDP growth in the construction sector in the Republic of Macedonia from 2008 - 2010

	GDP growth			
	2008	2009	2010	Average (%)
Industry	2,4	-8,5	0,7	0,4
Construction	-5,8	4,2	2,5	3,4
Services	7	1,7	1,8	2.0

Source: EC-2011, based on data from the Ministry of Finance and Ministry of Economy and interviews with relevant parties

The investment in the construction sector in 2010 participates with 34.7% from the total investments into fixed assets in the Republic of Macedonia.

In 2011, the participation of the micro and small-sized companies rose and the one of the medium-sized companies went down, further deepening the fragmentation of the construction sector.

The number of employees in construction has been quite variable in the last 4 years and is 6.5% from the total number of employees in the Republic of Macedonia and 8% from the private sector employees.

According to the interviews with the relevant parties, the level of informal employment (grey economy) in the building sector of RM was estimated at a minimum of 20 to 30% from current formal employment.

Republic of Macedonia has 564,296 households and 698,143 apartments[4], with 1.2 apartments per household.

In the last 10 years, there have been between 5,000 to 5,500 apartments built each year, with the exception of 2006 when there were 6,431 apartments built.[5]

Today's building stock comprises of 28.7 million m^2 of individual dwellings and residential buildings with several apartments (construction units). The public building stock (public administration and under the ownership of the municipalities) is 2.6 million m^2 with a note that this figure refers only to those public buildings for which there exists recorded data.

The total building stock (private and public) is 31.3 million m^2.

Considering the age of the public buildings, they require significant reconstruction. According to EU's recommendations for the public sector, the reconstruction rate is to be 5% a year. For the private building stock this rate is to be 3%. If the use of stimulation measures and an active EE policy helps reach such rates, then the value of construction work could reach as much as 200 million Euros per year.

The contribution of the construction sector to the national economy is high in terms of creating GDP, employment and export. The sector relies on the import of machines, equipment and specific construction materials while its export oriented towards design, engineering and highly qualified labor force.

3.3. Main Actors on the market and on the value chain

The value chain in the construction sector can be reviewed at two levels: the first – chain of values of the overall construction sector and the second – chain of values in building construction.

The key factors in building construction are:

1) *National Institutions and Legislation*: Parliament of the Republic of Macedonia, Government of the Republic of Macedonia, Ministry of Economy of the Republic of Macedonia, Energy Agency of the Republic of Macedonia and the municipalities;

2) *Education of Staff:* formal education institutions (Faculty of Architecture, Electrical Engineering, Mechanical Engineering and other faculties) and secondary vocational schools as well as informal education institutions (workers' universities, non-government organizations and training centers at the economic chambers).

3) *Companies:* building construction in the Republic of Macedonia as well as professional companies – organization, designers, consultants, energy audit, clients, ESCO as well as companies for the production and trade with construction materials and equipment;

[4]MAKSTAT database
[5]Economic Chamber of Macedonia (2012), Analysis of Housing Construction in the Republic of Macedonia

4) *Social Partners:* worker unions from the building construction of the Republic of Macedonia and organization of employers;

5) Professional Associations of: engineers, architects and technicians.

The analysis of the Value Chain applied is in line with the world recognized methodology shown in Figure 1 Value Chain in Construction.

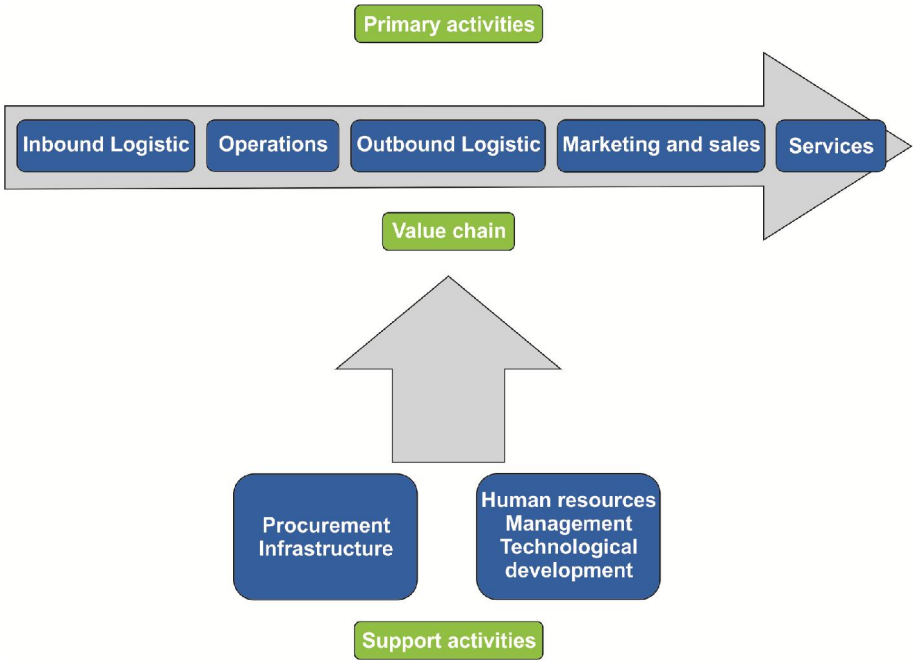

Figure 1 Supply Chain in Construction

The value chain distinguishes into two types of activities:

A) Primary Activities:

1. Inbound logistics – refers to the business relations of the companies from the building sector in the Republic of Macedonia with domestic and foreign suppliers of materials and equipment.

2. Operational activities in building construction – construction of private and public buildings of various content (housing, education, public health, sport, culture, etc)

3. Outbound activities – refers to the commissioning and sale of the apartments and buildings. The sale and marketing are carried out in the construction process and after the completion of construction.

4. Marketing and sales - matches activity 3. In our case, it is the job of marketing to promote new buildings with proper EE characteristics, i.e. to do reconstruction of the existing buildings in order to raise their EE class.

5. Maintenance or warranty services – this is very important for ESCO, i.e. companies for funding and implementation of EE measures in the building construction.

B) Further construction or support activities:

6. Procurement and infrastructure – department for planning of supplies.

7. Human resource management – plans all the activities related to the recruitment, development and training in companies. The BUS-M project aims to present at a macro level the organization of efforts for improving the skills in the building sector in the Republic of Macedonia.

8. Research and development of new products/services, i.e. building with high EE - refers to the new methods of construction, insulation, EE equipment and installation, use of RES in the construction of buildings by taking into account all of the EU directives for energy characteristics of buildings and applying all of the technical CEN, ISO and other current standards and rulebooks on building construction, i.e. buildings with high EE and RES use.

Figure 2 Supply Chain in Building Construction

Such a value chain asks for new skills. It also helps us to find out about the total number of employees in the building construction in the Republic of Macedonia. However, the Build Up Skills - MK project entails capacity building in the building sector only for the main activities: II.2.a, II.2.b and II.5 of Table 2.

The analysis of the responsibilities, interests and expectations of the stakeholders in relation to meeting the EE and RES targets has confirmed the following:

1. The national institutions and the Government of the Republic of Macedonia have set up indicative objectives for energy savings implemented by:

- Defining the legal framework for regulation of the energy, construction and education sector;
- Formulating strategies and action plans for implementing the approved policy in relation to the EE and RES;
- Implementing EE programmes for public buildings;
- Coordinating the activities of the municipalities related to the implementation of the regulations from the Law on Energy

The interests of the Government are to meet the energy targets in conditions of fewer human and finance resources. The Government is also expected to coordinate the ministries which have the responsibility of implementing the informal education system (verification of programmes and training institutions in the area of EE and RES) as well as occupation classification.

2. The companies from the building sector are still not interested enough for raising the EE and RES implementation measures. The pressure caused by the prices of energy and the need for training of the direct participants in the EE and RES implementation process affect profitability and raise construction costs as well work efficiency. This low interest in providing training for the workers is related to the additional costs imposed on the companies that choose to provide their workers with training (absence of the workers in the course of training, the need for paying higher salaries to highly-qualified workers).

3. The education institutions are still not certified for EE and RES training. They have lack of trainers and proper organization of the training sessions leading to a final exam for assessment of the qualifications earned, as well as capacity for the implementation of intense training, which will help evaluate the participants' knowledge.

4. The direct participants in the building construction process are with low qualifications, low salaries and poor interest in acquiring additional skills for EE and RES. They look upon the training sessions as a waste of time, which can be better used for making additional income and not as a possibility for increasing their earnings as a result of having certified qualifications.

3.4 Market Trends and Forecasts

3.4.1. Vulnerability

In a state of crisis, the construction sector relies on the measures and investments by the Government. In the next three years this support is expected to continue and the share of the construction sector in the GDP to keep growing. Nevertheless, due to the surplus capacity, construction prices will remain static. The increase of energy prices and construction materials will leave building companies with no choice but to respond by further reducing the numbers of directly employed staff.

As a result of the low purchasing power of the citizens, housing construction will remain at the same level as in the last 5 years. This trend will keep the current level or decrease the number of directly employed staff in the construction. A major part of the construction workforce in the Republic of Macedonia of lower qualifications, which was estimated at 60% in 2010, is the category most affected by the crisis. The EE and RES training costs are to fall at the expense of the construction companies.

The measures of the Government to decrease the number of unregistered workers will decrease the supply of qualified workers, directly employed in construction, thus increasing the pressure for payment of higher gross salaries by the construction companies.

3.4.2 Strengths

The Government programme for capital investments is important for the work of the construction companies[6]. The largest proportion of the investments is realized by the domestic construction companies. Also the activation of the third component of IPA for the regional development and competitiveness will increase the demand for construction work related to infrastructure projects.

The National Programme for Energy Efficiency of Public Buildings in the Republic of Macedonia 2012-2018 aims at applying EE measures in the buildings from the public sector with an area of 2.3 million m^2. A total of 95.2 million Euros have been set aside for the implementation of this programme, which is expected to open from 3,000 to 5,000 new jobs[7].

3.4.3 Forecast

The 2012 data shows that the construction sector has a higher GDP growth compared to the rest of the industries as well as the largest investment share into the fixed assets in the Gross Value Added of 38.5%.

The growth factor of this sector should be boosted with domestic demand (with support of the Government), the IPA funds and the current (and future) National programmes for Energy Efficiency and massive use of RES (Renewable Energy Sources). The trend of lower incomes of the construction companies from participating in foreign markets is expected to continue in the following period, as a result of the economic crisis.

In 2013, the building sector will have to face some serious challenges including the following:

- Decreased construction of residential buildings for the population due to the limited access to consumer loans;
- Decreased investment activity in the foreign markets where the construction companies participate;
- Reservations of clients in engaging into economic activities;
- Rise in unemployment;
- Further public restriction in public spending;
- Legal requirements for the application of EE measures in the new buildings.

[6]Budget Projections of the Republic of Macedonia, 2012-2015 with 400 million Euros of capital investment.
[7]Government of the Republic of Macedonia (November 2011), *National Programme for Energy Efficiency of Public Buildings in the Republic of Macedonia* 2012-2018, p.102

3.5 Main Factors for Sector Change

As is the case with many other sectors, the building sector is also trying to adjust to the numerous factors of change. Change refers to the various economic influence, the requirements for energy saving and the construction of energy efficient buildings, limited natural resources, the age of the existing building stock, changes in the national demography that have an impact on the workforce (population age) and many other factors.

Of recent years, the approach of focusing on energy saving and environment sustainability has created various priorities, parallel to the requirements of the new technologies and training for their implementation. The building sector has strict laws regulating its work compared to the other economic sectors. The upcoming regulations on energy efficiency and classification of the buildings according to their energy consumption will be another step to a better regulation of this sector.

The use of renewable energy sources offers new possibilities for income growth in the building sector.

Other change factors are:

- Increase of the price of gas and energy
- Limited natural resources and increase in the prices of construction materials
- Financial limitations imposed by the recession (limited loaning for housing construction)
- Increase in innovation and application of new products and technologies
- Expectance of the employers and the stakeholders that bureaucracy will increase
- Smaller number of students and young people decide to enter the sector in the next 10-15 years
- Changes in legislation, which will impose strict standards in terms of energy efficiency
- Increased global, regional and national competition
- Lack of leadership and relevant programmes and projects

3.6. Migration of the workers

The analysis conducted on the structure of construction employees has shown that the age limit of the directly employed workers is over 50. This situation is a result of the low salaries and the image of the sector with the young people. A great number of workers decide to leave the building sector and very few enter it coming from the group of unemployed or graduated students.

By entering the foreign market many Macedonian construction workers acquire a more extensive experience, especially in the area of embedding new construction material and application of new technologies. It's only in Germany that the Macedonian construction companies have an organized approach compared to the rest of the EU countries due to a treaty signed between the Macedonian Government and the German Government on employing workers from Macedonian companies for the execution of project contracts. Each year the German side approves a

certain quota (detachment) for sending Macedonian workers to work in Germany. For the year of 2012/2013 this quota/detachment is 570 workers.

3.7. Informal (Grey) Economy

It is the opinion of the relevant stakeholders that the informal employment level (grey economy) in the building sector in the Republic of Macedonia is 20-30% from today's formal employment.

Table 2.Informal Education Estimate for the Building Sector in the Republic of Macedonia

Work Status	2009	2010	2011
Individuals officially registered as unemployed	16.000	15.000	14.000
Workers, directly employed in construction,	15.000	12.000	10.000
Craftsmen – grey economy	2.000	2.000	2.000
Total	31.000	29.000	26.000

Source: ILO (International Labour Office, Geneva) - Department of Statistics, June 2012Statistical update on employment in the informal economy

Official unemployment in FYR Macedonia remains high at more than 31%, but may be overstated based on the existence of an extensive grey market, estimated to be between 20% and 45% of GDP, that is not captured by official statistics.

The grey, informal, "black" economy is made up of two constituent activities: a) Legal activities that are not reported to the tax authorities and the income from which goes untaxed and unreported (for instance: it is not illegal to repair something in the private house, or clean someone's house, etc. It is, however, illegal to hide the income generated by these activities and not to pay tax on it) and b) Illegal activities which, needless to say, are also not reported to the state (and, therefore, not taxed).

These two types of activities together are thought to comprise between 30- 40% of the GDP in Macedonia , meaning that this percentage is "black". This equals 3,0-4,0 billion USD per annum.

Based on the above, the opinion of the Expert group is that minimum 9.000 to 12.000 workers (20-30% from official labour force in building industry) are engaged in un-formal activities in the Building industry market. Such economic activities are mostly visible in build-up of individual houses in the rural parts of FYR Macedonia.

4. National Policies and Strategies to Contribute to the EU Energy Targets in Buildings

This chapter presents the national policy on meeting the energy targets in the construction sector (related to the EU directives), the national system on continuing education and the construction occupations that fall within the scope of the informal education training.

The majority of the national laws, strategies and other relevant documents in the area of energy and education, which have an influence on the building sector in meeting the requirements of the EU 2020 strategy, have already been passed. These contribute to the realization of the EU 2020 strategy in the building sector in the Republic of Macedonia. The rulebooks defining construction standards are being worked on and will be implemented by the Energy Agency of the Republic of Macedonia

The national framework for the continuing education system has already been defined and its implementation started in 2011. The implementation of the legal framework falls under the jurisdiction of the Ministry of Education and Science, the Center for Secondary Education and Trainings, as well as the Adult Education Center. At the moment a national qualification framework for defining occupation standards is being adopted.

The monitoring of the verified informal education programmes is still in its initial stages, meaning there is no way yet to closely monitor the delivered trainings per occupations or the number of participants in the trainings.

The data refers to the 2010-2012 period and was extracted from the strategic documents of national institutions and information obtained through direct interviews with relevant institutions as well as from the responses to the questionnaires, which were a part of a research on the construction companies and institutions delivering trainings for informal education and trainings for the introduction of EE and RES measures.

4.1. Energy

National energy targets in terms of EU 20/20/20 Strategy are:

a) At least 9% savings by 2018, as to reach 14,5 % energy savings by 2020, compared to the average consumption in the period of 2002-2006 or 237.31 ktoe

b) Reduction of to 5.792 ktCO_2 emissions from 2010 to 2020

c) The share of the renewable energy sources of final energy consumption at 21% in 2020

The Building sector contribution amounts 36, 13% (24,08 % households (57,14 ktoe) and 12.05% commercial an services sector (28,6 ktoe from total savings calculated on 237,31 ktoe))

Relevant legislation related to energy targets are: Law on Energy, the Rulebook for energy performance in buildings and the Rulebook for energy audit.

4.1.1 National Energy Policy and Strategy to Meet the 2020 Targets

The national legislation for meeting the energy policy targets consists of:

- Law on Energy of the Republic of Macedonia (Official Gazette of the Republic of Macedonia, Issue No. 16/2011 and 136/2011);
- Energy development strategy of the Republic of Macedonia for 2008-2020 with vision for 2030, January 2009;
- Strategy for the promotion of energy efficiency in the Republic of Macedonia by 2020, September 2010;
- Strategy for the utilization of the renewable sources of energy in the Republic of Macedonia by 2020;
- Regulation on the indicative objectives for energy savings in the Republic of Macedonia, Official Gazette 112 – 24.08.2011;
- Second NAPEE (National Action Plan for EE) for the 2018-2020 period. The Government of the Republic of Macedonia will develop additional measures for achieving 14.5% energy savings by 2020, which will help Macedonia get a step closer to the defined EU target of 20% energy savings by 2020;
- Rulebook (draft) for energy performance in buildings, 2012;
- Rulebook (draft) for energy audit, 2012;

The indicative objective for total energy savings by the end of **2018** has been defined based on the Strategy for Energy Efficiency and the first Action Plan for Energy Efficiency and is:

- At least 9% savings from the average annual consumption of final energy in the period of 2002-2006. Based on this objective, the cumulative energy savings by 2018 will be at least 147,2 ktoe (kilo tons oil equivalent). Also, the initial result expected is for the cumulative energy savings to reach 66.1 ktoe by 2012.
- By 2020, the energy savings anticipated are 237.31 ktoe or 14.5% compared to the average consumption in the period of 2002-2006.

Table 3 Energy Savings per Sectors by 2020 in ktoe per year

Sector	2012	2018	2020
Industry	41.0	40.51	91.09
Traffic	12.5	24.19	60.48
Households	7.6	90.45	57.14
Commercial and Service Sector	5.0	44.63	28.60
Total	66.1	199.78	237.31

By meeting the targets given in Table 4, the following CO_2 reduction is expected:

Table 4. Reduction of CO_2 emissions from 2010 to 2020 in $ktCO_2$

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Households	15	44	90	154	241	353	490	661	869	1112	1407
Commercial and Service Sector	5	13	24	38	60	89	120	152	184	218	253
Industry	25	153	303	477	748	1067	1426	1815	2254	2694	3137
Transport	10	34	73	128	200	287	389	509	647	808	995
Total	55	244	491	798	1249	1796	2427	3137	3954	4832	5792

Renewable Energy Sources

The renewable energy sources share of final energy consumption at 21% by 2020 is in accordance with the Strategy of RES Utilization in the Republic of Macedonia by **2020**.

4.1.2 Summary of the Planned Activities in Relation to the Implementation of the EPBD Recast and the RES Directive

Republic of Macedonia has agreed to adjust all documents in the area of energy to the EU directives.

Compliance with the Directive 2010/31/EU. According to the Law on Energy, the Ministry of Economy was assigned to prepare a Rulebook on the energy performance in buildings. This task was passed onto the Energy Agency of the Republic of Macedonia, which prepared the Rulebook in line with the 2010/31/EU directive and in line with the strategies and targets set by the Republic of Macedonia. The compliance is especially evident in the part for the technical systems of buildings, issuance and publishing of certificates on energy performance, as well as for the requirements mandatory for new buildings, buildings awaiting major reconstruction and building given on rent. On the other hand, the Methodology on the estimation of the energy performance of buildings is adjusted to the current energy situation of the buildings in the country and any realistic improvements that can be carried out. This Rulebook is expected to be adopted and its implementation to be started in 2013. Also, the Strategy for the Promotion of Energy Efficiency in the Republic of Macedonia by 2020 has been adopted and adjusted.

Compliance to the 2006/32/EC directive. According to the Law on Energy, the Ministry of Economy was assigned to set up a work group for the development of a Rulebook on energy audit. In 2012, this Rulebook was finalized and is expected to take effect in 2013.

Compliance to the 2009/28/EU directive. In August 2011, a Rulebook on renewable energy sources was adopted, completely in line with the 2009/28/EU directive in the part of keeping a register of electric power plants which use RES and the issuance of certificates for the origin of the electric energy produced by RES. Aside from this by-law, in 2010 the Strategy on the Utilization of Renewable Energy Sources by 2020 was also adopted.

Compliance to the 2009/28/ EC . Republic of Macedonia hasn't started procedures for ensuring certification schemes for required RES occupations in article 14. Strategy for RES usage is adopted, but the Action plan for RES is not prepared.

4.1.3. Relevant legislation in the Building sector, RES Obligations in Buildings

Relevant national regulations related to EE and RES in buildings are: Law for construction and Rulebook energy performance in buildings.

Law for construction (Official gazette of Republic of Macedonia no. 39/2012) in article 9 regulates basic requirements for EE and RES in new constructions

According to the regulations, activities have already been started to develop Rulebooks for the construction sector in relation to EE measures and the RES utilization requirements. At the moment of the making of this report, the Rulebooks were still in their initial stages of development.

RES obligations for buildings don't exist. There are proposals included in National Strategy for RES usage concerning to measures for solar thermal systems; taxes exemptions and municipalities' funds for EE and RES but these proposals are not implemented through national legislation.

4.1.4. Planed Contribution of the Building Sector to the 2020 Targets

Macedonia is a country with very ***low energy consumption per capita*** and very ***high energy consumption per GDP unit***. The energy consumption per capita is low in all of the sectors. In relation to the developed countries, the lowest is the one in the traffic sector, then in the commercial sector and households. However, the energy consumption per GDP unit is high in all sectors. It's the highest in the industry, followed by the commercial sector and households. In 2006 the consumption of final energy per capita in Macedonia was three times lower than the energy consumption in the European countries - members of the Organization for Economic Cooperation and Development whereas the ***consumption of primary energy*** per GDP unit was almost 4 times higher. Especially high here is the share of the electric energy. In 2006 Macedonia had almost 5.5 times higher consumption of electric energy per GDP unit than the developed European countries. [8]

Most common energy resources in the total consumption of primary energy in 2006 are coal (45.5%) and crude petroleum and imported petroleum products (35%), followed by wood (6%), imported electric energy (5.6%), hydro energy (5.1%), natural gas (2.4%) and geothermal energy (0.4%).

The energy consumption in Macedonia is most concentrated in four sectors. The highest final energy consumption is seen in industry (33.8%), followed by **households (29.2%),** traffic (20.5%) and the commercial and service sector (13.1%). The consumption in agriculture and forestry (1.8%) and for the non-energy needs (1.7%) is negligent.

In the consumption of final energy (in 2006) most common were the petroleum products with 42% and electric energy with 32%, followed by wood (10%), heat (7%), coals (7%), natural gas (2%) and geothermal energy (1%).[9]

The consumption of electric energy is continuously growing and in the last 5 years the total consumption has reached an annual growth rate of 4.5%. In the consumption of electric energy of 2007 the **households participated with 36%,** large consumers with 26%, the commercial and service sector with 10%, small industry with 9% and losses amounted to around 19%.

Scenarios for the Total Final Consumption[10]

According to the **basic scenario**, the total consumption of final energy by 2020 **is expected to grow with an average annual rate of 2.6%** and in 2020 will reach 2616 ktoe. The total growth is 43.9%, i.e. in relation to 2006 the needs will grow by an additional 798 ktoe. The **household share is to remain almost at the same level at 29%.**

According to the **scenario with stricter measures for energy efficiency**, the needs for **final energy will grow at an average annual rate of 2.16%** and by 2020 will reach a value of 2453 ktoe, which is 163 ktoe (6%) less than the estimated consumption in the basic scenario.

[8] Ministry of Economy (2010),Strategy for Energy Development in the Republic of Macedonia by 2030, p. 8
[9] Ibid p.8
[10] Ibid p.9

Building Sector's Share[11]

According to the projections of the Government, the households' share in the final energy consumption is 29.4% of the total energy consumption commercial and services sector[12] with 135%. The building sector contribution in the indicative EE targets should account for 36.13 %. (24,08 % households or 57,14 ktoe and 13.05 commercial sector or 28,6 ktoe from total savings planned in 2020 to 237,31 ktoe.

The households consumption structure is composed of: 57 % for heating, 27 % for devices, 11% for sanitary water and 7% for lighting.

Households have the highest consumption of electric energy among all sectors. Predominant among the energy consumption in households are electric energy (mostly for heating) - 52.6% and firewood – 33.3% (2006 data). Liquid fuels and heating energy (central heating) contribute with almost the same share of 6.7 – 6.9%. Natural gas is still not used in the residential sector.

Commercial sector consumption composed of 43% electrical energy, 43% oil products, 9% heat energy, 3,6% firewood, 1,8% coal and geothermal energy and natural gas both with 0,4%.

The penetration rate of the energy efficiency measures is expected to grow, but after taking up promotion activities and introducing financial stimulation measures. In 2018, the total annual energy savings for all measures will grow to 40.51 ktoe, while the cumulative energy savings by 2018 will be equal to 162.8 ktoe.

4.2. Continuing Education and Training

Macedonian national education system encompasses formal and informal education with adopted procedures for verification of institutions and programs. However the implementation is in the beginning phase following by capacity building of institutions that should verify programs and institutions and by establishing monitoring system for educational services delivery.

Informal education is carried out mainly in accordance with the articles of the Law for adult education. Educational services suppliers can be public and private institutions, employers and social partners, non-governmental association and individual trainers that fulfill required standards.

Adult education development is financed by the central budget, local self government units, participants' fees and other sources.

4.2.1. National Policy and Strategy Related to Green Skills and Jobs

The national education system in the Republic of Macedonia consists of formal and informal education. The formal education of adults is institutionalized education carried out in both state and private universities in the form of full-time and part-time education in accordance with the given curricula and syllabi.

Formal education of adults consists of:

- Primary adult education.

[11] Ministry of Economy "First Action Plan for Energy Efficiency in the Republic of Macedonia by 2018, p.8-9
[12] In this sector are included public buildings (central and local government: hotels, retails stores and financial sector)

- Secondary adult education, vocational training, vocational education for occupations, technical education and postsecondary education for adults, as well as retraining and additional training.

- Higher adult education.

Formal adult education is carried out in line with the laws that describe this activity.

Informal adult education is an organized learning process aimed at training adults for work as well as for different social activities or personal development. It is mainly carried out in line with the provisions of the Law on Education of Adults in the Republic of Macedonia. Providers of educational services for adults can be any public or private educational institution for adults, institutions for adult education, training centers, employers or social partners, associations of citizens or individual trainers that meet the criteria stipulated in the Law on Education of Adults (Official Gazette of RM, Issues No. 7/2008, 17/2011, 51/2011 and 74/2012)

Policy and Legislation: Current Situation

In 2006 the Parliament of the Republic of Macedonia passed the *National Programme for Education Development in the Republic of Macedonia 2005-2015*. A vital part of this national programme was the *Programme for Adult Education in the Republic of Macedonia*, whose recommendations were used in January of 2008 to pass the Law on Adult Education and to establish the public institution know today as the Center for Adult Education. With this law, adult education was defined as a part of the unique education system in the Republic of Macedonia. This document which regulates the adult education system is first of its kind and has managed to fill in the gap brought about by the informal education that had existed in the education system of the Republic of Macedonia. Previously, adult education was regulated by laws that referred to formal education. A significant novelty in this Law is the fact that informal education and learning is for the first time addressed as a very important segment in the overall education of people.

With a law decision, the Adult Education Center (AEC) was established as a public institution in the Republic of Macedonia and as a separate legal entity by the Government of the Republic of Macedonia. The mission of the Center is to set up a functional, contemporary and EU-compatible adult education system in the form of life-long learning, allowing for high quality education and opportunities for acquiring skills in line with the needs of the population, rise of employment and entrepreneurship opportunities and the needs of the labor market and contribute to economic, social and personal development. AEC provides a quality adult education system in line with European standards and practices through standards and criteria which will provide quality education of adults, both formal and informal and quality and competitive workforce on the labor market through the support of a social partnership. According to the Law on Adult Education, among other things the Center is also responsible for developing occupational standards for adult education programmes, verifying adult education programmes, issuing the adult education programme catalogue and publishing it on the official webpage of the Ministry, issuing the catalogue of verified and licensed institutions for adult education and publishing it on the official webpage of the Ministry etc. Proposals on the strategy for adult education development are given by the Adult Education Council.

The national legislation on informal education comprises of:

- Law on Work Relations, Issue No. 80/93-2007;

- Law on Adult Education (Official Gazette of the Republic of Macedonia, No. 7/08, 17/11, 51/11);

- Rulebook on the content and form of the documentation and records kept by adult education institutions;

- Rulebook on the name, contents and form of the certificate for knowledge, skills, capacities and competences acquired from the special programmes for adult education;
- Rulebook on the method and form of keeping a central register and municipal register for institutions that implement adult education programmes (Official Gazette of the Republic of Macedonia, No. 37/10)**;**
- Rulebook on the verification method of the special programmes for adult education (internal act, passed by the management board);
- Rulebook on the content, form and signing procedure of the contract for adult education programme monitoring (approved by the AEC manager);
- Rulebook on the standards, space and equipment for adult education institutions (approved by the Ministry of Education and Science) as well as provisions from the Law on Primary Education, Secondary Education, Vocational Education and Training, Higher Education and the provisions from the by-laws on the standards for the space and equipment for primary, secondary and tertiary education as well as teaching aid norms for 4-year secondary vocational education.

Adult Education Funding

Pursuant to the Law on Adult Education, the resources for funding and development of adult education are provided from the budget of the Republic of Macedonia, from the budgets of the local self-government unit association, from the participants in the education process and other sources.

European Qualifications Framework

The European Qualifications Framework (EQF) exists to help employers and individuals to better understand how qualifications gained within different countries compare thus enabling increased mobility of experts and engineers across Europe. This is why EQF aims at establishing qualification relations at a national level in the countries members of the EU – 27.

The EQF has been first introduced in 2008. If every country adjusts its qualifications to the EQF, after 2012 each diploma is to comply with the EQF level.

The qualification framework EQF refers to all types of education, from secondary to academic.

This system stimulates the life-learning programmes by promoting the significance of informal education.

In Denmark, a country with the highest percentage of implemented EE measures in buildings and RES use, 12 new skills have been identified in each occupation:

1. Basic occupation knowledge: technology, materials and market
2. Customer behavior knowledge
3. EE and RES globalization, models and partnerships
4. Innovations of processes, products and business models

5. IT solutions
6. Production technology, installation and maintenance
7. Materials, waste and material recycling
8. Ecology and sustainable development
9. Work in a mixed team
10. Processes and planning
11. Automation
12. Testing and documentation

Another European document and initiative that needs to be included in this analysis, which is in direct relation to informal education, is the Unique Qualification Framework (UQF) and its local counterpart, the National Qualifications Framework (NQF). Even though this document was last on the list of documents developed in the EU within the policies and trends referring to education, it still manages to give an overall picture not only of education, but also in terms of the realistic and relevant relationship of education to the labor market in order to provide a unified understanding of qualifications in all of the employers from the EU member countries, but also in all of the education systems that produce human capital for the market. Also the document encourages the mobility of the workforce, its flexibility and information, i.e. education in the current context – it is embodiment of the life-learning process.

New Occupations and Profiles for New Green Jobs in the Building Sector of the Republic of Macedonia

In the Republic of Macedonia the initial work on the National Qualifications Framework has already started. In 2009, a National Council/body was established, which was supposed to work on the preparation of a NQF and a plan for its application. The deadline for EQF compliance, which was the same for all member countries, by establishing and putting into effect a NQF, was accepted in Macedonia also and set for the end of 2012. In these conditions and from today's perspective, it is almost impossible to keep to this deadline if we take into consideration the experience of other member countries, which took around 5 years to complete the process. Also only 6 EU member countries (Denmark, France, Latvia, Malta, Ireland and Great Britain) have developed their own National Framework in compliance with the EQF.

At the session held on 17.11.2010, the Government of the Republic of Macedonia passed a DECREE for the National Framework for higher education qualifications. This decree defines the National Framework for higher education qualifications, which helps closely determine the profile, goals and initial basis for setting up study programmes of the first, second and third study cycle as well as study programmes for vocational education less than three years.

The National Framework consists of four levels and six sublevels, which comply well with the European Framework for higher education qualifications, given in the table below:

National Framework for Higher Education Qualification Level		Higher Education	European Framework for Higher Education Qualification Level
VIII		III study cycle Doctoral studies	8
VII	VII A	II study cycle Master's studies	7
	VII B	II study cycle Specialist studies	
VI	VI A	I study cycle University studies 240 credits Vocational studies 240 credits	6
	VI B	I study cycle University studies 180 credits Vocational studies 180 credits	
V	V A	Vocational studies from 60 to 120 credits Short cycles within the first cycle	5
	V B	Vocational education related to the first study cycle to 60 credits according to ECTS	

Article 12 of the Decree states that: "Every qualification within the National Framework ought to be compatible with the corresponding qualification from the European Framework for Higher Education Qualifications. The procedure for assessment of the compatibility of the National Framework with the European Framework for Higher Education Qualifications is conducted at least every 5 years…" Vocational qualifications ought to be defined in detail and made compliant to the European Qualifications Framework.

There is no Strategy for green jobs nor Program for upgrading EE and RES skills and qualifications for building sector occupations encompassed in formal education.

Participants and Services

According to the Law on Education, participants of the adult education programmes can be persons of at least 15 years of age, who meet the other criteria prescribed in the programme. There is some statistic data on the formal adult education in Macedonia, while informal education has not been backed up by relevant statistic data. It's because of this that we cannot make an analysis or come up with a clear picture of this part of the education practice.

4.2.2. National and Regional Implementation of the European Qualifications Framework and Other EU Education and Training Policies in the Building Sector

The preparation of the National Qualifications Framework is ongoing. The Vocational Education Center is in charge of the compliance process with the European Qualifications Framework (EQF). This activity is a part of the IPA project. The working version is expected to be finished in March 2013 and will refer to the degrees from 1 – 51 – blue collar worker, 2 – occupation worker assistant (semi-qualified). 3 – Occupation worker (qualified), 4 – technician,

5 – specialist and craftsman (highly qualified). The qualifications will be distinguished according to 3 criteria (know-how, skills and attitudes).

The certification of skills of the construction workers referes to specialists and craftsmen: the specialized exams are carried out in secondary schools for construction sector while the craftsmen exams are organized by the crafts chambers.

4.2.3. Informal Education in the Building Sector

According to the National Occupation Classification of the State Statistical Office, since 02.08.2011 the following construction occupations have been distinguished (listed under Main Group 7 – OCCUPATIONS FOR NON-INDUSTRIAL WORK IN PRODUCTION):

71.	Construction operatives and related construction workers
711.	Bricklayers and related construction workers
7111.	Construction workers for buildings
7112.	Bricklayers and other related construction workers
7113.	Stonecutter, stonemason and carver
7114.	Concrete placers, concrete finishers and related workers
7115.	Installers and assembly of bulding envelope
7119.	Other bricklaying occupations not elsewhere classified
712.	Occupations for final construction work and related workers
7121.	Roofers
7122.	Floorers and wall tillers
7123.	Plasterers
7124.	Insulation workers
7125.	Glaziers
7126.	Plumbers and pipe installers
7127.	Heating and ventilation installers

Informal education for these occupations is regulated with the Rulebook for Verificaton of Training Programmes and the Rulebook for Verification of Adult Education Institutions.

Ministry of education and science is responsible for verification of training providers From 2008 to 2012 almost 109 programs for 31 occupations have been verified and out of 6 refer to building sector occupations.

5. Statistics on Building and Energy Sectors

The aim of the analysis of the statistical data regarding the energy and built sector is to evaluate the main indicators from the available data for the period from 2006-2011 and the projections up 2020. This provides for evaluation of the existing fund of buildings and to design the scenarios for increasing the energy efficiency and use of the renewable energy sources in the buildings.

This Chapter makes analysis of the technical aspects of the buildings (typology and age), the required intervention for EE and RES, as well as the required number of staff for introduction of measures for EE and RES in accordance with the EU recommendations.

5.1. Statistics on the Building Sector

The data have been provided from the State Statistical Office of the Republic of Macedonia, information from the Chambers, contacts with relevant institutions and direct interviews, all regarding to the the period from 2007-2011.

5.1.1. Building stock, type of buildings (residential, commercial, industrial, public), annual rate of new construction and renovation

There are 564.296 households and 698.143[13] in the Republic of Macedonia, so that each of the households owns 1.2 dwellings. In the past 10 year period there are about 5.000 - 5.500 dwellings constructed per year, except for the year of 2006 when there were finished 6.431 dwellings.

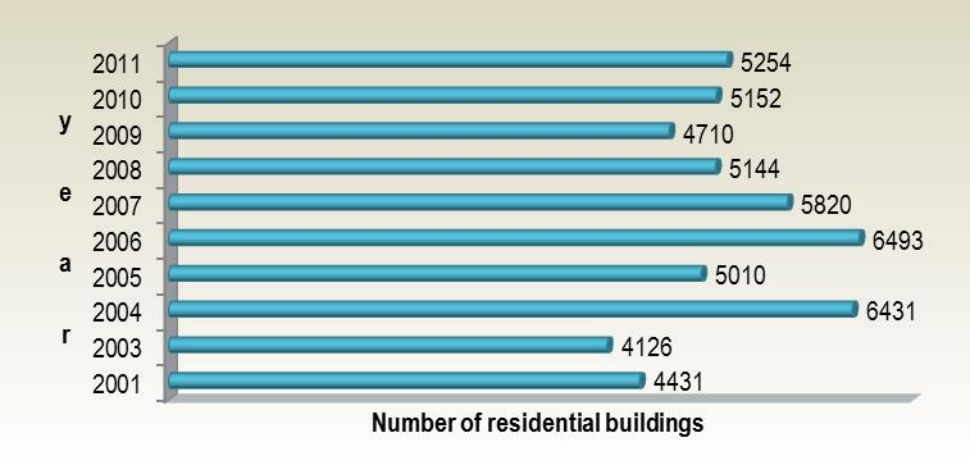

Figure 3 Dwellings built in the period from 2001-2011

[13]MAKSTAT Database

Table 5 . Amount of the costs for building of dwellings given in EUROs

2010	Total	Building land	Construction	Other costs
Total of residential buildings	848	234	544	69
Skopje	1043	347	597	99
Other settlements	718	160	509	49
2011	Total	Building land	Construction	Other costs
Total of residential buildings	815	187	567	61
Skopje	958	210	671	77
Other settlements	672	164	462	46

Table 6. Share of costs given in EUROs per 1m² dwelling area

2010	Total	Building land	Construction	Other costs
Total share of costs	100	27,7	64,1	8,2
Skopje	100	33,3	57,2	9,5
Other settlements	100	22,3	70,8	6,9
2011	Total	Building land	Construction	Other costs
Total share of costs	100	30,0	69,5	7,5
Skopje	100	22,0	70,0	8,0
Other settlements	100	24,4	68,8	6,8

The needs for reconstruction are analyzed from two aspects: first concern to the workforce needs in case Republic of Macedonia follows EU recommendations for reconstruction of 5 % private building stock and 3 % of public buildings; and second aspect workforce needs in order to reach national energy targets posed for households and commercial and services sector.

Private and public building stock is analyzed in regard to production scope in the period from 2008-2011, ageing structure (construction year) average specific consumption in public buildings and basic EE measures planned by Governmental program.

The physical scope of the production of buildings and individual houses is deducted data that has been estimated in accordance with the norms and standards for performance of construction works[14] Total number of new construction decreased in the period 2009-2011, whilst administrative and public building increased in the same period.

[14] Physical scope of production for 2011 amounts 950.000 m². This figure has been calculated according to the following assumptions:
a) Number of dwellings= 1280·60 m²= 76.800 m².б) Housing (new built houses cca. 8000·100 m² = 800.000 m².в) Public buildings (state, municipality, administrative, cultural cca. 70.000 m².
Total a+b+v = 950.000 m² new constructed building areas.

Table 7. Finished works in the Building Sector in the Republic of Macedonia from 2009 – 2011

Description	2009	2010	2011
Total buildings (building dwellings)	1.429	886	1.280
Housing (private sector)- estimation	9.000	10.000	8.000
Residential buildings (5 to 50 dwellings)	78	92	120
Administrative buildings (state and municipality property)	3	11	15
Public buildings, culture, entertainment, sports, other	62	60	75

Sources: State Statistic Office (number of buildings); Issued construction permits for dwelling buildings by municipalities plus illegal constructions; for public buildings: issued construction permits.

Table 8 Age of the Building stock

Period of construction	%	Dwelling (x1000)	Average (m^2/item)	Total Building stock (x1000m^2)
before 1919	1	4,5	75	338
1920-1945	4	18,0	62	1.116
1946-1970	30	135,0	58	7.830
1971-1989	48	216,0	65	14.040
1991-2011	17	76,5	70	5.355
Total active building stock		450		28.679

Source: Building Sector in the Republic of Macedonia,1960-2010

The most of the building stock, more precisely 78%, was built during the period from 1946 to 1970. This means that 30 % of the building stock is over 30 years old, while 48% of the building stock is over 25 years old. The data from the National Programme EE for Public Buildings in the Republic of Macedonia from 2012-2018 show that 59% of the public buildings were constructed before 1970, 30% of them were constructed within the period from 1971 to 1990, and only 11% were built after 1990.[15]

Table 9 Number of public buildings and heating area per sectors

SECTOR	Legal entities	Total buildings	Area	
			Total	Heating
			m^2	m^2
Health	111	485	539,201	487,967
Education	1,406	1,515	1,667,197	1,464,735
Social care	85	246	235,914	220,459
Municipality administration	85	167	103,090	75,420
State administration	9	28	18,714	17,363
TOTAL (all Sectors)	1,696	2,441	2,564,116	2,265,944

Source: Financial Plan for implementation of the National Program for EE in the public buildings in the Republic of Macedonia 2012-2018.

The average specific energy consumption in the public buildings is 214 kWh/m^2, while the average energy costs amount 18.7 EURO per 1m^2.[16] The potential of savings has been estimated at 33%, and 95.2 million EUROs are

[15] *Note:* Financial Plan for implementation of the National Program for EE in the public buildings in the Republic of Macedonia 2012-2018 refers to 2.6 million m^2 of area of public buildings. It covers only 40 % of the total fund of public buildings. Therefore, projections for the total fund of public buildings have been made according to which this total fund amounts 6.5 million m^2.
[16]World Bank and Ministry of Economy (2012), Financial Plan for implementation of the National Program for EE in the public buildings in the Republic of Macedonia 2012-2018, page16

required for its implementation. By means of realization of the EE measures the saving will amount 14 million EUROs per year, so that the investment return period is 6.8 години.

Measures for Energy Efficiency in Public Buildings[17]

The basic EE measures suggested in the Study refer to the savings by means of applying thermal insulation and for electrical power saving.

1. EE measures regarding the saving by means of applying thermal insulation:
   - Thermal insulation of the exterior walls;
   - Replacement of the existing windows and glasses as well as the exterior doors with new ones that are energy efficient;
   - Thermal insulation of roof;
   - Thermal insulation of floor and perimeter;
   - Installation/reconstruction of the heating system by installing an automatic pump in the existing heating sub-stations in the public buildings that are connected to the central heating;
   - Installation of systems for automatic control in the boiler stations for the radiators that use hot water;
   - Replacement of the existing ovens that function on fire-wood with new ones that are highly efficient;
   - Replacement of the existing radiator covers with new ones in order to provide better heat emission produced from the radiators.

2. EE measures regarding the saving of electrical power:
   - Replacement of the incandescent lamps with energy efficient ones;
   - Illumination control system by motion sensors;
   - Installation of reactive power compensators;
   - Installation of solar collectors for sanitary hot water;
   - Improvement of the illumination;
   - Replacement of the existing hot water pumps with new EE pumps.

Reconstruction needs according to EU recommendations

The EU Recommendations regarding the rate of the reconstruction as to introduce the EE and RES measures refer to carrying out reconstruction of buildings of an annual scope of 3% of the total private building stock and 5% of the public buildings fund. Fulfillment of these recommendations would mean realization of the goals provided for by the EU Strategy.

[17]World Bank and Ministry of Economy (2012), Financial Plan for implementation of the National Program for EE in the public buildings in the Republic of Macedonia 2012-2018, page18

Table 10 Value of the reconstruction of the existing building stock by introducing the EE measures, data obtained from the authors of the analysis

Period and type of building	Building stock (1000m²)	Rate of reconstruction (% /year)	Area planned for reconstruction per year (1000m²)	Unit price for reconstruction (EURO/m)	Investment value for introducing the EE in the buildings (million
1919	338	2,5	7	250	1,69
1920-1945	1.116	3	33	220	7,37
1946-1970	7.830	4	313	200	62,64
1971-1989	14.040	3	421	200	84,24
1991-2011	5.355	1	54	180	9,64
Total building stock (million m²)	28,68	2,9	828.000		166
Public buildings	2,6	5	130.000	300	39
Total fund buildings			958.000		305

The value of the activities for introducing the EE measures will amount about 180 to 250 EURO/m² depending on the age of the building. In order to realize the EU Recommendations for the annual rate of reconstruction of the building stock and public buildings, for the purpose of implementation of the EE measures, about 200 million EURO per year would be necessary for the purpose of implementation of the EE measures, i.e.166 million EURO per year for the private building stock and 39 million EURO per year for the public buildings.

Reconstruction needs in order to meet national energy target in 2020

Building sector contribution to national energy targets is focused on energy savings in households and commercial sector. Thus reconstruction needs are analyzed for these sectors, energy consumers where energy savings are planned.

Table 12 presents investments and planned savings by introducing EE measures in buildings. Total investments in residential and public sector, buildings and construction materials production amount on 522, 06 millions Euros, out of them 390 million Euros in private and public buildings.(table 13)

Energy savings in private and public buildings in the period 2012-2013 amount on 238,42 **(k**toe) –table no 14

Table 11 Investments, savings, acquisitions expressed in million EUROs according to the adopted national Strategy for Improvement of the Energy Efficiency in the period from 2010-2020

Sub-sectors	Investments	Savings with the current electricity prices	Savings with liberalized electricity prices	$ktCO_2$	Economic, ecological and social benefits from introducing the EE measures in the buildings
Housing Sector	279,6	151,3	311,9	1407	• amenity and health • lower budget • measure against energy poverty
Public Sector	114,1	124,5	266,0	253	• competitiveness • better conditions • new jobs
Buildings	393,7	275,8	436,4	1,660	
Production of construction materials	73,9	612,8	995,1	3130	
Transport	54,5	314,2	432	955	
Total	522,06	1202,8	1.965,03	57,9	

Source: EE Strategy, Ministry of Economy Note: Prices and forecasts from table 14 were developed according to the prices from 2010 година.

Table 12 Necessary investments expressed in million EURO-s in order to reach the goals of the National EE Strategy as of 2020

Building Sector	Total investment	Government of RM as a Client	Municipality as a Client	Foreign donors	Private Sector
Private dwellings	279,56	4,0	0,7	44,9	229,9
Commercial & public buildings	114,1	27,4	14,4	18,8	53,5
Total in the Building Sector	393,70	31,4	15,1	63,7	283,4

Source: EE Strategy as of 2020, Ministry of Economy of the Republic of Macedonia .

Table 13. Energy savings per sectors, expressed in kilotons equivalent for oil (ktoe)

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Private dwellings	7,63	11,4	15,74	20,42	26,52	33,49	40,51	48,32	57,14
Commercial and administrative buildings	4,96	7,53	10,83	14,85	18,43	21,62	24,19	26,54	28,60
Building Sector	12,59	18,93	26,57	35,27	44,95	55,11	64,7	74,86	85,74

Source: EE Strategy, Ministry of Economy

Table 14. Rate of required financial investments for implementation of the EE in the building sector, expressed in million EORO-s

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Private Sector	12,4	17,2	18,9	19,6	26,2	31,8	34,5	43,9	52,4
Commercial Sector	8,9	10,1	12,3	15,5	14,0	14,8	14,8	14,9	15,0
Total	21,3	27,3	31,2	35,1	40,2	46,6	49,3	58,8	67,4

Source: EE Strategy as of 2020, Ministry of Economy

The required DIRECT labour as for the implementation of the planned rate for introduction of the EE measures in the Building Sector in the Republic of Macedonia calculated according to the time necessary for reconstruction of the required area in m^2 and the price of the labour per day. The rate for the reconstruction of the existing buildings is 2,9% per year for the private building stock and 5% for the public buildings, as well as for construction of new buildings (both residential and public ones) following the trend from the past several years.

Table 15. Required number of staff for implementation of the EE measures by reconstruction of the existing building stock and the new building stock

Existing buildings (m^2)	Reconstruction (%)	Reconstructed area (m^2/year)	Unit price of reconstruction (per diem/m^2)	Required labour (per diem /year)	Annually per diem	Required number of workers
Private	2,9	832.300	3,1	2.580.130	250	10.320
Public	5	130.000	4,0	520.000	250	2.080
Total	7,9	962.300	7,1	3.100.130	500	12.400

New buildings	New area (m^2/year)	Unit price of reconstruction (per diem /m^2)	Required labour (per diem /year)	Annually per diem	Required number of workers
Housing buildings	700.000	10	7.000.000	250	25.200
Public buildings	200.000	15	3.000.000	250	12.000
Total	900.000	25	10.000.000	500	40.000

Total number of workforce needs immediately involved in Building Sector in the Republic of Macedonia amount on 52.400 workers i.e. 40.000 workers for new EE construction and 12.400 workers for reconstruction of the existing buildings in order to introduce the EE and RES measures. .

The current number of workers, immediately involved in construction is: 43.600 (according to the data obtained from a direct survey in the companies), i.e. 48.585 (in the entire Value Chain).

This indicates the possibility to employ about minimum 9.000 and maximum 12.600 new workers immediately involved in construction, who will have to be adequately trained as to acquire a skill (certificate) for installation of the equipment for energy efficiency for RES.

5.1.2. Low Energy Buildings, Annual Rate of New Construction of Energy Efficient Buildings and Energy Efficient Renovations

Less than 1 % of the total housing stock is comprised of low energy houses and buildings with good EE.

Definition. Green Value Chain is a business chain related to the low energy buildings. Passive building (a building with quite low energy consumption), which includes: Production and distribution of materials and equipment.; Professional services: architecture, construction, mechanical engineering, heating, ventilation and air-conditioning, electrical installations and equipment, PM (Project Management).; End users.;Quality and energy control (Energy Audit).;Harmonization with technical and other standards.;Independent institutions for quality control.;Research and development of new products- services in the sphere of EE and RES.;Education and training of architects, engineers, technicians and and direct labour force.; Financial, bank sector, funding of EE and RES projects, including both formal and informal financial services, ESCO (Energy Service Companies for funding and implementation of EE) etc.

In Macedonia 4000 solar thermal systems are installed which take share of 0,04 % fromtoatl final energy consumption. According to Strategy for RES usage in 2020 new 150.000 solar thermal system should be installed in households and 5 % in public and commercial buildings.

Statistics lacks about annual rate of new EE buildings and annual rate of renovation.

National program for EE in public buildings concerns to renovation of 2,6 millions m^2 with total investment amounts on 95 million Euros. Program Implementation isn't started yet.

5.1.3. Companies Operating in the Building Sector

The number of active economic operators, companies or organizations (including the MMSP) in the construction sector in 2011 is 4.400 and participates with 6% of the total number of active economic operators in the Republic of Macedonia.[18]

Table 16. Number of active economic operators in the construction sector

Construction sector	2010		2011	
	Total	Share (%)	Total	Share (%)
	4 368	5,80	4 400	6,0

Source: MAKSTAT

Table 17 Number of active economic operators in the construction sector according to their size

Year	Without employees or without data	1-9	10-19	20-49	50-249
2010	593	3335	247	126	61
2011	403	3512	272	150	57

Source: MAKSTAT

[18]Makstat- database

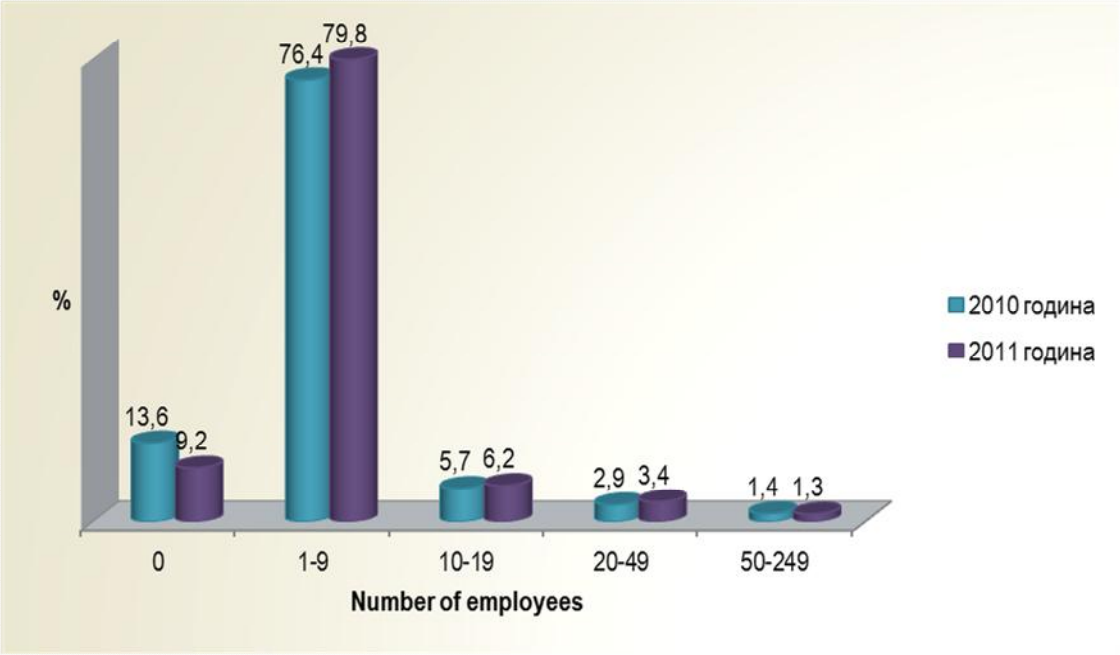

Figure4. Share of active economic operators in the construction sector according to the company's size
Source: MAKSTAT 2012

The biggest share (79,8%) of 4.400 construction companies is small companies with 1-9 employees. For the purpose of survey of the attitudes in the companies with regards to the application of the EE and RES measures, the following grouping is used: Construction Companies; Material Manufacturers; Craft Companies; EE companies and RES companies.

5.1.4. Main findings about the Need for Renovation and new constructions

a) Building Stock

The private housing stock amounts 28.67 million m^2. The majority of the housing stock, more precisely 78%, was built within the period from 1946 to 1970 which means that 30 % of the housing stock is more than 30 years old, while 48% of the housing stock is more than 25 years old.

The public building stock amounts 2.5 million m^2, 222 millions of which are m^2 with heated area., The data from the national Programme for EE in the public buildings in the Republic of Macedonia from 2012 to 2018 regarding the public buildings, show that 59% of the buildings were constructed before 1970, 30% of them were constructed in 1971 and 1990, and only 11% were built after 1990.

New constructions are 900.000 m^2 per year (460.000 m^2 households and 440.000 public and commercial buildings).

Average specific energy consumption in buildings amount on 214 KWh/m^2 whilst average energy cost amount 18,7 euros per m^2

b) Planned Energy Savings

The planned savings due to the implementation of the EE measures in the building sector amount 12.59 ktoe in 2012 and 85.74 ktoe in 2020.

The planned input in the building sector regarding the savings $ktCO_2$, in 2020 amounted on 1.660 $kтCO_2$.

Building sector contribution in energy savings targets is 36,13 % (: 24,08 % in households and 12.05 % in commercial and services sector..

c) Need for Reconstruction

The EU Recommendations regarding the rate of the reconstruction in order to implement the EE and RES measures, are to carry out reconstruction of the buildings with an annual scope of 3 % of the total private housing stock and 5% of the public buildings stock.

In order to meet these recommendations a reconstruction of 958.000 m^2 per year is required, as follows:

- 828.000 m^2/year private housing stock
- 130.000 m^2 /year public buildings

There is no timeframe for renovation till 2020 amd data about annual rate of renovation as well.

d) Value of the Reconstruction

As for the realization of the required reconstruction, in compliance with the EU recommendations, 305 million EURO-s are necessary, as follows: 166 million EURO-s for implementation of the EE measures in the private housing stock and 39 million EURO-s /year in the public buildings stock.

e) Planned Measures for EE and RES

The measures (the activities by the direct workers in the construction sector) that are to be implemented in the reconstruction refer to three targets:

- Building envelope*:* roof, façade; windows and doors; for the purpose of less loss of energy
- Energy Supply: interior walls and floors; electricity, heating, ventilation (air-conditioning). Replacement of the appliances in order to achieve less energy consumption and introducing of the EE systems
- Energy Sources: geo-thermal systems, bio-mass; solar heating; photo-voltaic systems, wind turbines; combined heat and power facilities (implementation of new renewable sources).

Table 18. Categories of construction works for EE of buildings and related occupations

Construction Work Categories for EE in Buildings			
Work description		Occupations – National Qualification	EE Measures
Exterior	Construction work	7111 – Construction workers for buildings	Use of new materials with a low heat transfer coefficient
		7112 - Bricklayers and other related construction occupations	
		7113 - Stonecutter, stonemason and carver	
		9313 – Blue collar workers in building construction	
	Roofing works	7115 - Carpenters and joiners	Roof insulation
		7121 - Roofers	
		7213.1 - Whitesmith, skilled workman	
	Façade works	7123 - Plasterers	Exterior wall insulation
		7124 - Insulation workers	
	Façade Carpentry and Glazing	7125 - Glaziers	Replacement or change of the window size, change of glass
Energy Infrastructure	Interior Walls and Floors	7122 - Roofers	Insulation of walls, floor and perimeter
		7124.1 – Thermal insulation worker	
	Electrical Engineering	3113.1 – Electrician for installation and equipment	Installation of energy management systems
		7411 – Electricians in buildings and similar occupations	
	Heating, Ventilation and Air-Conditioning Systems	7133 – Heating, ventilation and air-conditioning installer	Reconstruction of the heating system, pipe insulation, control system. Mechanical ventilation with heat recovery, pipe insulation, control system.
		7127.2 – Heating, ventilation and air-conditioning installer, skilled workman	
Energy Supply	Geothermal Systems	7412 - Electric mechanic and electrical fitters 7412.4 – *Electrical fitters of energy machines and devices* 7412.6 - Fitter of electric machines and equipment 7412.7 - Electric mechanic for electric power 7412.8 - Electric mechanic for electric power, specialized 7412.9 - *Electrical fitters* 7412.9 - Electric mechanic 7412.10 - Maintainer of electric appliances and equipment	Installation of geothermal systems
	Biomass Systems		Installation of biomass systems
	Сочеви системи за топла вода и за добивање на електрична енергија		Installation of systems for sanitary hot water with the use of solar energy
	Wind turbines		Installation of wind turbines
	Combined Heat and Power Facilities		Construction of combined heat and power facilities

f) Required number of on-site workers

In order to realize the required rate of reconstruction of the existing housing stock regarding the implementation of the EE measures, 10.000 workers directly involved in the construction are necessary, while as for construction of new buildings following the trend in the past years there is a need of 39.000 workers. Accordingly, for realization of

the EE and RES measures the minimum demand of labour force in the building sector amounts 49.000 workers, and the maximum annual demand of labour force in the building sector is 53.400 workers.

Regarding the available number of employees in the building sector, there is a need of minimum additional 10.000 workers, directly involved in the construction, who shall be qualified for implementation of the EE and RES measures, or maximum additional 14.400 workers directly involved in the construction, who shall be qualified for implementation of the EE and RES measures, (in case if the trend of GDP growth of 3.4% per year in the building sector remains the same).

Clarification:The Training needs for the Direct work force relates to **both categories** : the current workforce and the new additional workers. However, the Training curriculum (which is combination of theoretical and practical part) shall be adopted for each category separately. The numbers : 9600 to 16020 trained workers shall depend from :

a. Market demand for new or retrofit of buildings to implement EE and RES measures.
b. The Role of Government of FYR. Macedonia to include mandatory the EE-RES criteria in the process of Green public procurement (major reconstruction of the existing public buildings) .
c. Rules for mandatory certification of the companies-organizations and individual workers and experts, regarding implementation of the EU Directives

g) Construction Companies

There is a high level of defragmentation in the construction sector companies. The largest share belongs to the companies with 1 – 9 employees, i.e. approximately 79.8 %. During the last two years the share of the companies with over 50 employees decreases, while the share of the micro (from 1 to 9 employees) and the small companies (from 10 to 49 employees) increases.

Business specialization of the companies has not been given. There is a lack of data regarding the groups of the companies: construction sector companies (especially for building sector); construction materials manufacturer, craft companies, companies specialized in EE, companies for RES.

5.2. Statistics on the Current Workforce in the Building Sector

The Labour Force Data cover both the number of the employees as well as their level of qualifications and skills. The number of employees in the construction sector industry varies within the last 4 years and its share is 6,5 % of the total number of employees in the Republic of Macedonia, and it represents 8% from the employees in the private sector. The number of employees in the construction sector was 55.000 workers in 2011 година (including the employees in the informal sector), 39.000 of whom are employed in the building sector.

Table 19. Employed in the construction sector

Year	2008	2009	2010	2011
Total number	610.000	630.000	648.000	640.000
Agriculture	121.000	123.000	128.000	136.000
Industry	151.000	146.000	142.000	139.000
Construction Sector	39,400	40.800	41.000	45.000
Services	298.000	325.000	322.000	320.000
Public Sector	108.000	115.000	119.000	123.000
Private	502.000	515.000	529.000	517.000
Total	610.000	630.000	648.000	640.000

Source: Ministry of Finance and State Statistic Office, Economic Chamber of Macedonia, 2012

Figure 5. Employed in the building sector within the period from 2006-2010

Source: MAKSTAT

Table 20. Number of employees in the construction and building sectorr

Total number of employees in RM	NIC	2010	2011	2012
A. Direct Labour Force				
Building Sector – direct labour force	41	27.499	28.181	
Specialized labour force	43	9.782	10.815	
Total A		37.281	38.966	
B. Experts closely related to Building Sector in the Republic of Macedonia				
Architects and Engineers	71	3.198	3.875	
Real Estate Agents	68	1.566	1.714	
Management and Consulting (MC)	70	700	785	
Sale and Marketing	73	1.007	930	
Exploitation and Maintenance	81	2.286	2.315	
Total B		8.757	9.619	
Total A+B			48.585	

Basic data according to the Statistical Yearbook of the State Statistic Office of the Republic of Macedonia for 2011.

The data given below are a data combination regarding the entire Value Chain.

Annex 1. Employees in Building Sector SectorВработени во високоградба	2009	2010	2011	2012
Blue collar workers in Building Sector	20.500	19.400	18.900	No data
Experts and Professionals	2.000	1.800	2.100	No data
Technicians in Building Sector	3.600	3.400	3.200	No data
Unskilled staff	4.200	3.820	3.100	No data
Sale of construction materials	2.200	2.800	2.900	No data
Craftsmen in the Building Sector	6.400	6.200	5.600	No data
Skilled workers in sectors: energy, electricity, water supply, earth gas, air-conditioning	6.500	7.100	7.800	No data
Total	45.400	44.520	43.600	

Clarification: The Table-20 indicate the total number of employed persons in:part 20 a). Construction sector (roads, bridges, tunnels, other infrastructure) and part 20.b. employed parson in Building industry (private and public buildings).

For the purpose of project Build-up Skills FYR Macedonia), the analysis is carried out ONLY for the Building sector. The number of blue collar workers in the Building sector is: 18.900 workers , plus : building technicians (directly involved on-site) the number of 3.200; unskilled staff 3.100; craftsmen 5.600 and 7.800 skilled workers for the building installations : HVAC (Heating, Ventilation, Air-conditioning) , electrical installations in building, water supply, sewage , and other technical systems in the buildings . The above numbers counted 38.600 workers.

The difference (balance) to 43.600 people is related the methodology of the National Statistic Office of FYR Macedonia. Namely, the Official statistics have joint evidence for Construction workers and. Building sector workers.

Since 2009 Employees' the costs in construction of new buildings have increased faster than construction materials costs. It is resulted by introduction of new gross wages payment system

Table 21 Construction costs Index for new buildings, 2005-2011

	2005	2006	2007	2008	2009	2010	2011
New construction costs for residual buildings	100	109	111,7	116,9	123,9	121,1	122,8
Construction material costs	100	111,5	113,4	116,4	118,7	116,2	117,6
Employees costs	100	102,3	107,3	118,1	138	134,3	137,1

5.2.1. Unemployment Statistics

Data for the unemployed persons are official data from the Employment Agency of the Republic of Macedonia, as follows:

- The total number of unemployed workers directly involved in construction and qualified for the building sector was 12.978 on 30.09.2012.
- In 2011, new 1585 persons with occupation skills in the building sector were employed.
- In 2012, new 1258 persons with occupation skills in the building sector were employed.

Annually, about 1.500 to 1.600 new workers, directly involved in construction, are employed in the building sector.

5.2.2. Occupations Required for EE and RES in the Building Sector

The need for direct construction workers shall be analyzed from the aspect of both quantity and quality. The quantitative analysis refers to the required number of workers for implementation of EE and RES measures, while the quality analysis covers the skills necessary for realization of the national indicative objectives that will contribute to the EU Strategy 20/20/20.

The quality analysis states that there is a need of two types of skills: basic knowledge of EE and RES in order to increase the awareness of the need for upgrading the skills with a specialized know-how for implementation of the EE and RES measures regarding the reconstruction of the existing housing stock and the new buildings.

The EU Directives for RES, Article 14, for upgrading of the skills of: installer of smaller biomass boilers and stoves, solar photovoltaic systems, solar systems solar sanitary hot water systems, shallow geothermal systems and heat pumps.

The occupations provided for by the Law on Energy are Energy Controller and Energy Manager.

Table 22 Needs for workers, directly involved in buildings construction, for realization of national EE and RES objectives

Occupation	Annual need for workers
7111- Building operatives , semi-qualified workers and assistants	200
7112- Bricklayers and relative construction occupations	1100
7113- Stonemason, stone carver and graver	100
9313- General -Blue collars in building sector	300
7115- Wood trades and interior fit-out	550
7121- Roofers	1.100
7213.1. Plumber, craftsman	300
7123- Façade plasterer worker and Plasterers	500
7124- Insulation workers	400
7125- Glaziers	1.000
7124.1- Thermal insulation operatives	400
3113.1- Electrical trades and installation and equipment	400
7411- Electrician in buildings and similar occupations	300
7133- Heating, ventilation and air-conditioning installers	400
7127.2- Heating, ventilation and air-conditioning installers, craftsman	500
7412- Electrical mechanics and fitters	300
7412.4- Electrical fitter of power machines and devices	200
7412.6- Fitter of of power machines and equipment	200
7412.7- Electrical mechanic for electrical energy	300
7412.8- Electrical mechanic for electrical energy, specialist	300
7412.9- Electrical fitter	500
7412.9- Electrical mechanic	100
7412.10- Maintainer of electrical appliances and equipment	150
TOTAL	**9.600**

5.2.3. Main findings regarding the Labour Force in the Building Sector

Employees

There are 38.966 directly employed workers in the building sector. The current number of workers directly involved in construction, is sufficient to carry out the activities regarding new buildings (Table 16). In accordance with the EU Recommendations additional 12,400 workers directly involved in construction are required for reconstruction of the existing housing stock and public buildings.

Occupations in the Building Sector

According to the National Classification of Occupations there are 23 groups of occupations with 113 detailed occupations related to the building sector. A number of 79 of these occupations are directly involved in the EE and RES measures (Annex 4).

Workers required for Application of EE and RES Measures

The realization of the indicative national objectives for EE requires 9.000 workers for 23 occupations which must have a priority in the upgrading of skills. (Table 22). This number of workers is to be provided from the registered unemployed persons (12.978 persons) as well as from the graduates from the high construction sector schools.

Skills Requirement

Skill requirements are related to the following categories of construction works:

- *Building envelope, roof; façade; windows and doors, with thermal insulation for the purpose of less energy loss*
- *Power supply.* Internal walls and floors; electricity, heating, ventilation (air-conditioning), replacement of the appliances for the purpose of less consumption of energy and implementation of EE systems
- *Energy sources*: geothermal systems; biomass; solar heating; photovoltaic systems, wind turbines, combined heat and power facilities (implementation of new renewable sources)

The types of upgrade trainings for these skills regarding the above stated categories of construction works related to EE and RES shall be additionally specified.

5.3. Statistics for Energy Consumption and Renewable Energy in Buildings

Annex 6 gives certain relevant energy indicators for the Republic of Macedonia such as the energy and emissions i.e. the indicators of the World Bank for 2002, 2008 and 2011

Annex 2. Certain important energy indicators	2002	2008	2011
Energy per capita (kgoe)	1.750	1.800	1.790
Imported energy (%)	19	22	28
Energy from waste and biomass in relation to the total generated energy (%)	4	5	7.5
Consumption of the electrical power per capita (kWh)	2.900	3.800	3.600
Electrical power from liquid fossil fuels (%)	6	6	7
Electrical power from hydro-energy in relation to to the total generated energy (%)	8	7	7
Electrical power from coal in relation to to the total generated energy (%)	72	68	65
Emission of CO_2 per capita (mt)	5,8	5,7	5,5
GDP for energy unit (PPP-USD/ kgoe)	1,8	2,9	4,1
Number of dwelling units per 1000 inhabitants in the Republic of Macedonia	210	250	280
Average number of dwelling units per 1000 inhabitants in EU-27	480	510	540

Source: World Bank (WB-CEB Housing in SEE 2003 and 2010, WB data): 2011

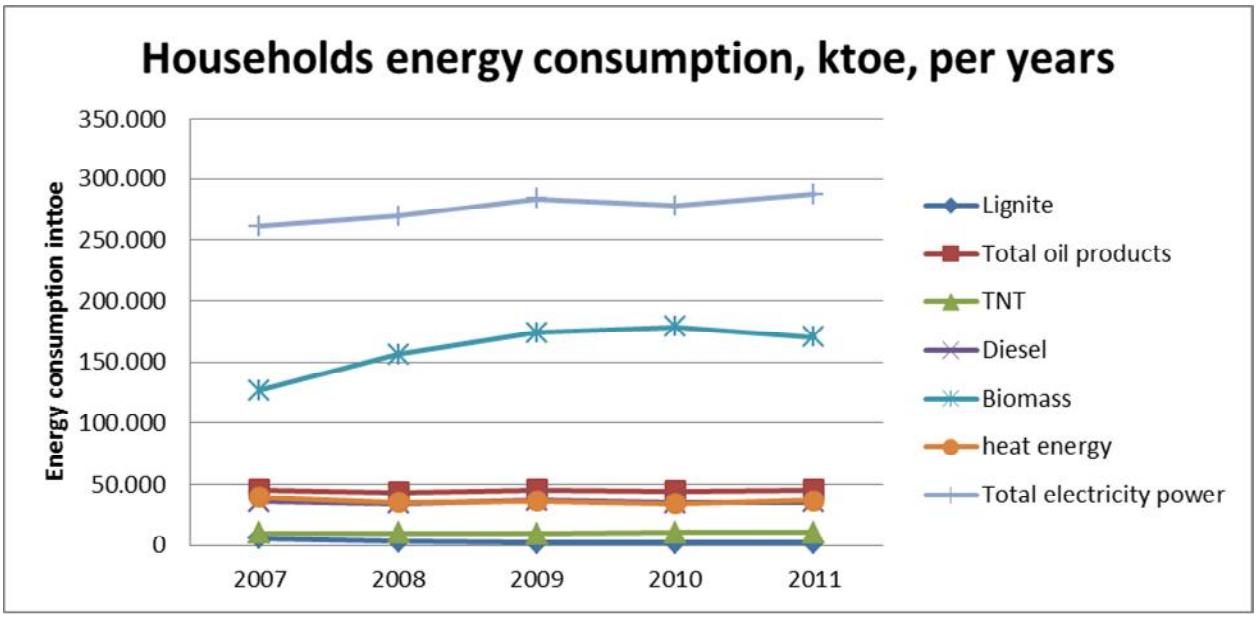

Figure 6 Households energy consumption, ktoe, per years

Source: MAKSTAT 2012

The biggest households' energy consumption is electricity energy with increasing trend, following by biomass consumption with decreasing rends.

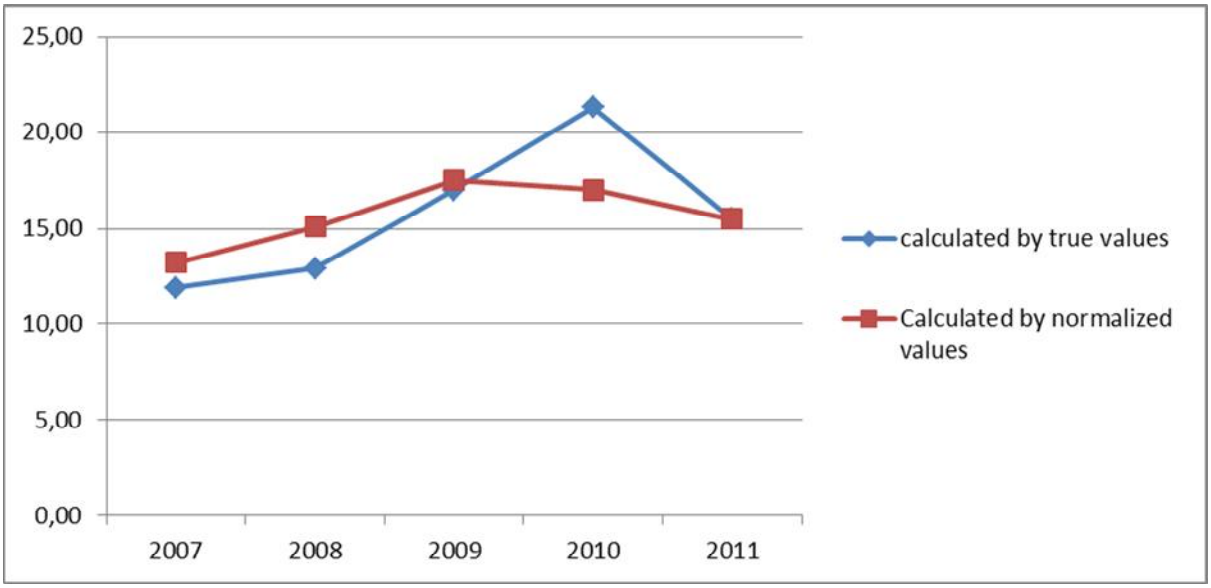

Figure 7. RES share in final energy consumption, 2007-2011

Source: MAKSTAT 2012

5.4. Missing Data

- Number of EE buildings, it is necessary to define how much of the existing housing stock meet the standards for EE.
- Annually completed high school students from the high schools for construction tehnicharis are to be obtained from the Ministry of Education or CHSE. It should be taken into account the number of high school graduates who continue their education, specifically continue their further education on university level.
- Number of trades - workers directly involved in the construction, in the building sector. The State Statistical Office has no records of the number of employed workers directly involved in the construction, in the building sector It is particularly important to determine the number of 23 occupations from the national classification that shall have a priority in the skill upgrading.

6. Existing VET for workers in the building sector in RM

This chapter aims to analyze the educational system in Macedonia for training of workers for the construction sector in terms of the following aspects: presentation of the authorities in this sector; market of service providers; quality assurance and organization, implementation of the European Qualifications Framework and other European regulations for education and training in the building sector in Romania; existing monitoring tools for the development of the educational system in Romania, presentation of projects and training programs are considered relevant at national level and level of local government.

Adult Education Centre in collaboration with the Center on Secondary Education and training are competent for market regulation and quality assurance by the service providers.

The used data refer to 2010-2011, and they have been provided by means of direct interviews and research conducted by relevant institutions.

6.1. Responsible Authorities

According to the Law on Adult Education, in addition to the Centre for Adult Education and the Council for Adult Education, the Ministry of Education, Ministry of Labour and Social Policy, the units of local self-government and social partners are also in competence for the adult education.

The competence of the Ministry of Education is to bring adult education strategy and annual action plans for its implementation, based on proposals given by the Council for Adult Education. Ministry of Education verifies and issues licenses to the educational institutions for the adults, keeps a register of validated institutions. Moreover, the Ministry adopts a curriculum and programs for primary, secondary and adult vocational education, in accordance with the proposal made by the Centre for Adult Education and national framework curricula and educational programmes for adults. The Ministry of Education provides funding of adult education from the Budget of the Republic of Macedonia based on the specified needs of the State, as well as funds for research and development required for the education of the adults, all this in compliance with the requirements of the State and the European Union.

Ministry of Labour and Social Policy has the competency to perceive the needs for staff retraining and additional training through the analysis of the labor market and to submit an opinion to the Council, to participate in the preparation and harmonization of the vocational qualifications in accordance with the standards, preparation of the *Standards Vocation List* and in organization of professional orientation of the participants, all this in cooperation with the Center to initiate preparation of new professional qualifications according to the standards for occupations.

By incenting the decentralization, a part of the competencies in the area of adult education are assigned to the local government. In the field of adult education, greater competencies are granted to the social partners (chambers and the majority union). Namely, the chambers submit proposals to the Centre for adopting new and innovation of the existing programs, as well as for development of new occupational standards. They can establish institutions for adult education and to adopt programs that are financed by the chambers. The majority union submits proposals for improvement of the conditions for the practical training of the participants at the employers, it can establish institutions for adult education and adopt programs that are financed from the funds of the union.

There is not any accurate analysis of the market of providers and users of educational services in the Republic of Macedonia. There are only individual efforts by the Ministry of Education and Science for analysis of the labor market that are part of the overall reform activities of the secondary vocational education.

6.2. Accreditation Bodies and Training Providers Relevant to This Sector

There are several types of institutions in the Republic of Macedonia that constitute the system of adult education. On the one hand it is the state and public institutions that have competencies and are responsible for adult education in the country:

- Ministry of Education and Science of the Republic of Macedonia
- Adult Education Center
- Council for Adult Education
- Ministry of Labour and Social Policy

On the other hand, these institutions are the adult education service providers, which according to the Law on Adult Education can be public and private institutions for adult education, adult education institutions, specialization centers, employers and the social partners, associations of citizens or individual trainers.

Some of the current education providers are as follows:

- Public and private specialized institutions for adult education: workers universities, educational consulting firms, training centers, centers for foreign languages, computer education centers, counseling centers, primary schools for adult education
- Secondary schools
- Unions, Chambers and associations
- Employment Agencies
- Professional Bodies , Universities
- NGOs

According to the source of AEC there are 11 verified adult training programs in Macedonia, and none of them is in the field of EE or RES. The closest to this is the training for installers of joinery with duration of 220 classes including 70 theoretical lectures + 140 classes of practice + 10 classes for knowledge tests followed by a written and practice exam, but still neither EE nor RES are mentioned.

In Macedonia there are 15 workers or national universities, which are undergoing the procedure of the adoption of the Law on Civil Universities. They offer professional training designed for work of lower requirements that provides practical know-hows and skills in various areas of labor for up to two years, i.e. I level of professional qualifications, as well as informal education related to professional training and specialization of both the young and adult persons.

Table 24 shows the Government's measure from the operational plan to increase the employment which coveres an

occupation related to the building sector, for example: plasterer - fitter.

Table 23 Training for deficient staff

Training to meet the demanded occupations on the labor market	
Goal	The measure aims to increase the employability of the registered unemployed persons by acquiring the skills for the demanded occupations in compliance with labor's needs
Brief description	The training will be carried out according to the approved and verified training programs by the Ministry of Education and Science, and after receiving a positive expert opinion from VET for institutions[3] and / or AEC for Adult Education Institutions[4]. Persons who will complete the training successfully, will gain the appropriate document in accordance with the training, issued by a certified / licensed trainers
Number of trainees	For the year 2012 216 persons
	In 2013 the number of trainees will be determined in accordance with the planed funds in the Budget of the Republic of Macedonia
Required funds	10.972.800,00 MKDenars for the year of 2012
	The amount of the required funds for 2013 will be in compliance with the planed funds in the Budget of the Republic of Macedonia
Fund Sources	2.594.850,00 MKD – Budget of MLSP 8.377.950,00 MKD – Budget of EARM (Employment Agency of the Republic of Macedonia) – Subaccount for active employment programmes and measures
Institutions competent for implementation	MLSP,EARM, MES, VET,AEC,SAC,UNDP Training Performer (educational institutions)

One part of the non-formal education for deficit occupations has been implemented through national employment Agency which is not training delivery institutions not responsible body for programs verification. The training has been implemented by Annual Operational programs for employment National employment Agency is responsible for training implementation that aims at improving employability of unemployed people.

Training are targeted to occupations that are demanded on the labour market, the resources available for organizing and executing trainings and signed Memorandum of Understanding between EARM and VET and / or EARM and AEC.

The trainings that are to be carried out by educational institutions cover the following construction sector occupations:

1. electrical installer and electrical fitter for residential buildings (Skopje, Bitola, Kumanovo, Kocani and Stip);
2. electrical installer and electrical fitter for industrial buildings (Skopje, Strumica, Kumanovo, Prilep and Stip);

3. installer and fitter for water supply and gas-supply installation (Skopje);
4. plasterer (Tetovo and Skopje);
5. gastronomy waiter (Ohrid, Gevegelija);
6. maker of locksmith products (Skopje, Kocani, Kumanovo, Bitola, Stip, Gostivar);
7. maker and fitter of carpentry (Skopje, Kavadarci, Strumica);

Trainings that will be provided by adult educational institutions refer to one occupation:

1. maker and fitter of carpentry (Strumica)

Trainings can be realized by previously expressed interest by training contractors and upon an opinion given by the VET (Centre for vocational education and training) and / or AEC (Centre for Adult Education) for the programme documents, as well as and in case if for the above stated trainings a sufficient number of unemployed candidates is provided.

Criterion for participation in the training for each of the occupations in terms of previous educational level will be defined by the training programs.

Persons who will be involved in training, during the training days will receive remuneration to cover the costs for food and transportation in the amount of 4,700.00 MKD per person / per month, with personal income tax included, insurance in case of accident during working hours and professional disease. The right to participate will be allowed to the recorded unemployed persons who have not been included in the Programme for preparation for employment for occupations required on the labor market during the past years.

The training will be implemented within a period of 3 months in relevant institutions. After completion of the training, candidates will perform practical work in real conditions at the employers, in duration of 1 month, what for they are to receive a certificate for accomplished practical work at the employers.

After the completion of training and passing the exam, the unemployed person will acquire the appropriate document for the accomplished training. It can be noted that there have not been planned any special trainings in the field of EE and RES.

Table 24 Data from the Center for Vocational Education

Municipality	Occupation	Profession	Vocational Education and Training Schools /Workers Universities	Verification according to the Operational Plan
Bitola	Electrical installer and electrical fitter for residential buildings	Electrical engineering	SOTU „Gjorgji Naumov“	OP 2011
Gostivar	Locksmith	Mechanical engineering	SOU „Gostivar“	OP2012
Gostivar	House painter	Construction and geodesy	SOU „Gostivar“	OP 2010

Kavadarci	Wood cutter	Forestry and wood processing	SOU „Gjorce Petrov“	OP 2012
Kocani	Electrical installer and electrical fitter for residential buildings	Electrical engineering	SOU „Goso Vikentiev“	OP 2012
Kocani	Locksmith	Mechanical engineering	SOU „Goso Vikentiev“	OP 2012
Kumanovo	Locksmith	Mechanical engineering	SOU „Kiro Burnaz“	OP 2012
Kumanovo	Electrical installer and electrical fitter for residential buildings	Electrical engineering	SOU „Nace Bugjoni“	OP2012
Prilep	Electrical installer and electrical fitter for residential buildings	Electrical engineering	SOU „Riste Ristevski - Ricko“	OP 2011
Skopje	House painter	Construction and geodesy	SGGU GS „Zdravko Cvetkovski“	OP 2010
Skopje	Electrical installer and electrical fitter for residential buildings	Electrical engineering	SETU „Mihajlo Pupin“	OP 2008
Skopje	Pipe installer	Mechanical engineering	SUGS „Vlado Tasevski“	OP 2008
Skopje	Maintenance staff of mechatronic systems	Electrical engineering	SUGS „Vlado Tasevski“	OP 2008
Skopje	Carpenter	Forestry and wood processing	SUGS „Gjorgji Dimitrov“	OP 2011
Skopje	Flat pack furniture producer	Forestry and wood processing	SUGS Gjorgji Dimitrov“	OP 2012- has both a programme and license, but there are not candidates
Strumica	House painter	Construction and geodesy	SOU „Nikola Karev“	OP 2011

Centre for Adult Education neither have data on the number of delivered training in adult education institutions, nor the number of participants in the training. Therefore, regarding the number of training participants for the construction vocations, assumptions were made by use of the data from the conducted research and data from the direct survey of the training contractors for informal adult education. According to the obtained data, the number of the persons trained for EE and RES measures is about 150.

6.3. Certification and Accreditation Framework

6.3.1. Adult Programme Verification

Special programs for adult education under Article 18 of the Law on Adult Education (Official Gazette of the Republic of Macedonia No.7/08) are the programs for: literacy of the population, •mother language and foreign languages, •retraining,aditional training, entrepreneurship and management, • Information and Communication Technologies, • creative expression and participation in cultural and artistic events,• preservation and protection of the environment, • specific social skills,•active citizenship,•basic know-how of science and technology,•other know-how, skills and abilities.

Centre for Adult Education will verify the special adult education programs leading to professional qualifications in accordance with the National Classification of Occupations of 2011 (published on the internet site of State Statistics Office (www.stat.gov.mk) in the following fields/vocations:•Economic and legal and commercial vocation; •Health profession; • Textile-leather profession; • Graphic profession; • electrotical vocation ;• personal services;• catering and tourist vocation ;• forestry and wood production vocation ; • construction and geodesy vocation ; • agricultural and veterinary vocation;• traffic vocation;• sports high school; •geological and mining and metallurgical vocation ;• chemical and technology vocation; •mechanical vocation.

According to PI Adult Education Center there are 15 certified programs in total for all occupations, where those regarding the construction-geodetic profession are given in Table 25.

Table 22 Verified programmes for construction occupations

	Verified Programme	occupation	Providers of the training	Municipality
1	Installers and assembly of bulding envelope	02.Construction geodetic vocation	Workers University Joska Svestarot	Strumica
2	Plasterer-fitter	02. Construction geodetic vocation	Education Catering and Services Company - Business Centre for training	Ohrid
3	Plasterer	02. Construction geodetic vocation	Education Catering and Services Company - Business Centre for training	Ohrid

As training providers verified programs for all occupations, according to the same source only eight subjects occur. Table 26 gives the institutions that are certified for training of the construction workers.

Table 26. Verified institutions for trainings for construction vocations

Providers of the training	Municipality
Baby-Commerce Academy Style	Bitola
Education Catering and Services Company - Business Centre for training	Ohrid
Institute of advanced composites and robotics	Prilep
Workers University Joska Svestarot	Strumica
Workers University Pere Toshev - Prilep	Prilep
SOU „Kiro Burnaz“	Kumanovo
Secondary School Dr. Pance Karagjozov	Skopje, Gazi Baba
Hear Fashion Group	Skopje Centre

In March 2012, the Association for the development of adult education and lifelong learning made a research on the topic 'Bidders fof inormal education in the Republic of Macedonia“. Survey was answered by 55 subjects. It may be noted that the majority of informal education providers offer informal education in the form of trainings and workshops, and mostly their target group are young and unemployed persons. Training of business nature, information technology and languages are the most popular among bidders, but also and the most required ones by the users of informal education. The informal education is offered in both urban and rural regions. Most of the bidders do not have any verified programme and they offer and implement their services together with partner organizations. In any case, there is a great interest in verification of the programmmes, presented on Figure 5a and b.

Figure 8. Fields of training for informal education (a) and percentage of verified programs (b)

Source: Part of the results of the survey of the Association for the development of adult education and lifelong learning

Upon receipt of the documentation for verification of special program the PI Adult Education Center reviews the submitted documents and checks whether they are complete, whether the forms of the Centre for Adult Education are used for verification of the special programmes and accordingly the Centre makes a decision whether the documents are going to be submitted to the Commission for verification or are they going to be sent back to the adult education institution. If the documents are not proper i.e. they are not complete the adult education institution is advised to submit the additional required documentation. The Institution has to complete the documents within 8 days and to send them to the Adult Education Center.

Within 30 days from the date of submission of the completed documentation to the Adult Education Center, the Centre reviews and evaluate the submitted special programme for education of adult persons.

6.3.1.1. Evaluation of the Special Programme for Adult Education

Upon receipt of the documents and the initial review by the PI Adult Education Center documents are handed over to the Commission for verification, which according to the Book of Rules on the method of verification of special adult education programs is consisted of minimum three members: one member from the Centre for Adult Education, a member of the Center for Vocational Education and Training, school, university, and one expert in the field of the submitted programme. President of the Commission is a member of the Centre for Adult Education. The Commission considers and evaluates the submitted program within 30 days after submission of all required documents.

At this stage, the PI Adult Education Center may require from the institution for adult education additional information regarding the institution that realizes the programme as well as for the programme already submitted for verification. Institution for adult education is obliged to submit all requested information to the PI Adult Education Center within the time period specified by the PI Adult Education Center.

6.3.1.2. Making a Decision for Verification of Special Adult Education Programme

According to the conducted evaluation of the specific program and checking of the other documentation, the President of the Commission for verification submit to the Director of the Centre a report by which he proposes a Decision on the Request for verification of the special programme, according to which:

- the requirement and the submitted programme can be completely accepted;
- the requirement and the submitted programme can be completely refused.

Decision on the submitted Request for verification of the special programme is made by the Manager of the Centre for Adult Education.

The Decision for the verification of special adult education programme shall be issued for a period of 3 (three) years. After receiving the Decision for verification of the special programmed, the service provider can start the procedure for licensing of the Institution for adult education and after obtaining the license from the Ministry of Education and Science the Institution acquires the right to enroll participants and to begin the implementation of the programme. for The Adult Education Center submits the Decision for verification of the special programme for adult education to the Ministry of Education and Science.

Establishments / institutions for adult education whose request for verification of special programmes was rejected are provided by the Adult Education Center more detailed explanations regarding the reasons for refusal of verification of the special programme.

The special programmes that have been verified are recorded in the Register of adopted programmes for adult education run by the Adult Education Centre. The Register of adopted adult education programmes is published on the official web-site of the Adult Education Centre.

6.3.1.3. Monitoring by the PI Adult Education Center and withdrawal of the Decision for Verification of special programme

The PI Adult Education Center performs monitoring and external evaluation of the implementation of the verified special programme for adult education. The external evaluation will be carried out according to defined criteria of the Adult Education Center and will be implemented by persons authorized by the Adult Education Center.

Monitoring reports on the implementation of the verified programmes for adult education are prepared by Adult Education Center. They are based on the reports of the performed internal and external evaluation and visits by the Adult Education Center in the premises of the establishment/institution for adult education.

The Manager of the Adult Education Center, on the basis of the obtained information, monitoring reports and reports of internal and external evaluation of the implementation of verified special programs can make a Decision for withdrawal / seizure of the verification of the special programme for adult education. The Adult Education Centre shall submit to the establishment / institution a more detailed explanation regarding the reasons for premature withdrawal of the Decision for verification of the special programme.

Two months before the expiring of the verification of the special programme for adult education, the establishment / institution for adult education shall submit to the Adult Education Centre a request forRe-verification of the special programme, which can be found on the web-site of the Adult Education Centre, as well as a paying-in slip for the payment for re-verification of the special programme, on the account of the Adult Education Centre, in compliance with the Price-list for re-verification of the special programmes for adult education, which price-list has been put forward by the Managing Board. In case if there are not any remarks regarding the submitted request the Adult Education Centre makes a Decision for verification of the special adult education programme for the next 3 (three) years.

6.3.1.4. Informing by the Establishment / Institution for Adult Education

The establishment / institution for adult education after receiving the decision for verification of the special adult education programme shall submit to the PI Adult Education Center an annual report on the implementation and evaluation of the programme. The establishment / institution for adult education shall inform the Adult Education Center, within 15 days, for the changes that occurred in the implementation of the special programme for adult education and the goals of the programme that are over 20%.

6.3.1.5. Implementation of the Verified Special Programmes for Adult Education

The establishment / institution for adult education are responsible for the development and implementation of the special programmes for adult education. The establishment / institution are responsible for provision of quality and implementation of the standards for the verified special programmes for adult education proscribed by the Ministry of Education and Science of the Republic Macedonia, the Adult Education Center and Vocational Education and Training Center.

Programmes should be developed according to the needs of a given target group and to enable participants to acquire the provided for know-hows, skills and competencies. After acquiring the Decision for verified programme for adult education, the establishment / institution van make a public announcement that the programme is verified in compliance with the regulations and standards of the Ministry of Education and Science, the Adult Education Center and Vocational Education and Training Center.

6.3.1.6 . The Process for Application and Completion of the Verification Request and a Model of Special Adult Education Programme

Before starting the process of verification the establishments / institutions for adult education should previously become introduced with the procedures and criteria for verification of special programmes and to check whether they meet the criteria and standards for implementation of verified special programmes for adult education proscribed by the Ministry of Education and Science of the Republic Macedonia, the Adult Education Center and Vocational Education and Training Center.

Upon completing the Request for verification and the Model of special adult education programme they should use comprehensive language, and the used professional terms shall be precisely explained.

6.3.2. Verification of the Institutions - Service Providers

6.3.2.1. Conditions Required for Licensing of the Adult Education Service Providers

Provision of the quality by the establishments and institutions for adult education shall be accomplished as follows:

- Adult education service providers have defined development goals
- The defined development goals are in line with national priorities in education and adult education
- Adult education service provider communicates with the authorities, local government and participants in the programmes in order to offer a service of better quality and to achieve effective realization of the set goals

- Service Provider for Adult Education has introduced mechanisms to evaluate the achieved goals of the programme activities and according to the obtained results from the evaluation, plans the development of the future programme activities

- Adult education service provider regularly observes the implementation of the programme activities and improves the quality

The Service Provider runs / provides a documented quality system according to the criteria of the State Education Inspectorate and applies it in order to achieve the program goals:

- Service provider has defined management structures, assigned responsibilities and functions

- Service provider has defined organizational structures, assigned responsibilities in the part of management, financial operations, teaching staff, administrative and support staff

- Service provider systematically implements a documented quality system according to the criteria of the State Education Inspectorate and continuously improves the teaching process

- Service Provider works in accordance with the relevant legal regulations in the area of financial operations

Service Provider provides and and professionally improves the staff in order to achieve the set program goals:

- Service Provider hires staff who have adequate professional and andragogical training acquired either formally or informally

- Service Provider offers the staff labor contracts and working conditions

- Service Provider takes care regarding the development of the know-how, skills and competencies of its staff and thus provides education of higher quality

Service provider has appropriate premises, teaching aids and devices to deliver relevant programme activities:

- Service provider has provided the prescribed premises, teaching aids and devices according to the number of participants in the program activities in compliance with the Rulebook on standards for space, equipment of the establishments and institutions for adult education and the provisions from the Law on Adult Education, Law on Primary Education, Secondary Education Law, the Law on Vocational Education and Training, Higher Education Law and the provisions of the bylaws that govern the standards for space and equipment for primary, secondary and higher education and Norms for teaching aids and aids for occupations in the four-year secondary vocational education, which can be found on the website of the Center for Vocational Education and Training: www.csoo.edu.mk.

- Special programs for adult education are realized in the premises of service providers that are built and equipped in accordance with the standards provided for in the Rulebook on Standards for space, equipment of the establishments and institutions for adult education and the and Norms for teaching aids and aids for occupations in the four-year secondary vocational education. Premises where the adult education programs are to be implemented should be owned by the service providers or leased.

- Service providers should have premises for theoretical and practical classes.

- Service provider complies with the prescribed regulations for the protection and health protection of the employees and participants in educational activities and and is obliged to ask appropriate institutions for a solution to meet the minimum technical and Понудувачот на услуги ги исполнува пропишаните регулативи за заштита и заштита на здравјето на вработените и учесниците во наставните активности и е должен да побара решение од соодветни институции за задоволување на минималните технички и hygienic conditions of the area where the education of adults is implemented

Service provider regularly informs the Ministry about any changes of the conditions in the premises within 15 days after the change. Also, the service provider submits an annual report to the Ministry of Education and Science on the results of the internal evaluation, which is conducted by the Adult Education Center in accordance with certain criteria.

6.3.3. Extent to Which the Existing System Covers the Skills for Implementation of EE and RES in the Construction Sector

Special qualification regarding both EE and RES has not stated. According to the Nomenclature of buildings structures and civil works, works in terms of installation of EE and RES are mentioned **only** as an item 43.21.10 . The electrical installation works, which in addition cover and "…electrical installation works for installation of other electrical equipment in the buildings, including solar electric collectors and floor heating...".

Current educational system doesn't encompass skills for implementation of EE and RES measures in building sector. Training providers that are not verified according to national education system have the training programs for EE and RES (described in 6.4)

6.3.4. Existing System of Technology Monitoring and Skills Training

6.3.4.1. Data, information and research base

The information system for adult education which would provide clear and transparent monitoring, evaluation and planning in this area has not been sufficiently developed, yet. However, during the past period attempts were made for improvement of this situation. According to the Law on Adult Education, the Ministry competent for education keeps a central register for verification of institutions that implement publicly recognized programmes, and the municipality, i.e. the City of Skopje keeps a Municipal Register for the establishments and institutions that implement publicly recognized and special programmes for adult education in their region. A corresponding Register and database have been prepared by the Adult Education Centre.

Although the Republic of Macedonia there is not a national system for collecting data regarding the adult education, the data and information for policy development in adult education can be obtained from several sources: Statistical Yearbook of the Republic of Macedonia and the Labor Market survey prepared by the State Statistical Office, the Adult Education Program in the Republic of Macedonia regarding the lifelong learning, and other analysis and reports from the Republic of Macedonia to the international organizations where we are members, as well as the regular reports to the EU institutions, regular dialogue under the Stabilization and Association Agreement and the Accession Partnership, the European Commission's Annual Report on the of the Republic of Macedonia, Reports and recommendations by the European Training Foundation (ETF), reports from the UN instruments, reports of the Council of Europe under the respective instruments, and of course the instructions exactly from the bodies of the Council of Europe, the World Bank reports and other institutions.

6.4. Courses and Training Schemes on Energy Efficiency and Renewable Energies in Buildings which Exist but are not (yet) Part of the National Continuing VET System

Training providers in the Republic of Macedonia are: the Workers Universities, total 14; NGOs, 55 of which provide trainings; and the three chambers.

EE and RES Courses that are provided to the institutions for informal education cover the following fields:

- Construction of KSINTI facades,
- Energetic rehabilitation of existing buildings
- Energy efficiency in new buildings
- Solar thermal
- Photovoltaic
- EE of buildings
- Promotion and strengthening of capacities
- EE on farms and rural households

The programmes of these courses are not verified and are not a part of the National System for Vocational Education.

There are seven training institutions that run trainings for EE and RES and they offer them at a price of MKD 6,980 for a two-month training; 4,000 MKD for a two day training and 15,000 MKD for a 40-hour specialized training. (Annex 3).

In the field of EE and application of RES in the construction sector there are not data about any launched trainings. Possible trainings in this field are conducted within companies where workers are directly engaged and whose vocational training and improvement regarding EE and RES is required. Therefore, all data on the available trainings in this field should be collected through direct surveys (questionnaires) at corresponding companies.The list of companies that are working in the field of RES (production, supply and installation) can be found on the web site of CeProSARD. (Annex 4):

In the field of EE for the building sector there are 26 entities engaged in the production of equipment, materials or provide consultancy services for implementation of the EE and RES measures (Annex 5).

6.5. Relevant Initiatives at National / Regional level Supported by the EU

The goal of PACE Partners of the Project for acquis compliance and energy efficiency (PACE) is to facilitate the process of EU integration of the business communities from the six countries of the Western Balkans (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia).

6.6. Main findings about the system of vocational education and Training, Trainings for EE and RES

System and institutions for vocational education and training

There is a legally set up national system for vocational education and training with contractual institutions. The institutions competent for informal adult education are formed recently i.e. in 2011. The experience and capacity in verifying the programmes for EE and RES is insufficient. There is not any strategy green jobs and for introducing the education for EE and RES in the high schools.

Accreditation and certification system

There adopted verification rulebooks for verification of programmes and institutions for providing training programs for adults. The procedures for verification of programs and institutions last from 6 to 9 months.

Vocational education and training in the construction sector

So far, three training programs have been verified: carpenters; plasterers-fitters and façade makers. Eight institutions have been verified for the delivery of training for the construction vocations. There is not available information available regarding the expressed interest and the number of visitors that complete the training programmes per year. There is only one vocation i.e. the electrical installer, being involved in the training programme for solar energy and floor heating.

Training that are not a part of the national system for vocational education and training

There are trainings that are not a part of the VET system as well as trainings that are provided by the manufacturers of equipment and construction materials and adult training institutions. Trainings are organized as seminars that last for a period of 1-2 days, weekly trainings (5 day seminars) or as courses (of 40 classes within a period of 32 months).

7. Skill Gaps between the Current Situation and the Needs for 2020

This chapter presents the current situation of the construction labor market in order to be able to assess the 2020 skill needs. By taking into account the analysis of the construction workforce and the actions required for the implementation of the EE and RES measures (analyzed in Chapter 3) we can estimate the number of workers that require training in the building sector for meeting the energy targets for 2020.

Also, efforts are made to assess the need for training of priority occupations which are directly involved in the implementation of the EE and RES measures by the workers directly employed in construction. This assessment will be reviewed and defined together with the stakeholders in the establishment of the National Qualification Platform and the project's steering committee. This way, in case of any errors in the previous estimates, they can be addressed immediately in the next stages of the project, especially in the section for skill development of priority occupations.

7.1. Labour Force Evolution

In the last 4 years labor force demand is around 55,000 workers a year, 39,000 of which in the building sector only and the estimates are that this average number of workers a year will remain the same in the period to follow.

The estimates have been made based on the assumption that the EU recommendation will be followed for an annual refurbishment of the private building stock of 3%, increase of the labor force demand of 5% with a minimum of 10,000 and maximum of 14,400 workers and a gross annual demand of a minimum of 49,000 and a maximum of 53.400 workers.

The analysis has pointed out to a lack of labor force in the sector. More than half of the surveyed companies (67%) said that they needed one or more workers with EE know-how. These would participate in EE trainings, but they expressed concern for the migration of the labor force once training was completed (most of the workers with EE and RES know-how leave for higher paychecks in some of the EU countries).

Also, the unfavorable age structure of the workers and the migration in other sectors can pose a problem in providing workers trained for the implementation of EE and RES measures.

The lack of labor force in this sector can be made up for by the following:

- In the last two years the number of graduated participants in secondary education has been 286 in 2010 and 308 in 2011
- Around 50% of the participants with completed secondary education register for the first time as unemployed in the Unemployment Agency in the Republic of Macedonia
- There are 12,978 persons registered as unemployed from the construction sector at the Unemployment Agency in the Republic of Macedonia, 6,871 of which are of occupations referring to the building sector. The number of new employments in the building sector ranged from 800 new employments in 2010 to 700 new employments in 2011 of occupations related to the building sector.
- The EE and RES implementation measures by the workers directly employed in construction depends a great deal on the training degree of the architects, engineers and supervisors. Macedonia lacks in training for this highly qualified staff for the application of EE and RES measures. This gap in skills is however not subject of analysis in this report.

Table 27 Priority occupations for meeting EE and RES targets

Occupation	Annual need for workers
7111- Building operatives , semi-qualified workers and assistants	200
7112- Bricklayers and relative construction occupations	1100
7113- Stonemason, stone carver and graver	100
9313- General -Blue collars in building sector	300
7115- Wood trades and interior fit-out	550
7121- Roofers	1.100
7213.1. Plumber, craftsman	300
7123- Façade plasterer worker and Plasterers	500
7124- Insulation workers	400
7125- Glaziers	1.000
7124.1- Thermal insulation operatives	400
3113.1- Electrical trades and installation and equipment	400
7411- Electrician in buildings and similar occupations	300
7133- Heating, ventilation and air-conditioning installers	400
7127.2- Heating, ventilation and air-conditioning installers, craftsman	500
7412- Electrical mechanics and fitters	300
7412.4- Electrical fitter of power machines and devices	200
7412.6- Fitter of of power machines and equipment	200
7412.7- Electrical mechanic for electrical energy	300
7412.8- Electrical mechanic for electrical energy, specialist	300
7412.9- Electrical fitter	500
7412.9- Electrical mechanic	100
7412.10- Maintainer of electrical appliances and equipment	150
TOTAL	**9.600**

- The training of the direct employees is not based on the needs of the construction companies. Half of the surveyed construction companies do work which is related to EE and RES, however 75% of these do not possess trained workers for the implementation of these measures. This is why the training initiative stems from the workers themselves, who choose to attend trainings to help them get a job in the EU countries more easily.
- The trainings in the informal education institutions refer mainly to certification programmes (around 100 certificates for craftsmen are issued each year by verified institutions for informal education programmes for installers, equipment operators, O&M (Operation & Maintenance) workers , pipe welders, electrical wiring installers, system operators etc) or training for the use of construction materials which are delivered by the manufacturers of construction materials (around 400 workers a year get trained in the companies which produce construction materials and provide EE).

- RES training has been concentrated in three institutions, which make use of European projects. These trainings comprise of around 80 workers of construction occupations. The training curriculum consists of two theoretical modules and practical teaching. The best students in the training are then directed towards trainer training.

Table 28 Graduated students from the construction-geodetic stream in the secondary schools in 2010 and 2011

Education Profile	Graduates students from the construction-geodetic stream in **Macedonian** language of instruction				Graduates students from the construction-geodetic stream in **Albanian** language of instruction			
	Graduated students in academic year 2009/2010		**Graduated students in academic year 2010/2011**		**Graduated students in academic year 2009/2010**		**Graduated students in academic year 2010/2011**	
	male	**female**	**male**	**female**	**male**	**female**	**male**	**female**
Construction machine operator					62		34	
Architectural technician	28	9	29	10	37	10	38	12
Dry construction fitter	23	0	11	0	22	0	20	0
Construction technician	12	-2	11	3	43		48	
Geodetic technician	18	4	34	6	0	0	18	2
Bricklayer-plasterer					15		13	
Reinforcement operative							16	0
Graduated part-time students	5		3					
Total	**86**	**11**	**88**	**19**	**179**	**10**	**187**	**14**

In conditions like this, the factors that influence the workers' awareness on energy efficiency are the following:

- Companies think it's not economically feasible to implement EE and RES measures. Namely, 70% of the surveyed think that the construction industry has to adapt to the EE requirements, 20% think that this will be important for the future and 10% think it's necessary only if asked by Clients. However, companies still feel that the introduction of the EE measures depends on the legislation and the requests of the Clients.
- The capacity of construction companies to send workers to training is still very small. Even though 75% of the surveyed companies don't have workers with EE and RES certificates and 67% of companies would like to participate in EE training by obtaining specialization and certificates, still the majority of the respondents would do this only if the training was free.
- The demands of the surroundings are of exceptional importance for raising EE and RES awareness. For additional training of the workers, most influential for the companies are the EE legislation and the increased competition.

7.2 Skill Needs

The measures (the work by the directly employed workers in construction) that need to be implemented in reconstruction refer to three areas:

- *Building envelope:* roof, façade and doors and windows for less energy loss;
- *Energy supply:* interior walls and floors, electricity, heating, cooling, ventilation (air-conditioning), replacement of devices for lower energy consumption and introduction of EE systems
- *Energy sources*: geothermal systems, biomass, solar heating, photovoltaic systems, wind turbines and combined heat and power faculties (introduction of new renewable energy sources)

Table 29 Priority occupations for acquiring skills at three levels of qualification

Construction Work Categories for EE in Buildings			
Description of Work		Occupations – National Qualification	EE Measures
Exterior	Construction Work	7111 - Construction workers for buildings 7112 - Bricklayers and other related construction occupations	Use of new materials with a low heat transfer coefficient
	Roofing work	7115 – Carpenters and joiners 7121 - Roofers	Roof insulation
	Façade works	7123 - Plasterers 7124 - Insulation workers	Exterior wall insulation
	Façade Carpentry and Glazing	7125 – Glaziers	Replacement or change of the windows
Energy Infrastructure	Interior Walls and Floors	7122 - Finishers of Interior Walls and Floors 7124.1 – Thermal insulation worker	Insulation of walls, floor and perimeter
	Electrical Engineering	3113.1 - Electrician for installation and equipment 7411 - Electricians in buildings	Installation of energy management systems
	Heating, Ventilation and Air-Conditioning Systems	7133 – Heating, ventilation and air-conditioning installers, craftsmen	Reconstruction of the HVAC system

Occupation standards are defined according to the Methodology for Standard Development.

From the 52 occupation standards, 3 refer to construction (plasterer, dry construction fitter, wall decorator, technician designer for interior architecture). The development time of a new standard related to the implementation of EE and RES measures is 2 weeks (according to the given procedure and committee). The proposal of the committee is then approved and verified by the Ministry of Education (but this is still not law effective)

The National Qualifications Framework is being prepared and a working version of is expected to be finished towards the end of March 2013. It will consist of 5 levels of qualifications: 1 – blue collar worker, 2 – occupation worker assistant (semi-qualified). 3 – occupation worker (qualified), 4 – technician, 5 – specialist and craftsman (highly qualified).

The acquisition of the required skills for EE and RES is to refer to the following qualification levels: 2 – occupation worker assistant (semi-qualified). 3 – Occupation worker (qualified) and 5 – specialist and craftsman (highly qualified).

7.3. Monitoring Needs

Assessment of the needs for workers at a national level

At a national level, it is the Ministry of Labor and Social Policy which assesses the needs for workers. These needs and EE and RES competences will be agreed upon with the Ministry of Economy and together these two ministries will monitor the needs at a national level by taking into consideration the additions and the EU directives for energy policy.

Monitoring of the requirements for changes of the various qualification levels, know-how and capabilities

The development of the qualification system is the direct responsibility of the VET Center and AEC. The changes in the occupation standards will be implemented by the VET Center while their incorporation in the adult education programmes will be the responsibility of the AEC.

Education system monitoring

The monitoring of the education system falls under the responsibility of the Ministry of Education through verification of the informal education programmes and verification of the institutions which deliver those trainings.

The role of professional associations

Professional associations of construction workers will monitor the implementation of the qualification system and raise initiatives for change in the occupation standards so as to improve the EE and RES measures. They will also monitor the process of quality verification of trainings for the workers directly involved in construction.

Monitoring of the skill levels in companies

The wide usage of the certification system for training quality in companies will make easier the professional development of workers. The periodical assessment of the training needs in the construction companies will allow the needs for change of the skill level and qualifications on the labor market to be continuously monitored.

8. Barriers

This chapter analyzes the obstacles in the capacity building of workers directly involved in construction in terms of the EE legislation, regulation of the construction market, capacities of the education system and institutions which deliver trainings.

The barriers are identified based on legislation consultation, strategic documents, meetings with relevant institutions and research conducted between the construction companies and informal education institutions.

General

- Lack of capacities for long-term planning while in areas where these exist, capacity building is only for the development of strategies;
- Fragmentation of the EE activities;
- Lack of statistical data unification;
- Financial risks and orientation towards help and support through programmes;
- There is no specific law for mandatory application of EE and RES in the new buildings and the refurbished ones;
- Lack of by-laws, rulebooks and guidelines on the construction method;
- Lack of simulation policy based on numerical parameters for the EE degree;
- Lack of compliance to the ETICS (External Thermal Insulation Composite Systems) standard due to not having a rulebook or control for appropriate implementation of the given standard;
- Lack of the presentation of EE through figures and clear numeric indicators;
- Lack of guidelines for solar thermal;
- Insufficient information;
- High initial investment

Construction sector

- Sector fragmentation;
- Low EE and RES demand on the market;
- Weaknesses in the social partnership system;
- Poor interest for employee training

Formal education

- Decrease in the number of participants from the construction occupation;
- High dependence of a project' s development to EU programmes
- Lack of funding to cover costs for new skill development;
- Old contents and methods of learning;
- Unsatisfying level of cooperation with the employers;
- Teacher reward system;
- Fragmentation of the vocational education and training sector;
- Lack of "soft skills"

Informal education

- Lack of competent trainers for trainers;
- Fragmentation of the informal education sector;
- Small number of potential participants in the trainer training
- Educators are oftentimes unaware of the situation in practice;
- Limited access to trainings for participants from small and medium-sized enterprises
- Bad reputation of the sector.

9. Relevant Issues that are not Part of the Project

The discussion on the verification of the collected and analyzed data and the definition of the priority occupations was conducted in two expert groups (the first one focused on the EE and RES measures while the second one on the required training for workers directly involved in construction) at a session of the steering committee of the Build UP Skills MK project and the plenary session of the National Qualification Platform.

During discussions, the participants – representatives of relevant institutions raised some questions regarding the Report on the Capacities of the Construction Sector in the Area of Energy Efficiency and Renewable Energy Sources, which were considered important for meeting the national energy targets by 2020, but which are not a part of the project. These refer to the following areas: approximation of the legislation, national standards in construction, stimulation of the demand for EE and RES measures and inclusion of all of the workers from the building sector which is in need of training.

Approximation of legislation

- Development of Rulebooks, which will help define the norms for the implementation of EE measures in the construction of buildings;
- Passing Law on Energy Efficiency ;
- Changes in the Law on Construction, which will regulate the introduction of EE and RES measures.

National standards in construction

- Unification of the quality of materials used in renovation and the construction of buildings. This is especially relevant in the construction of roofs in buildings;
- Application of the EU Directive for construction products;
- Participation in the project by the Standardization Institute, as one of the key stakeholders in the section on compliance of Macedonian standards with the European standards.

Inclusion of the employees in the building sector

- Training of all of the persons included in the construction process: designers, civil engineers, civil and municipal servants for EE, auditors and supervisors;
- Training for architects and designers in the development of designs for renewable energy sources.

Stimulation of the demand for implementation of EE and RES measures

- Increase of the demand for the implementation of EE and RES measures through stimulations or access to favorable credit lines;
- Launching a wider promotional campaign for the benefits and advantages of the implementation of EE and RES measures. The end users need to be approached with specific facts on how much each of them is to gain by the implementation of these measures.

10. Conclusions

This report gives an overview of the national policy and strategies for improvement of the energy efficiency of buildings by 2020. It describes the private building stock and the public buildings as well as the national education system with special emphasis on the occupations relevant to the construction sector.

The previous chapters have shown that the Macedonian construction industry is facing a considerable number of barriers and problems, of general and specific nature in relation to the goal for meeting the national energy efficiency targets by 2020.

It's clear that Macedonia has to invest ambitious and continuous efforts if we intend to reach the target for decrease of energy consumption in buildings of private and public ownership. This is especially important if we take into consideration the fact that energy consumption in Macedonia has been at the same level for years and it has never decreased.

The increase of labor force demand will bring about a shortage of workers with qualifications for the introduction of EE and RES measures. The results from the research conducted as a part of this project show that more than half of the surveyed construction companies showed interest in training their workers for the implementation of energy efficiency measures and the use of renewable energy sources.

In order to optimize the energy efficiency efforts, the education level in the construction sector will also have to be raised. This report shows that 9,800 to 16,020 workers directly involved in construction ought to be trained for acquiring qualifications needed for construction: insulation, heating systems, replacement of windows etc.

A large proportion of the Macedonian building stock was constructed (78%) before 1970. Information shows that there is higher potential for energy savings. Great many buildings can be refurbished in this way by implementing EE and RES measures, but only if the owners of these buildings take on the initiative for improvement. However, the purpose of this report is not to address market barriers, but to focus solely on education barriers.

That's why this report has identified a great number of barriers and gaps in terms of the competence development of construction workers and craftsmen for EE and RES. This will be the starting point for mapping, which will be introduced in the next stage of the project. More precisely, this report is a status quo – image of where we are now and where we want to be as a start to the discussion on what initiatives are needed to attain the set goals.

The report is the starting point in the preparation of the final Roadmap for the needs, initiatives and priorities in the capacity building of the construction sector for meeting the national energy targets by 2020.

11. Authors / Contributors

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18. Rolesbook on the content, forms and procedures for the monitoring of the adult educational programs (laid dawn by the director of Ventre for Adult education) ;
19. Rulebook on the Contents, Form and Signing Procedure of the Contract for Adult Education Programme Monitoring (approved by the Manager of the Adult Education Center)
20. Rulebook on the Standards, Space and Equipment for Adult Education Institutions (approved by the Ministry of Education and Science) as well as provisions from the Law on Primary Education, Secondary Education, Vocational Education and Training, Higher Education and the provisions from the by-laws on the standards for the space and equipment for primary, secondary and tertiary education as well as teaching aid norms for 4-year secondary vocational education

21. Economic Chamber of Macedonia (2011), information on construction execution in the country and abroad
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23. Government of the Republic of Macedonia (November 2011), *National Programme for Energy Efficiency in Public Buildings in the Republic of Macedonia 2012-2018*
24. Project: Build UP MK, Report on the Survey Conducted in Construction Companies

13 . Abbreviations and definitions

Abbreviation	Meaning
BAS	Business Advisory Services
Bau	Businessasusual
BE	Buildingenvelope
BEMS	Building Energy Management System
Benv	Buildingenvelope
BioE	Biomass energy
Blm	Business with limited measures of EE
BLS	Base-line scenario
BUS-M	BUS-M (Build-up Skills FYR Macedonia)- EU-CIP-IEE Project
BwsEE	Business with strong EE measures
CEDEFOP	European Centre for the Development of Vocational Training
CEN	Eu Association of national standardization institutes
Chamber	ECM-Economic Chamber of Macedonia
CHP	Combined Heat and Power Facility
DG-TREN	Directorate-GeneralEnergy
DIN	GermanIndustrialNorms
Dir 1989/391	EU Directive on safety in work
Dir 2005/191	EU Directive on Energy and eco design
Dir 2006/123	EU Directive on services in the internal market
Dir 2006/32	EU Directive on Energy end-use and EE services
Dir 2008/28	EU Directive on use of RES
Dir2010/ 31	DirectiveEPBD
Dir 2010/30	EUDirectiveonEnergylabelling
Dir 2012/27	EE Directive in EU (15.11.2012)
EA	Energy audit
Eai	Energy audit instruments
EARM	Energy Agency of Republic of Macedonia (project partners)
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
Eebg	EE inbuildings
Em	Energy management
EN-15217	Series of EN standards EN-15217: 2007
EnS	Energysources
EPC	Energy Performance Certification of Buildings
EQF	EU Qualifications Framework
ES	Energy Supply
ESCO	EnergyServiceCompany
Eu-exchange	EU exchange activities
FEEIT	Faculty of Electrical Engineering and Information Technologies (project partners)
Flagship	EU- initiative: “Resources for Efficient Europe“ with measures for new skills and new jobs in
Gap	Gap analysis
GDP	GDP (Gross Domestic Product)

GHG	GHG (Greenhouse gases)
GoM	Government of the Republic of Macedonia
HP	Heat pump
HPP	Hydro Power Plant
HVAC	Heating, Ventilation, Air Conditioning
IEA	International Energy Agency
ILO	International Labor Organiyation
IPA	Instrument for Pre-Accession Assistance
IRENA	International Renewable Energy Agency
ISO	International Standards Organization
ISO-13790	ISO standard- Energy performance of buildings
ISO-14.000	ISO standard -Environmental Management System
ISO-50.000	ISO standard - Energy management system
Kgoe	Kgoilequivalent
Kreacija	MK Business Association (management, consulting) (project partner)
LEH	Low Energy Houses
major	Major renovation of buildings (over 25% of the value) to meet the required EE standards
Medu	Ministry of Education and Science
MoE	Ministry of Economy
MSME	Micro Small Medium Enterprises
Mt	Metric tons
Murb	Ministry of Transport and Communication
NBFI	Non-Bank Financial Institutions
NEEP	NationalEE ActionPlan
NG	Narural Gas
NSQA	National Status quo Analysis
nZEB	Nearly Zero energy building
PH	Passive House
PPP	Public Private Partnership
Primary-E	Energy from traditional and renewable sources of energy which is not subject of conversion
SET	SolarThermal
SHPP	Small Hydro Power Plant
SPV	Solar Photovoltaic
VCA	Value Chain Analysis
VET	Vocational education and training
Ktoe	Kilo ton Oil equivalent

Useful Definitions – State Statistical Office of the Republic of Macedonia

Building construction refers to the construction of buildings which for the most part are above ground level. The term refers to the construction of new buildings in the form of expansions, further construction, reconstruction of existing structures, repairs, adaptations, capital repairs – replacements and continuous maintenance works.

Reconstruction is done in order to improve the conditions in at least one section of the building (below the roof, at least one apartment, vertical line etc.) Most commonly the bearing structure is not reconstructed, but only the partition walls and some other elements (façade, roof, windows, doors, technical systems etc.)

Adaptation is construction work which refers to a change in the use of the whole building or one of its sections. The change takes place inside the building, with no changes to its structural integrity.

Repairs are done in order to fix one part of the building of a relatively small value.

Major repairs refer to construction work aimed at renewing some parts of the building without making any changes to its interior or to its structural system or use.

Capital repairs are changes to a part of the structure (e.g. roof, façade).

Continuous maintenance refers to preventative interventions to the building in order to improve its damaged condition. This construction work does not include any other changes except for normalization of the functions taking place within the apartment or building, which raises their value as well.

14. Annexes

Annex 1 List of construction companies which were given questionnaires for the project			
No	**Company**	**Address**	**City**
1.	MAKMERMER	Dovledzik bb	Bitola
2.	STENTON	Uzhichka Republika, 26	Bitola
3.	PELISTER AD	Dobrivoe Radosavljevikj, 3	Bitola
4.	MAK-STROJ INZENERING	Bul 1-vi Maj, 204/16	Bitola
5.	FORMI	Bul 1-vi maj, bb (kaj Niskogradba)	Bitola
6.	TONDAH MAKEDONIJA	IGM Proleter br.1	Vinica
7.	GP PELAGONIJA AD	Brakja Ginoski, bb	Gostivar
8.	PERPARIMI	s. Dolno Strogomishte	Kicevo
9.	RIKO-GRADBA DGT	M.Tito - Novo Selo	Novo Selo
10.	BALABAN I PARTNERI	Dimitar Vlahov, 14/9	Ohrid
11.	ASP PP VREKJI	ul.Petrino bb, Industriska zona Gorno Trno	Ohrid
12.	MERMEREN KOMBINAT	Krushevski pat bb	Prilep
13.	IZOFAS ДОО	ul. Dimche Dabovski br. 11	Prilep
14.	MARKOVI KULI	Joska Jordanoski, bb	Prilep
15.	KORVIN STON	Orde Chopela bb	Prilep
16.	EUROMETING	ul. Aleksandar Makedonski 2/42	Prilep
17.	BIM	Zheleznichka, 164 - Sv. Nikole	Sveti Nikole
18.	VARDARGRADBA	S.Trubarevo	Skopje
19.	UKIM ZIM "SKOPJE"	Rade Konchar, 16	Skopje
20.	DG BETON AD	Jurij Gagarin, 15	Skopje
21.	NOVOGRADBA	Bosna i Hercegovina,bb	Skopje
22.	GRANIT AD	Dimitrija Chupovski 8	Skopje
23.	IZIIS	Ul. Salvador Alende br 73 P.f.101	Skopje
24.	INKOM INZENERING	Bul. Jane Sandanski,70/2	Skopje
25.	IZGRADBA KOMERC	Prvomajska, bb	Skopje
26.	KEDING	Bul. Sveti Kliment Ohridski, 43-a	Skopje
27.	DOM-DIZAJN	Borka Taleski, 12 b	Skopje
28.	MAKMETAL AD	Sava Kovachevikj, 47Lj, -13	Skopje
29.	TZS i S ARHITEKTURA	Bul. AVNOJ 78 1-vi vlez,stan 17	Skopje
30.	BORTAS	Leninova 72/1-1	Skopje
31.	DIVI MAKEDONIJA	Orce Nikolov, 115	Skopje
32.	STOKUKjA	Hristo Smirnenski, 37-2	Skopje
33.	BONOR INZENERING	Ul. Boro Petrushevski br.9/suteren	Skopje
34.	ILINDEN	Proleterski brigadi, bb	Struga
35.	IGM ELENICA	Marshal Tito br. 222	Strumica
36.	OGRAZDEN	Marshal Tito 239	Strumica
37.	ZIKOL	Industriska zona sever bb	Strumica
38.	NEIMAR	Stiv Naumov, 4	Strumica
39.	BIRO 92	Janko Cvetinov, 15	Skopje
40.	EKOBEST KONSTRAKSN	Vangel Todorovski 5/1	Skopje
41.	TORAKS	bul.16-ta Makedonska Brigada 18	Skopje

Annex 1 List of construction companies which were given questionnaires for the project			
Address	City	Address	City
42.	DABAR	NikolaTesla 14 lok.6	Skopje
43.	ADORA	Orce Nikolov 182 a	Skopje
44.	AMERIKAN KONSTRAKSN	Partizanski Odredi 40/1/1	Skopje
45.	IMPEKSEL 2	Ognjan Prica 1 lok.2	Skopje
46.	TIM INZENERING	Mitropolit Teodosij Gologanov - 60b	Skopje
47.	REMIS	Nikola Trimpare 7	Skopje
48.	KUBUS	Partizanski Odredi 151 b-3 mez.3	Skopje
49.	GEMA GRUP	/	/
50.	PROTOTIP	Sava Kovachevikj 47-a	Skopje
51.	PERA KONSTRAKSN	Kiril i Metodij 7, SitiPlaza, kat 5 (M.H.Jasmin)	Skopje
52.	ROLOMATIK	Jadranska magistrala b.b. (Kachanichki pat)	Skopje
53.	VABEL	Budimpeshtanska 33b	Skopje
54.	OZON	Ul.Varshavska 1	Skopje
55.	REHAU	Prvomajska 7 bb	Skopje
56.	MACEF INT	Nikola Parapunov 3a-52/1	Skopje
57.	KTM PROEKT	Vodnjanska 17/3	Skopje
58.	FILBIS MIRKO	ul.Petar Acev br.19a	Skopje
59.	MARTIK	ul.Jane Sandanski 37-2/5	Skopje
60.	AIRKON	Bulevar Partizanski odredi, 70-b	Skopje
61.	HIDRIA	ul.Belasica 2	Skopje
62.	BIRO PANDEV	Goce Delchev bb	Strumica
63.	SIETO	Koce Metalec br.2b lok.5	Skopje
64.	PETRO M	nas.Ilinden mv.Trnica bb	Skopje
65.	MAVIS DOO	Goce delchev br.36	Shtip
66.	ALFA INZhINERING DOOEL	Gjorche Petrov bb	Radovish
67.	INTEGRAL DOOEL	Ljubo Bozhinoski Pish	Tetovo
68.	D.E.P.T.U. FOTON DOOEL	Bosilovo 241	Bosilovo
69.	MEGA SOLAR DOOEL	Hristo Smirnenski 54-1/5	Skopje
70.	TEKOMA	Goce Delchev 36	Shtip
71.	M-LAN SOLAR DOOEL	Belasica br.2	Skopje
72.	GEO SOLAR DOO	MM Brico bb	Delchevo
73.	HRISTOV ELEKTRO DOOEL	Nikola Parapunov 3/2-1	Skopje, Bunardzik
74.	TORPEDO MOBIL UVOZ – IZVOZ BITOLA DOOEL	Bul. 1 Maj bb	Bitola
75.	SOLARMAK DOO	Ul.Robert Koh br.1/2-3	Skopje
76.	ENSOL DOO		Bitola
77.	ENERGO VEVChANI	Bul. Turistichka bb	Ohrid

Annex 2 National Classification of Activities	
Expert Professionals	**Code**
Building sector	21.42.
Environmental engineering	21.43.
Mechanical Engineering	21.44.
Electrical engineering	21.51.
Electro-techniques	21.52.
Telecommunication	21.53.
Architecture in building construction	21.61.
Management Consulting (MC)	24.21.
Marketing and Sales	24.23.
ICT (Information and Communication Technology)	25.11.
Software development	25.12.
Web design. Multimedia	25.13.
3. Technicians	3111.
Electrical technician	3113.
Electronics technician	3114.
Mechanical-thermal technician	3115.
Technician for AutoCAD drawings	3128.
Technician for various works	3119.
Technician for the building sector	3121.
Technician-supervisor in construction sector	3122.
Technician for electricity production	3131.
Technician for thermal energy	3132.
Technician combustion furnaces	3133.
Technician for natural gas and oil	3134.
Technician for green skills and green occupations	3139.
Sales agents	3321.
Procurement Procedures (local Mk)	3323.
Representatives for commercial	3331.
Human resource management	3333.
ICT technicians	3511.
4. Administrative officers	
5. Sales	
6. Qualified operatives	
7. Production – non-industrial	
Building sector in the Republic of Macedonia	
Bricklaying work - traditional materials	7111.
Wall repair	7111.
Stone works	7113.
Concrete works	7114.
Carpenters	7115.
Other	7119.
Internal works in the building department in Republic of Macedonia	7121.
Floor and tiles work	7122.

Façade of building	7123.
Acoustic Insulation	7124.
Glazing works	7125.
Water supply	7126.
Pipe installers	
Natural gas pipes installer	
Plastic pipes for floor heating	
Compressed air installer	
Installation fitters for heating, ventilation and air-conditioning	7127.
Interior art-works.	7131.
Chimney sweepers, cleaning building facades	7133.
Welders	7211.
Flame-cutting fitters	7212
Fitters of sheet metal structures	7213.
Fitters of metal structures	7214.
Fitters of installations for heating, ventilation and air-conditioning – HVACequipment	7223.
Fitters of electrical equipment	7411.
Electrical mechanic for electric drive	7412.
Fitters of electrical network	7413.
Fitters of electrical and telecom equipment	7421.
ICT fitters	7422.
Operators and Machine fitters	
Mining	8111.
Stone processing	8112.
Stone processing machinery	8114.
Well drilling	8113.
Metal processing	8121.
Processing of metal surfaces	8122.
Processing of plastic materials	8142.
Steam and hot water boilers	8182.
Construction machinery operators	8342.
Cranes and lifts	8343.
Drivers of heavy vehicles with movable crane	8344.
9. Solid waste collectors (WASTE)	
10 . MILITARY green skills and occupations	

Annex 2.a – Main group of vocations for non-industrial method of work in the production	
71	**Construction operatives and related construction workers**
711	**Bricklayers and related construction vocations**
7111	**Construction workers for buildings**
7111.1	Construction workers with traditional building materials
7111.2	Construction worker for maintenance of buildings
7112	**Bricklayers and related construction vocations**
7112.1	Assistant bricklayer
7112.2	Bricklayer
7112.3	Mason
7112.4	Bricklayer of fireclay
7112.5	Bricklayer of fireclay, specialized
7112.6	Bricklayer of chimneys
7112.7	Bricklayer of chimneys, specialized
7112.8	Bricklayer of furnaces
7112.9	Bricklayer of furnaces, specialized
7112.10	Mason and woodcutter
7112.11	Mason and concrete placer
7112.12	Stone monuments mason
7112.13	Mason for sidewalks and streets pavement
7113	**Stonecutter, stonemason and carver**
7113.2	Stone mason
7113.3	Stone mason, specialized
7115	**Installers and assembly of building envelope**
7115.1	Carpenter
7115.2	Woodcutter
7115.3	Woodcutter, skilled workman
7115.4	Joiner
7115.5	Joiner, skilled workman
7115.6	Roller shutters workman
7115.7	Roller shutters skilled workman
7119	**Other masonry vocations that have not been anywhere classified**
7119.1	Fitter of construction elements
712	**Vocations for finishing construction works and relevant construction workers**
7121	**Roof sheeter and cladder**
7121.01	Finishers of Interior Walls and Floors
7121.2	Roofer, specialized
7121.3	Finisher of Interior Walls and Floors, skilled workman
7122	**Floorers and tilers**
7122.1	Parquet floor layer
7122.2	Floorer
7122.3	Floorer, specialized
7122.4	Tiler
7123	**Front wall plasterers and plasterers**
7123.1	Front wall plasterers
7123.2	Front wall plasterers, skilled workman

7123.3	Plasterer
7123.4	Manager of finishing works
7124	**Insulation workers**
7124.1	Acoustic insulation worker
7124.2	Hydro-insulation worker
7124.3	Thermal-insulation worker
7124.4	Insulation worker
7125	**Glaziers**
7125.1	Construction glazier
7125.2	Vitrification glazier
7126	**Plumbers and pipe installers**
7126.1	Assistant plumber
7126.2	Plumber
7126.3	Plumbers, skilled workman
7126.4	Gas fitter
7126.5	Gas fitter, skilled workman
7126.6	Plumbers and gas fitter
7126.7	Assistant pipe installer
7126.8	Pipe installer
7126.9	Pipe installer, specialized
7127	**Heating, ventilation and air-conditioning installers**
7127.1	Heating, ventilation and air-conditioning installers
7127.2	Heating, ventilation and air-conditioning installers, skilled workman
7133	**Chimney sweeper and building structures cleaner**
7133.1	Manager of chimney sweepers
7133.2	Chimney sweeper
7133.3	Chimney sweeper, skilled workman
7133.4	Cleaner of building with sand (sandblasting)
7133.5	Façade cleaner
7133.6	Eco- cleaner
72	**Metal processing worker, mechanical fitters and relative trades**
7212	**Welders and flame cutting workers**
7212.1	Gas welder
7212.2	Electrical welder
7212.3	Welder
7212.4	Welder, specialized
7212.5	Gas cutter
7212.6	Soldering worker
7213	**Whitesmiths**
7213.1	Whitesmith
7213.2	Whitesmith, skilled workman
7213.3	Metal bending worker
7213.4	Panel beater
7213.5	Panel beater, skilled workman
7213.6	Aircraft panel beater
7213.7	Aircraft panel beater, specialized

7213.8	Sheet metal marker
7213.9	Sheet metal marker, specialized
7213.10	Boilermaker
7213.11	Boilermaker, skilled workman
7213.12	**Metal sheet processing worker**
7214	**Makers, layers and fitters of metal structures**
7214.1	Assistant fitter of metal structures
7214.2	Fitter of metal structures
7214.3	Fitter of metal structures, specialized
3112	**Technicians in geodesy, construction and related vocations**
3112.1	Architectural technician
3112.2	Senior Construction Technician
3112.3	Construction Technician
3112.4	Building Construction Technician
3112.5	Construction Technician - Surveyor /estimator/
3112.6	Construction Technician - Designer
3112.7	Construction – Architectural Technician
3112.8	Construction Works Supervisor
3113	**Electrical Engineering Technicians**
3113.1	Electrical Technician
3113.2	Electrical Power Technician
3113.3	Electrical Mechanical Technician
3113.4	Technician for maintenance of electrotechnical products
3113.5	Electrical Technician for electrical machines, apparatus and devices
3113.6	Electrical Technician for installation and equipment
3115	**Mechanical Technicians and related vocations**
3115.1	Mechanical Technician for fitting works
3115.2	Mechanical Technician for maintenance of process equipment
3115.36	Mechanical Technician for maintenance of equipment
3115.37	Mechanical Technician
7233	**Mechanics and Fitters of agricultural and industrial machines**
7233.1	Manager of fitters, mechanics and machine repair workers
7233.2	Fitter of of process equipment
7233.3	Fitter of of process equipment, specialized
7233.4	Electric power equipment fitter
7233.5	Electric power equipment fitter, specialized
7233.6	Fitter of heating cooling equipment
7233.7	Fitter of heating cooling equipment, specialized
7233.8	Assistant machine fitter
7233.9	Machine fitter
7233.10	Machine fitter, specialized
7233.11	Mechanic of process equipment
7233.12	Mechanic of process equipment, specialized
7233.13	Power equipment mechanic
7233.14	Power equipment mechanic, specialized
7233.15	Heating equipment mechanic

7233.16	Heating equipment mechanic, specialized
7233.17	Mechanic for cooling appliances and air-conditioners
7233.18	Mechanic for cooling appliances and air-conditioners, skilled worker
7233.19	Compressors equipment mechanic
7233.20	Compressors equipment mechanic, specialized
7233.21	Pump mechanic, specialized
741	**Electrical installers and relevant vocations**
7411	**Electrical technicians in buildings and relevant vocations**
7411.1	Low-voltage installations fitter Монтер на нисконапонски инсталации
7411.2	Electrical installer
7411.3	Electrical installer, specialized
7411.4	Maintenance electrical technician
7411.5	Maintenance electrical technician, specialist
7412	**Electrical Mechanics and Electrical Fitters**
7412.1	Manager of electrical fitters and electrical technicians on power machines
7412.2	Electrical fitters on power machines and devices
7412.3	Electrical fitters on power machines and devices, specialized
7412.4	Electrical machines and equipment Fitter
7412.5	Power electrical mechanic
7412.6	Power electrical mechanic, specialized
7412.7	Electrical Fitter
7412.8	Electrical Mechanic
7412.9	Technician for maintenance of electrical apparatus and equipment
9313	**Blue Collars in Building Sector**
9313.1	Bricklayer
9313.2	Carpenter
9313.4	Worker in building sector

Annex 3 – List of deliverers of informal training						
	Institution	**Web and e-mail address**	**Name of Training**	**Duration**	**No. of classes**	**Price**
1.	COSMO INNOVATION CENTER bul. Jane Sandanski 113, 1000 Skopje, Makedonija	contact@cosmoinnovate.com.mk	Energy efficiency systems	2 months	20	6980
			Energy efficiency installations	2 months	20	6980
2	Albedo inzenering tim, ul. Koparska br.15, Prilep 7500 R. Makedonija	http://www.albedoinzenering.com.mk/ albedo_jane@t-home.mk	There is training, but cannot be found online			
3	ARESE Solushn K. Voda , Skopje	www.aresesolutions.com	There is training, but cannot be found online			
4	MACEF		Not published at the moment			
5	CePro SARD Orce Nikolov 172, Skopje	www.ceprosard.org.mk	There is EE training, but not for the construction sector			
6	NEOKOM EE and RES Center Kosta Novakovikj 8, Skopje	www.fbe.edu.mk и www.gec.mk	Four EE and RES trainings on the internet Classroom, materials and exam	from 1 to 5 days	From 8 to 40 classes	4.000 and 15.000 MKD
7.	Craftsmen Chamber of Skopje, Bitpazarska 12, Skopje	www.zkskopje.org	2 trainings for trainers	5 days	40 classes	Project

Annex 4 – Private Companies and Institutions which deliver trainings for their own needs		
Name	**Type of Entity**	**Location**
CeProSARD - Center for promotion of sustainable agricultural practices and rural development"	Consultant Institution/Organization	Skopje
GENBA ENERGY & CONSTRUCTION	Manufacturer/Contractor/Supplier Consultant	Turkey
NEGOIU	Consultant	Romania
ALBEDO - INZINjERING DOOEL PRILEP	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Prilep
ALTERNA GRUP Export Import Dooel,Skopje	Manufacturer/Contractor/Supplier	Skopje
Analitika	Institution/Organization	Skopje
ARESE Solushns dooel	Manufacturer/Contractor/Supplier	Skopje
A-H Ingenering	Consultant	Gostivar
Bipom-m	Consultant	Bitola
VAKO	Manufacturer/Contractor/Supplier Consultant	Skopje
VENTIL TREJD INTERNACIONAL	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
GREENVILE	Manufacturer/Contractor/Supplier Consultant	Gostivar
Environmental movement ,,MOLIKA,,	Institution/Organization	Bitola
DELTA PROEKT doo Skopje	Consultant	Skopje
DIA TREJD	Manufacturer/Contractor/Supplier	Gevgelija
DOOEL "MATAMA"	Manufacturer/Contractor/Supplier	Bitola
DPTU ENERGIJA doo	Manufacturer/Contractor/Supplier Consultant	Skopje
Eko Solar doo	Manufacturer/Contractor/Supplier Consultant Institution/Organization	2000 Shtip
EKOVAT SISTEMI DOOEL	Consultant	Skopje
Energo Sistem D.O.O Skopje	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
ENSOL DOO	Consultant	Bitola
ENTES doo	Manufacturer/Contractor/Supplier Institution/Organization	Skopje
ERGON SOLAR DOOEL SKOPJE	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
ETERNA SOLAR dooel	Manufacturer/Contractor/Supplier Consultant	Skopje Karposh
Euroterm Inzinering	Manufacturer/Contractor/Supplier	Prilep
EUROTEST DOO Skopje	Consultant	Skopje
Citizens' Association PROAKTIVA – Skopje	Institution/Organization	Skopje

Insoterm Doo	Manufacturer/Contractor/Supplier Consultant	Struga
Kamel Solar	Manufacturer/Contractor/Supplier Consultant	Skopje
KMG EOL KVAZAR DOOEL Skopje	Manufacturer/Contractor/Supplier Consultant	Skopje
Koleks Farkoprom	Manufacturer/Contractor/Supplier	Kumanovo
Leov Kompani	Manufacturer/Contractor/Supplier	Veles
Makedonija Eksport	Manufacturer/Contractor/Supplier Consultant	Skopje
MAKOTEHNA D.O.O	Institution/Organization	Bitola
MEGAPLAN	Consultant	Gostivar
MULTI-OS Dooel.Skopje	Manufacturer/Contractor/Supplier Consultant	Skopje
Non-Government Organization EKOVITA	Institution/Organization	Negotino
Ozon dooel	Manufacturer/Contractor/Supplier Consultant	Skopje
PETRO M DOO	Manufacturer/Contractor/Supplier	Skopje
Regional Environment Center for Central and Eastern Europe (REC) Macedonian office	Institution/Organization	Skopje
REHAU DOOEL	Manufacturer/Contractor/Supplier	Skopje
SVIS HIDROKOMPANI	Manufacturer/Contractor/Supplier	v. Chajle
Sieto doo – Skopje	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
SKM SOLKOM DOOEL	Manufacturer/Contractor/Supplier	Skopje Drachevo
Solar Makedonija	Institution/Organization	Skopje
SOFKIN DOOEL – RESEARCH, PRODUCTION AND DEVELOPMENT COMPANY	Manufacturer/Contractor/Supplier Consultant Institution/Organization	2420 Radovish
TANIKS DOOEL	Manufacturer/Contractor/Supplier Consultant	Prilep
TD Jove Ohrid dooel	Manufacturer/Contractor/Supplier	Ohrid
TIMELPROEKT, dooel	Consultant	Skopje
TOPLIFIKACIJA – INZENERING dooel	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
FLEKSPOVER	Manufacturer/Contractor/Supplier	Skopje
FONKO	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
Frutema	Institution/Organization	Kavadarci
Macedonian Center fo Energy Efficiency - MACEF	Institution/Organization	Skopje
Djimi KO	Manufacturer/Contractor/Supplier	Gostivar
Shesho Inzenering DOOEL	Manufacturer/Contractor/Supplier Consultant	

Annex 5 – Private Companies and Institutions which deliver trainings for their own needs		
Name	**Type of Entity**	**Location**
3D VIZIJA INZENERING – DOOEL	Consultant	Bitola
KEMA SKOPJE	Manufacturer/Contractor/Supplier	Skopje
ALHIMIKA TEHNOLODJI	Manufacturer/Contractor/Supplier Consultant	Skopje
AUSTERM GRADEC	Manufacturer/Contractor/Supplier	v. Gradec
BOZINAL PRO	Manufacturer/Contractor/Supplier	Krivogashtani
VINT Dooel Skopje	Manufacturer/Contractor/Supplier Institution/Organization	Skopje
GODES GOCE DOOEL	Manufacturer/Contractor/Supplier	Skopje
GRADBA JASEN	Manufacturer/Contractor/Supplier	Prilep
GRAFIKS TRADE	Manufacturer/Contractor/Supplier	v. Gradec bb
DGT ZIKOL	Manufacturer/Contractor/Supplier	Strumica
DELTA - AL	Manufacturer/Contractor/Supplier Consultant	Skopje
DOO „POM“ Bitola	Manufacturer/Contractor/Supplier	Bitola
DPTUG CIKLAMA INZINERING	Manufacturer/Contractor/Supplier	Gostivar
INZINJERING GENIKOM	Manufacturer/Contractor/Supplier	Prilep
KNAUF INSULATION	Manufacturer/Contractor/Supplier Consultant	Skopje
KOBIL DOOEL BITOLA	Manufacturer/Contractor/Supplier	Bitola
KUMAL SK DOOEL uvoz-izvoz SKOPJE	Manufacturer/Contractor/Supplier	Skopje
M.S.M. doo uvoz-izvoz , Skopje	Consultant	Skopje
MAKOTEHNA D.O.O	Institution/Organization	Bitola
OSRAM GMBH GERMANIJA – pretstavnishtvo Skopje	Manufacturer/Contractor/Supplier Consultant Institution/Organization	Skopje
Project for Mitigation of the Climatic Changes by Increasing Energy Efficiency in the Construction Sector	Institution/Organization	Skopje
RAJTEK	Manufacturer/Contractor/Supplier Consultant	Strumica
STIROSAN	Manufacturer/Contractor/Supplier	Vrapchishte
TTETRA Dooel Bitola	Manufacturer/Contractor/Supplier	Bitola
TEHNOKLIMA DOO	Manufacturer/Contractor/Supplier Consultant	Skopje
URBAN PROEKT	Consultant	Prilep

Annex 6

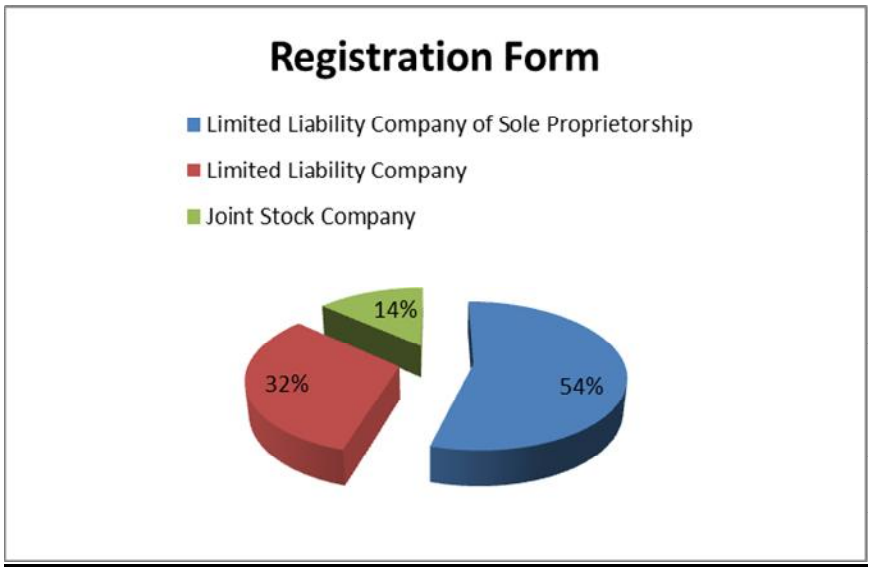
REPORT

On Construction Companies research

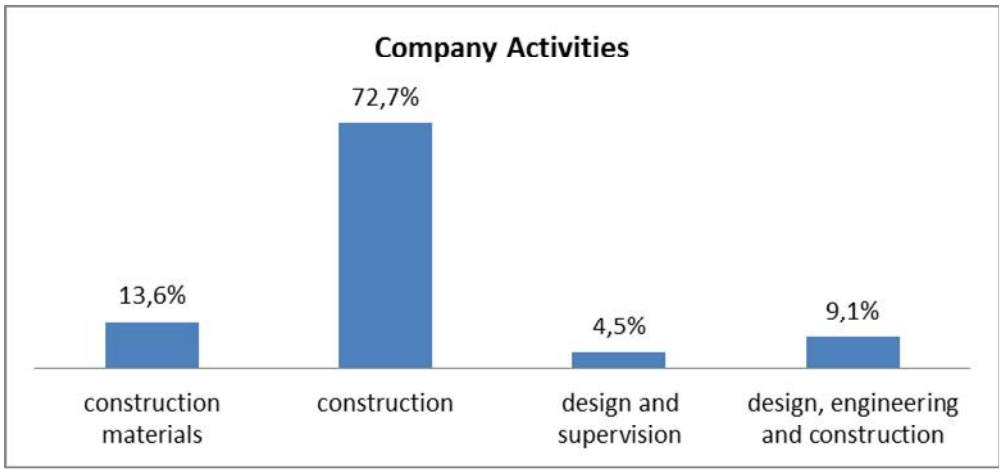
A hundred construction companies were included in the research within the Build Up MK project from November to December 2012.

This report presents the opinions of the companies in relation to EE and RES in construction, which were obtained based on a previously prepared questionnaire. The answers were then analyzed according to the area they referred to.

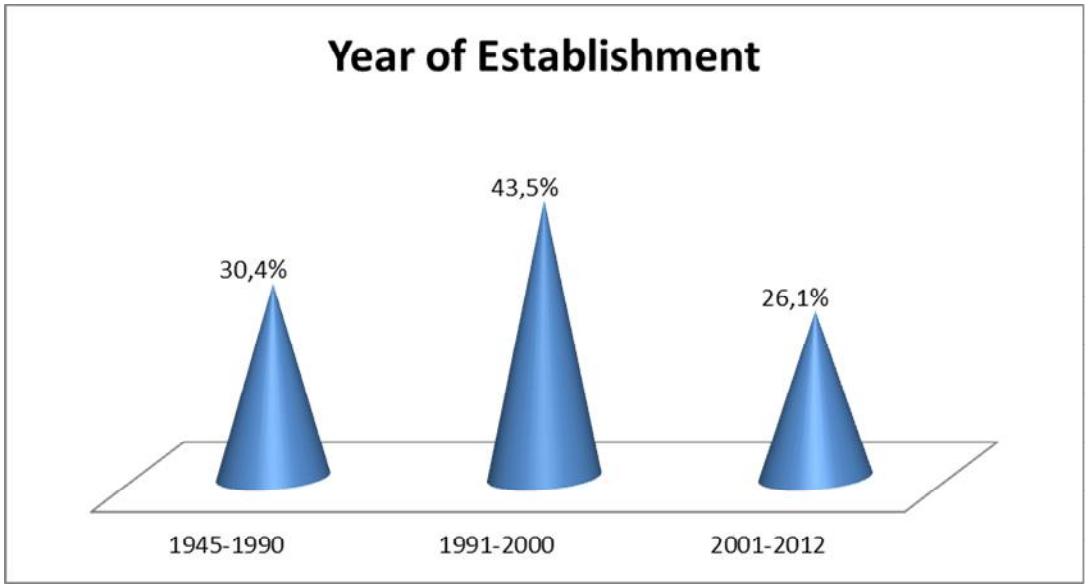
A) Sample Analysis



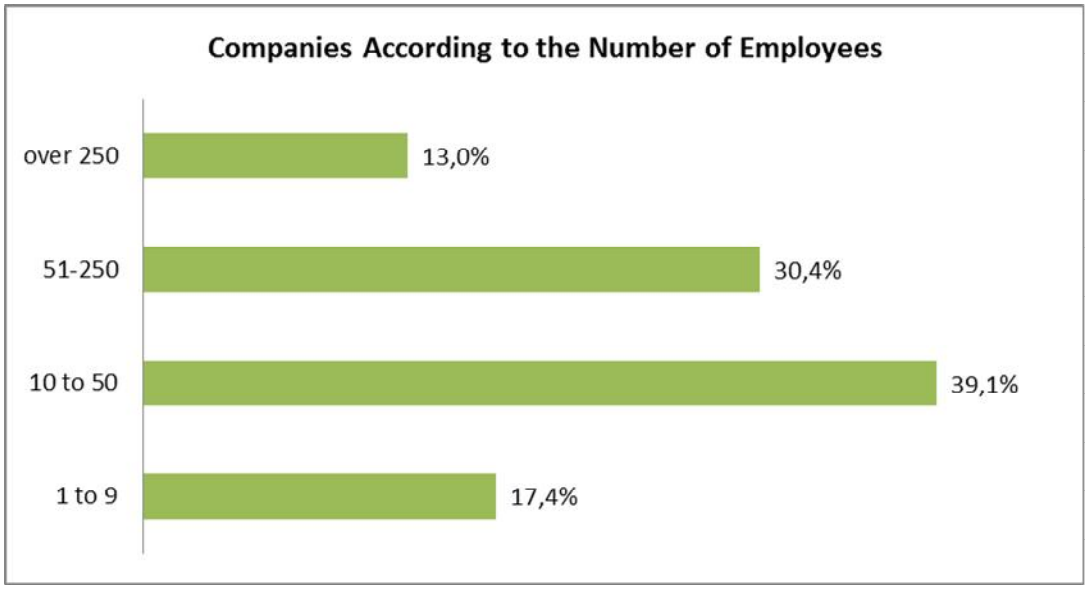
- 54 % of the companies have been registered as limited liability companies of sole proprietorship.



- 72.7% work with construction, followed by companies manufacturing construction materials with 13.5%, design with 9.1% and supervision with 4.5%. The companies that work with RES did not answer the questionnaire.

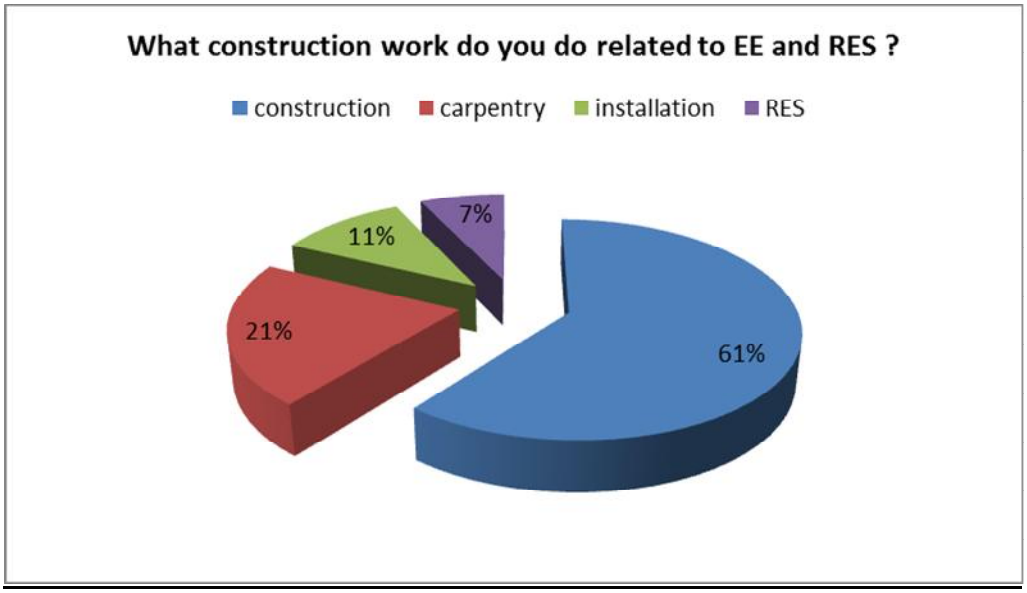


- The majority of the companies, i.e. 43.3% were established in the 1991-2000 period.

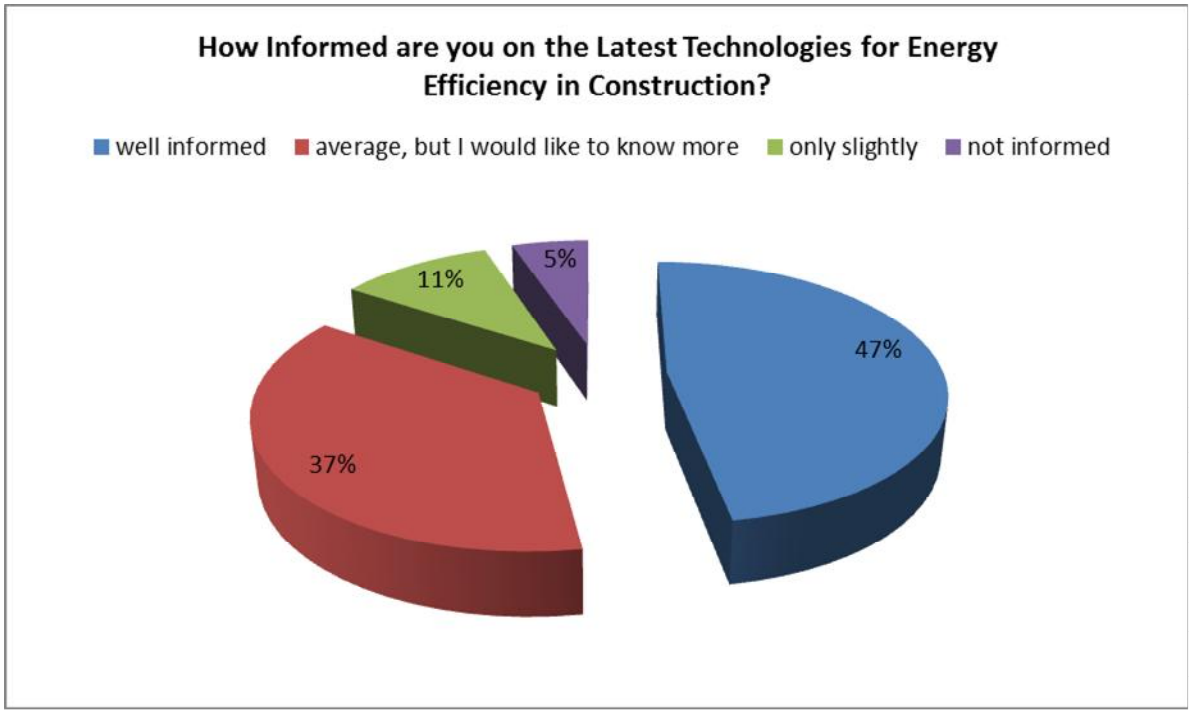


- The biggest share is the companies with 10-50 employees – 39.1%, followed by those with 51-250 employees.

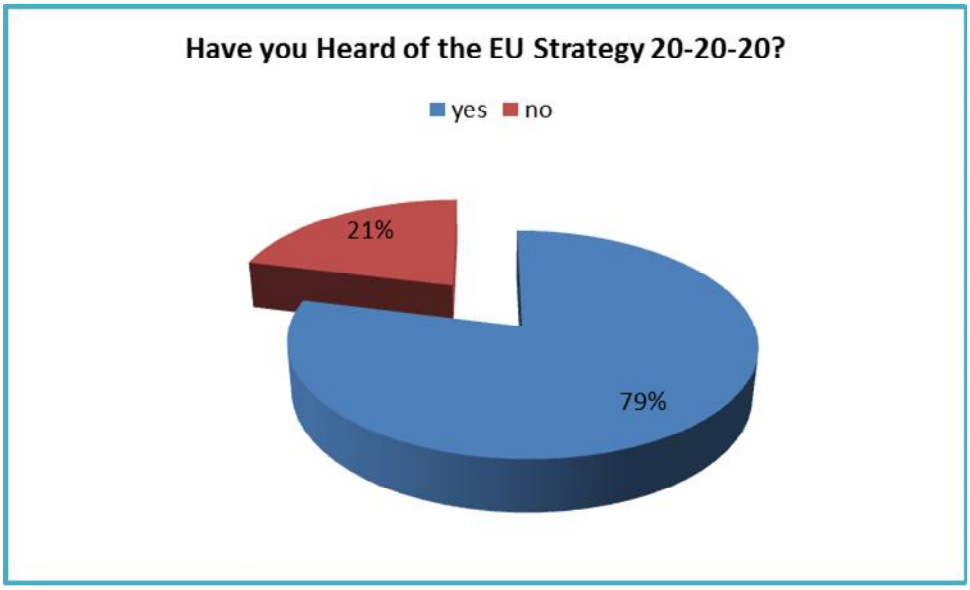
B) Experience with EE and RES measures



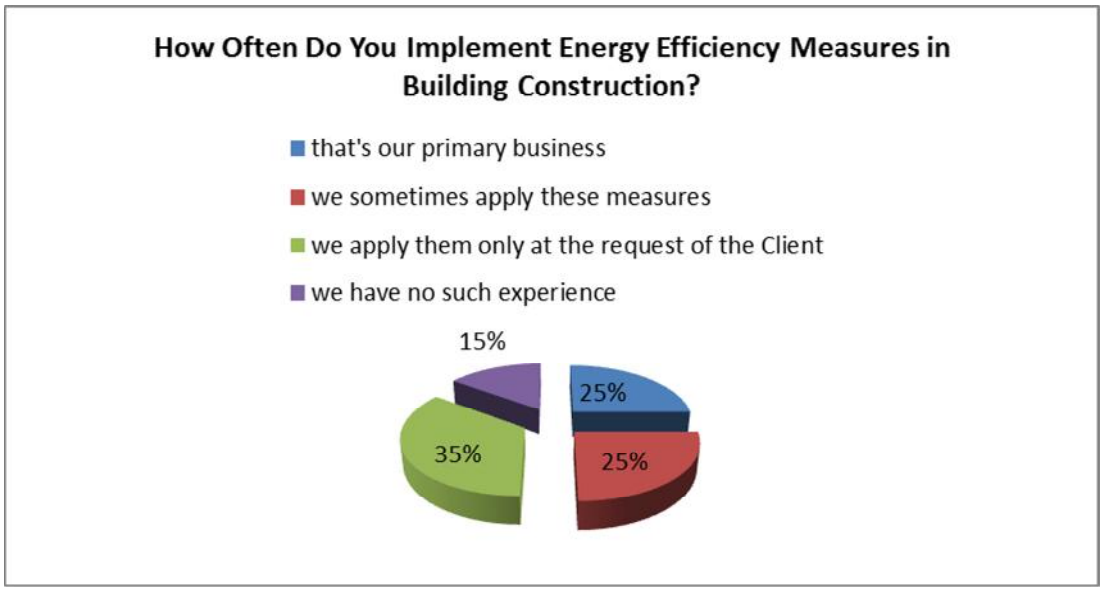
- 61% of the respondents implement EE and RES activities in construction, followed by those that implement EE and RES measures through carpentry with 21%, installation with 11% and only 7% of the respondents do work related to RES.



- 47% of the respondents said they were well informed of the EE technologies in construction, 37% had average knowledge, but would like to know more. So 53% of the respondents felt the need to be better informed of EE and RES.



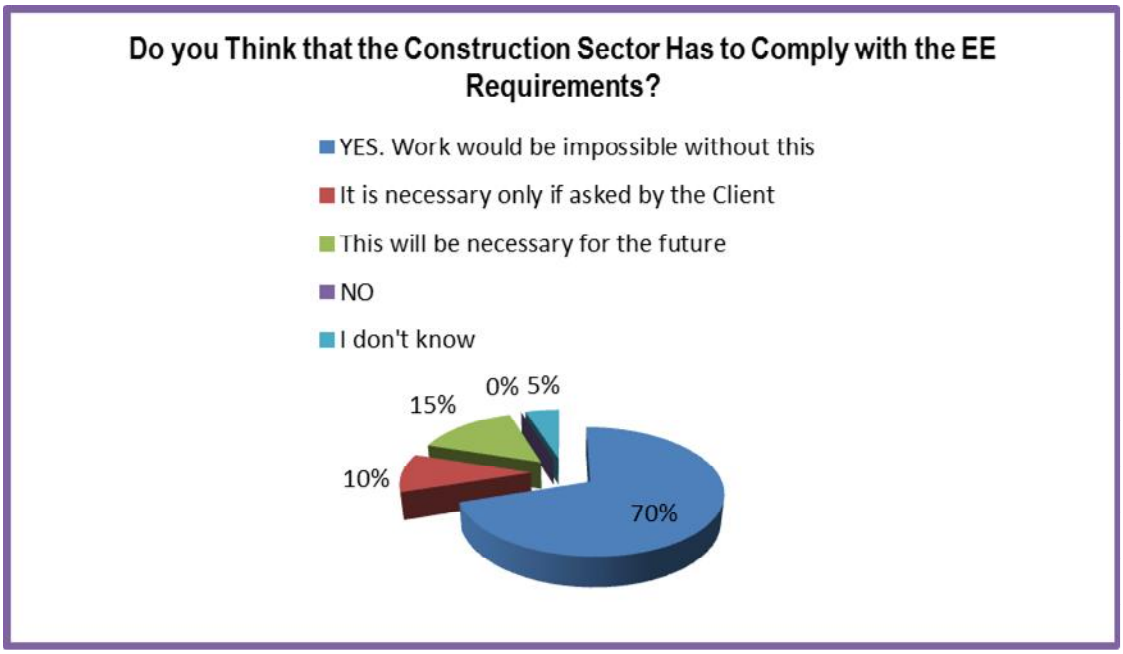
- The majority of the respondents, i.e. 79% of the surveyed companies said they were familiar with the EU 20/20/20 Strategy.



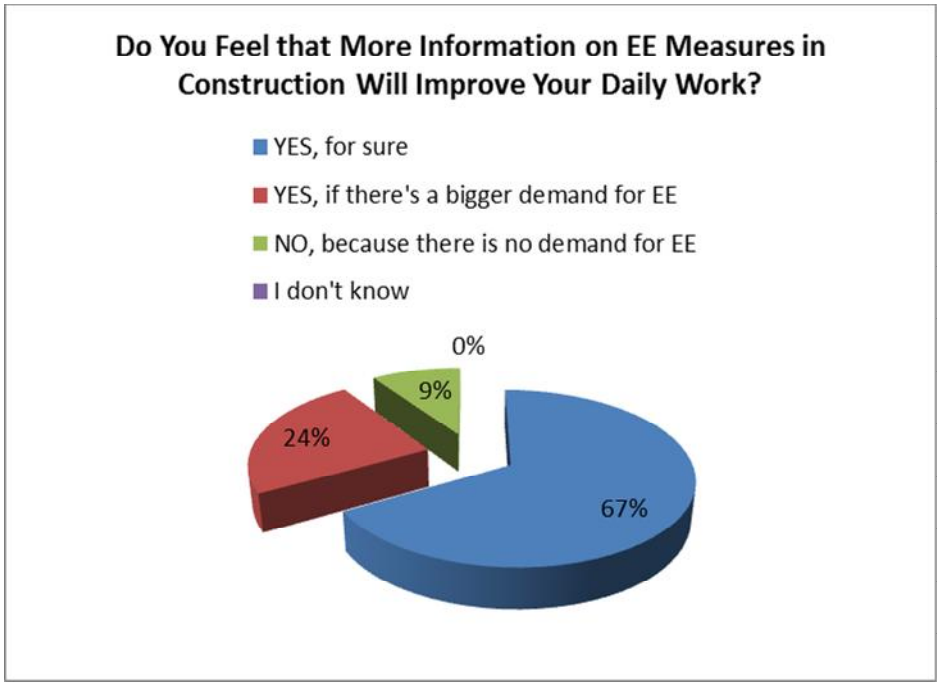
- Half of the surveyed companies have experience with, i.e. have been implementing EE measures, 25% of them work exlusively with EE and 25% have been implementing these measures only on occasion.

- 35% of companies have been implementing EE measures only at the request of the Client. Otherwise EE implementation is not their usual work pattern.

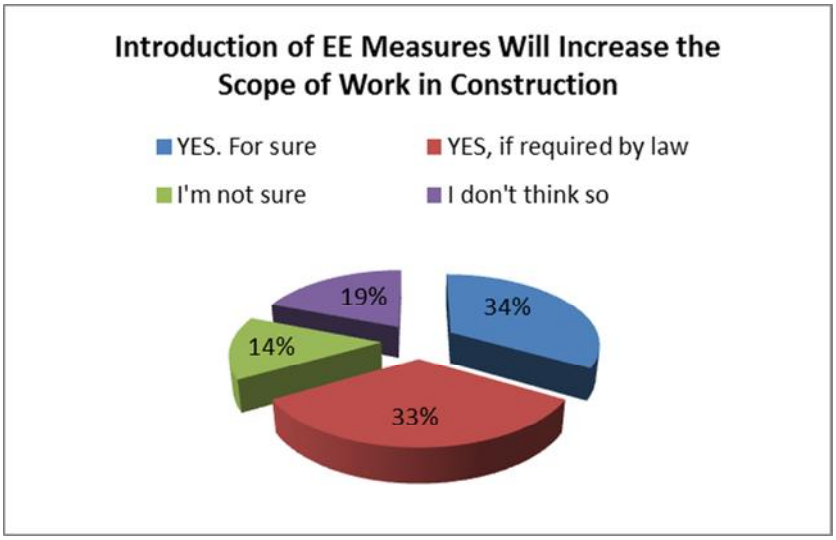
C) The need for the construction sector to adjust to the implementation of EE in buildings and the use of RES.



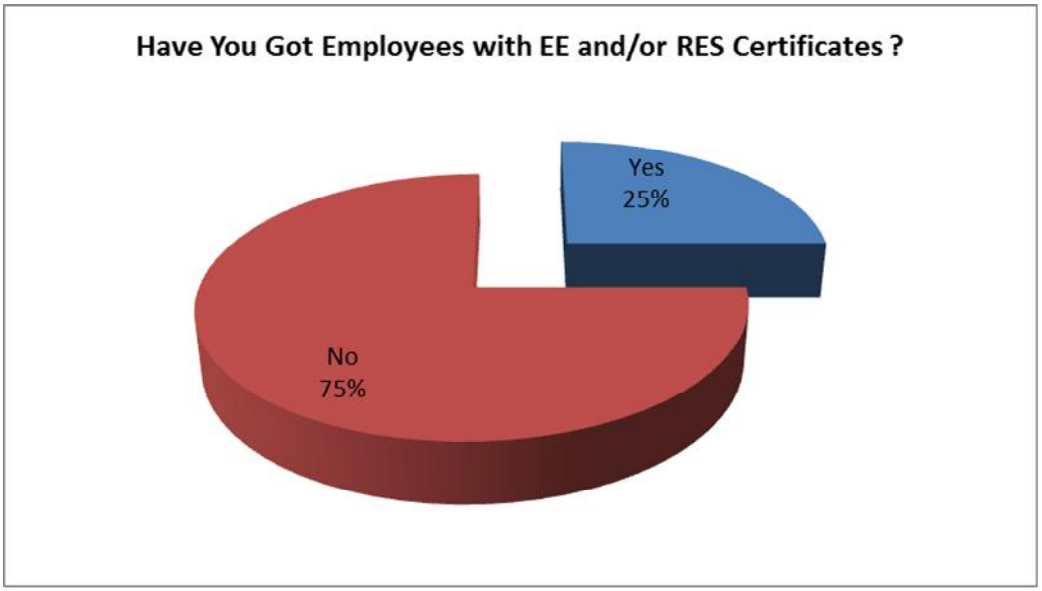
- 70% of the surveyed companies feel that the construction industry has to comply with the EE requirements, 20% feel that this should be done in the future and 10% feel that this is necessary only if asked by the Clients. The public sector needs to invest efforts into making the EE and RES standard a part of its procurement process and construction.



- 67% answered that more information on EE measures will improve their work while 24% said that would happen only if there was a bigger demand for EE implementation.

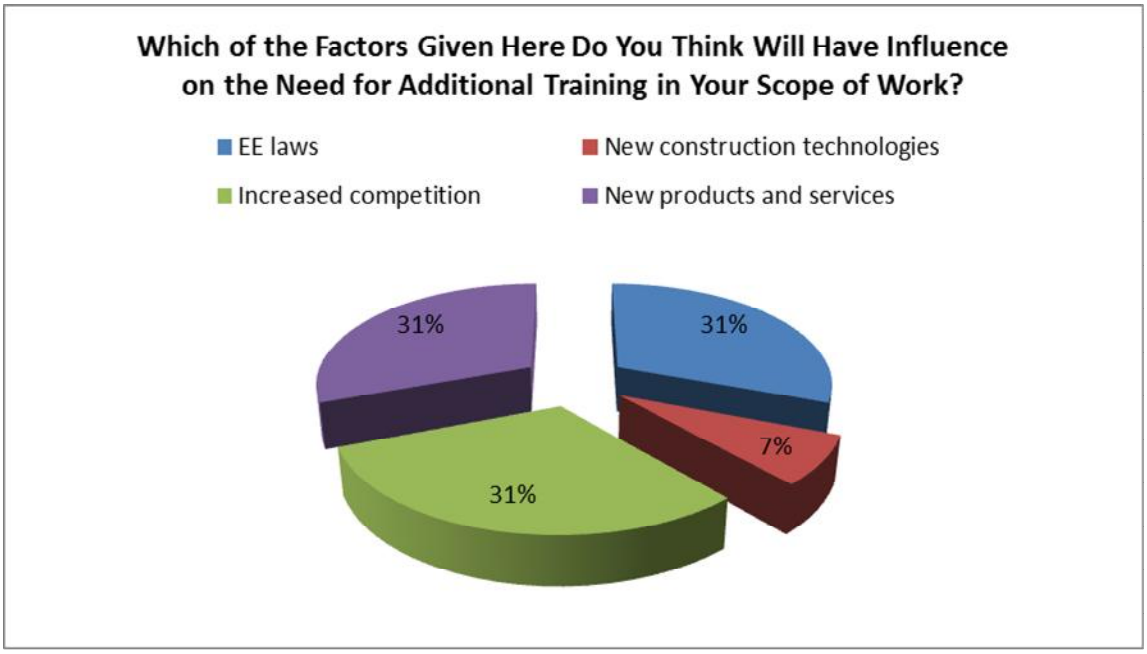


D) Education degree of the employees and the need for education on EE and RES

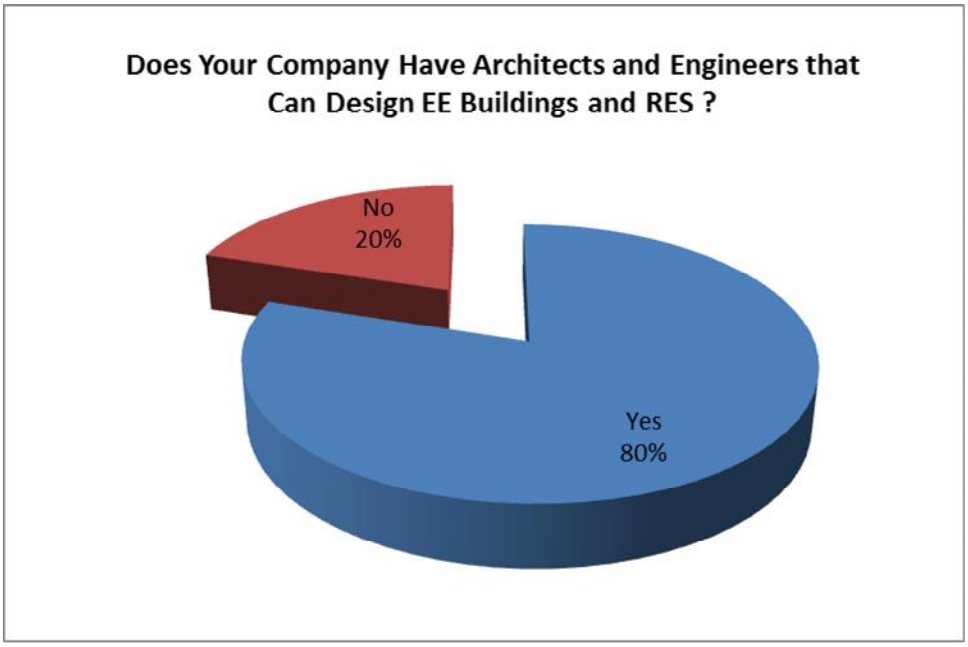


- 75% of the surveyed companies have no workers with EE and RES certificates. Half of those who said that they do EE work haven't got certified workers.

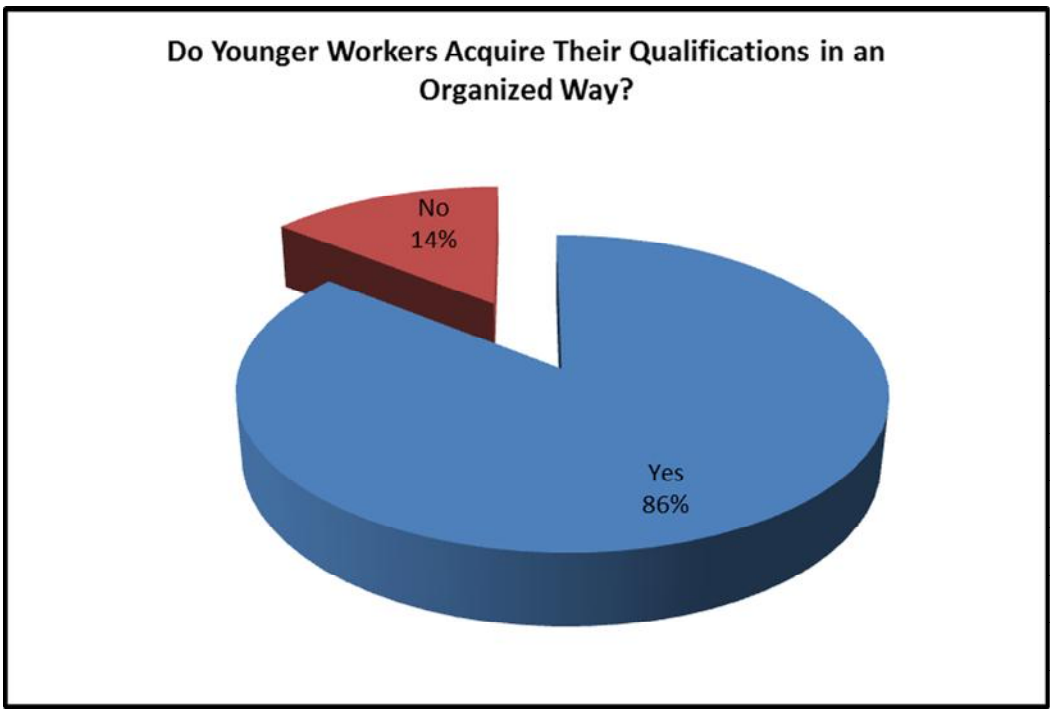
- 67% of the companies would participate in EE trainings and would like to receive specialization and certificates, but 38% of the total number of companies would train their employees only if the the training was free.

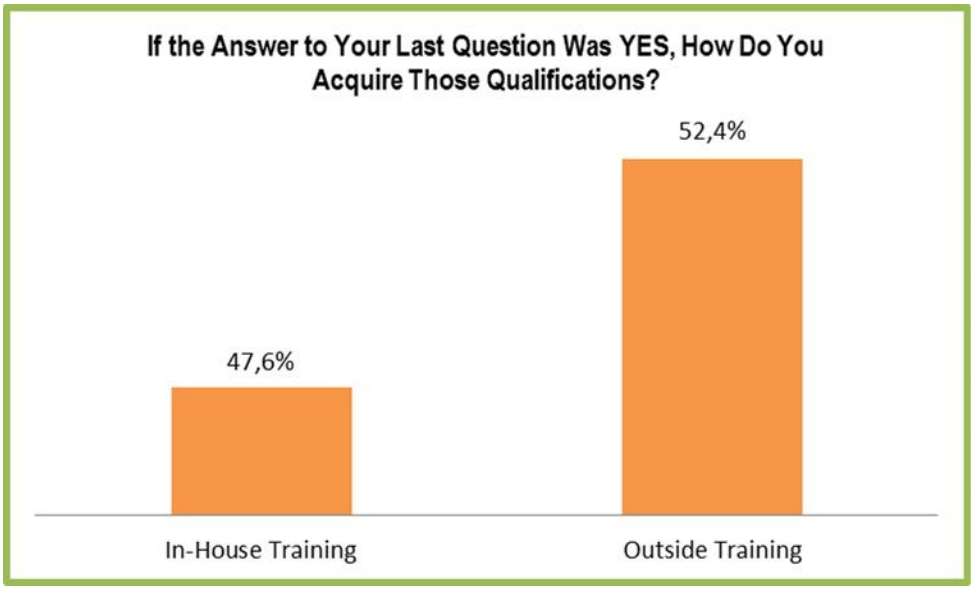


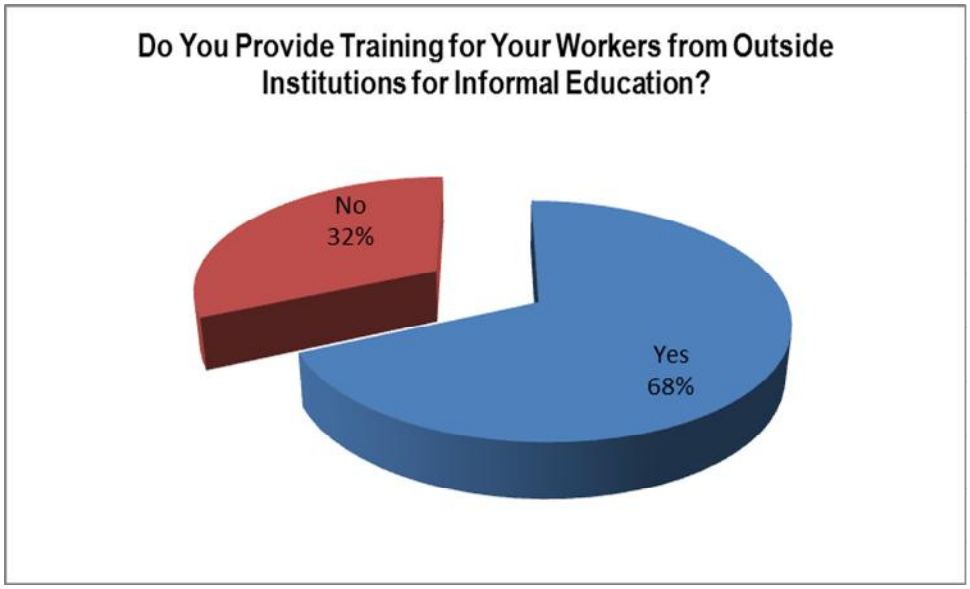
- For additional training of the workers, most influential is the EE legislation and the increased competition, both factors with 31% each from the total number of surveyed companies. This means that they expect for the EE measures to be applied more as a result of the surrounding than as a result of any development strategies.



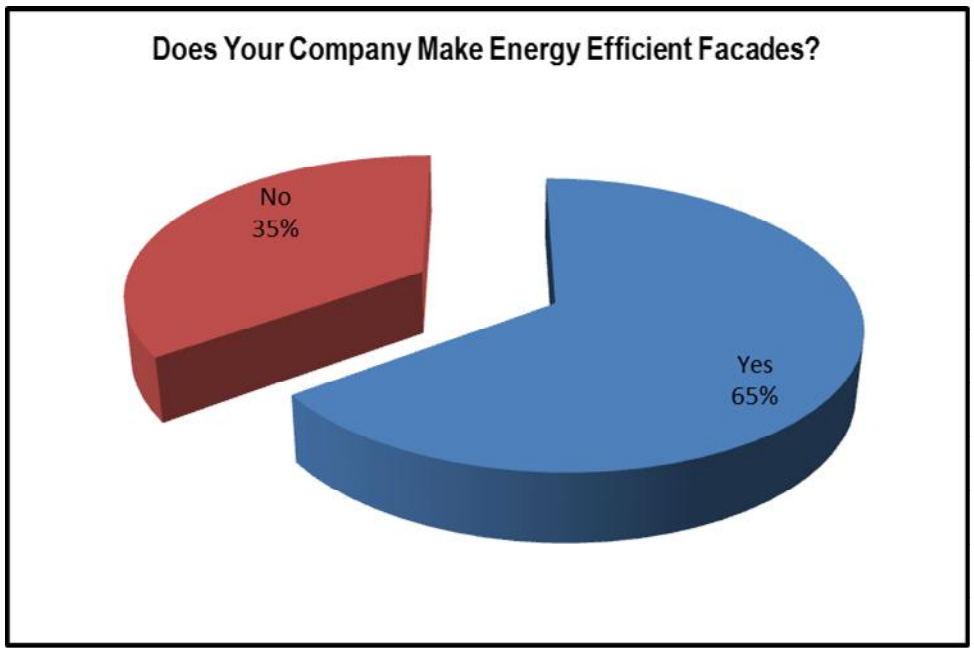
- 43% of companies said they would cooperate in the development of training programmes for EE and RES occupations only if it didn't take up too much of their time.

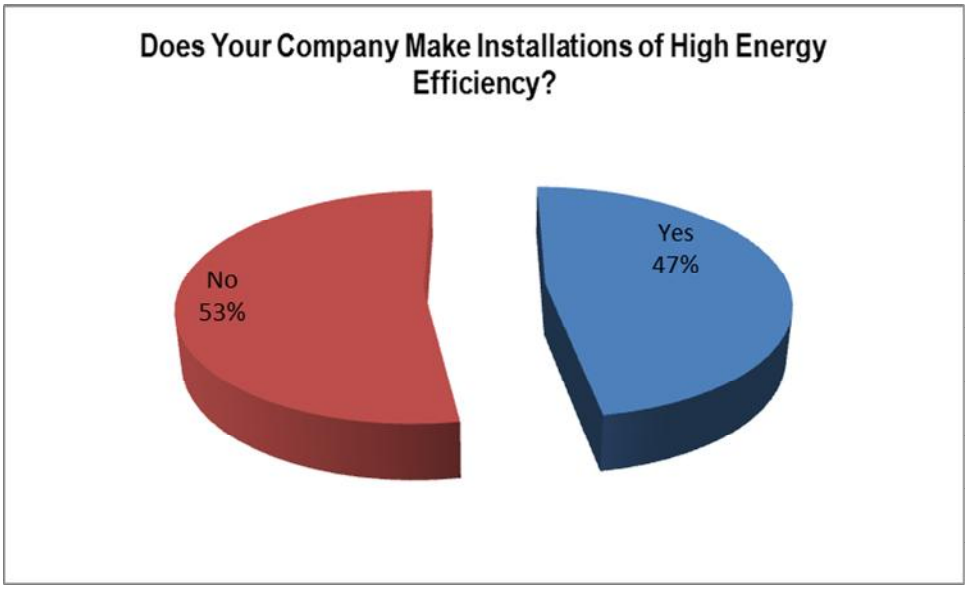

Do Younger Workers Acquire Their Qualifications in an Organized Way?
No
14%
Yes
86%

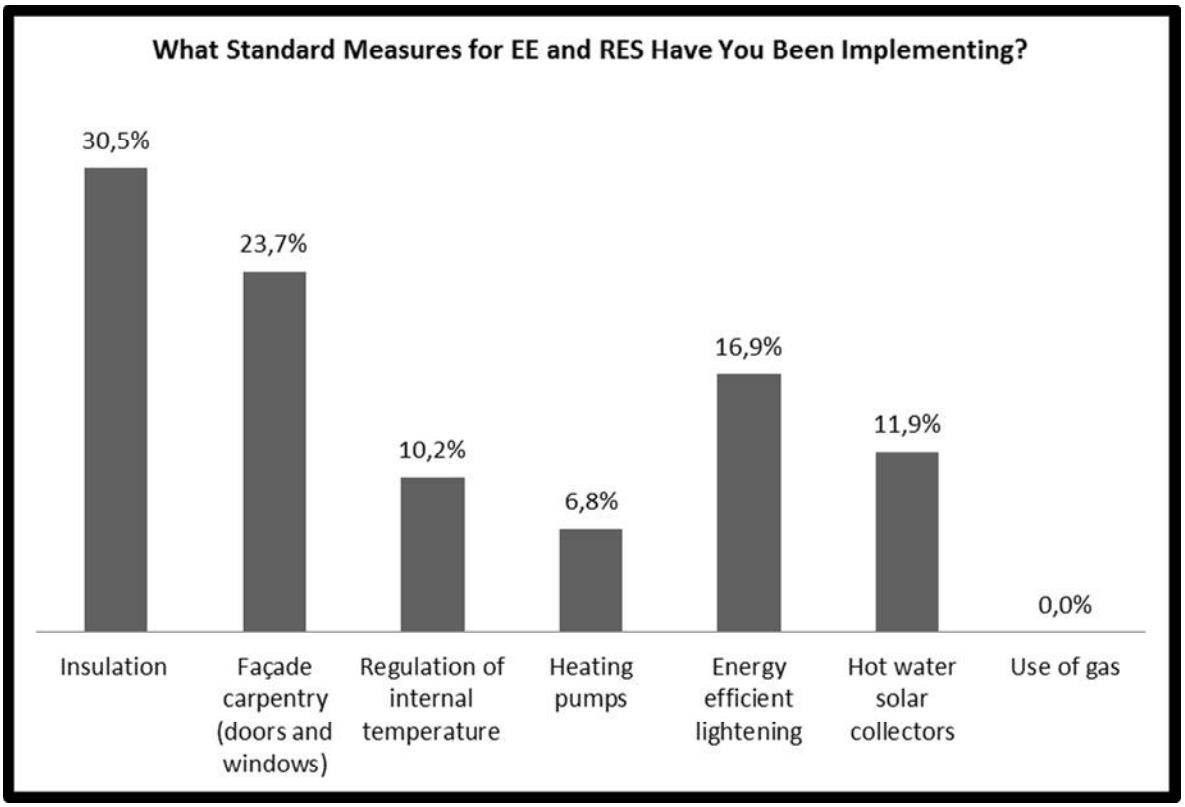

If the Answer to Your Last Question Was YES, How Do You Acquire Those Qualifications?
47,6%
52,4%
In-House Training
Outside Training



E) Specialization for EE and RES measures in the building sector




Does Your Company Make Installations of High Energy Efficiency?
No
53%
Yes
47%


What Standard Measures for EE and RES Have You Been Implementing?
30,5%
23,7%
10,2%
6,8%
16,9%
11,9%
0,0%
Insulation
Façade carpentry (doors and windows)
Regulation of internal temperature
Heating pumps
Energy efficient lightening
Hot water solar collectors
Use of gas

F) EE and RES barriers