

BUILD2LC Project
**Boosting Low Carbon Innovative Building
Rehabilitation in European Regions**

State of Art, SWOT analysis and
identification of needs

Region: Podkarpackie

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1 STATE OF ART OF ENERGY REHABILITATION IN BUILDINGS

1.1 Brief Picture of the Region

Podkarpackie Voivodeship is situated in south-eastern Poland, sharing its border with Ukraine and Slovakia. To the west it is bordered by Małopolskie Voivodeship, to the north-west by Świętokrzyskie Voivodeship, and to the north-east by Lubelskie Voivodeship. The region is the outer border of the European Union. It is known for being rich in natural resources as oil and natural gas as well as several mineral raw materials. Particularly dynamic has been the growth of the IT industry and aviation cluster, so called Aviation Valley, which dominate the region's modern economic image. The Bieszczady Mountains, part of the Carpathians, make the region an attractive destination for domestic and international tourism.

The Podkarpackie region accounted for 3.9% of national gross value-added (GVA) in 2013. There are other six Polish regions out of the total of 16 with lower GVA than Podkarpackie. The share of industry in the generation of GVA is estimated at 28.5%, which is the seventh highest result and above the national average (26.5%). Entities engaged in services generate 25% of regional GVA. In 2015, there were 1,600 foreign firms in the Podkarpackie which represents roughly about 1.8% of all foreign companies located in Poland.

The region is known for its rich deposits of such natural resources as oil and natural gas as well as such mineral raw materials as sulphur, gypsum, sandstone and limestone being currently extracted in modern mines. In addition to the development of traditional sectors based on existing resources (agriculture, industry and mining), the food, pharmaceutical, aviation and IT sectors have also developed. Particularly dynamic has been the growth of the IT industry and so called Aviation Valley, which dominate the region's modern economic image. Among the largest companies settled in the region one can indicate Dębica SA and Kirchhoff Polska (automotive), Asseco (IT) or Nowy Styl (Krosno) (furniture).

The region is famous for its Aviation Valley, which accounts for 90% of Polish aerospace industry output with over 22,000 employees. Currently, the Aviation Valley represents 100 companies within the region, and the number is still growing. The cluster is reinforced by the presence of Rzeszow University of Technology with a strong Faculty of Mechanical Engineering and Aeronautics. The Faculty is a coordinator of Aeronautica Integra Research Network, uniting research institutions which conduct studies in the field of aeronautics and space technology. The Faculty has achieved the status of an Advanced Technology Centre with the AERONET Aviation Valley. Another leading regional research organisation is the Rzeszow University, which is the largest academic institutions in the region.

Less significant position in the voivodeship's industrial structure is occupied by the textile industry, as well as clothing and leather products manufacturers, whose total output in 2006 constituted 1.4% of the industrial production of the voivodeship, while the employment rate in this sector amounted to nearly 6,700 people. In 2007 production in this sector decreased and was 1.3% with the employment of 6,000 people. Those rates reflect poor effectiveness of textile industry and the resulting difficult situation in the entities of this sector, which is caused by both low demand and inadequate technological level of the manufacturing process.

1.2 State of Play

Energy poverty

Energy poverty is still a not well examined issue in Poland. The existing data are rather raw and not every aspect can be presented in regional context. It needs further development in order to see it perspective of region.

Fuel poverty, or energy poverty, is said to occur when there is difficulty in satisfying basic energy needs at home at a reasonable price. The term applies to both the maintenance of thermal comfort and the fulfilment of other basic energy needs. Even though there may be a lot of causes to this problem, the following three – independent of one another or mutually strengthening – are the most common:

- a bad financial situation and – often – economic poverty that excludes the possibility of making investments on one's own and makes it difficult or even impossible to pay household bills;
- excessive and wasteful use of available energy – using inefficient, non-energy saving equipment; being unaware of needless energy losses; not having knowledge of simple ways to save energy;
- age and technical condition of a building, as well as the type and efficiency of a heating system – there are great energy losses in buildings with low energy efficiency, resulting in higher energy costs.

The term “energy poverty” is relatively new in Polish conditions and is not well investigated.

Its definition depends upon approach, but two main definition prevail. Relative one is taken from the UK. It is called “Low Income High Cost” (LIHC). Under the LIHC indicator, a household is considered to be fuel poor if:

- they have required fuel costs that are above average (the national median level)
- were they to spend that amount, they would be left with a residual income below the official poverty line.

There are three key elements in determining whether a household is fuel poor:

- Household Income
- Household Energy Requirements

According to this approach 17,1% (6,44 mio people) of Poles suffered energy poverty in 2013. The second approach, absolute one is that household cannot afford to keep adequately warm at reasonable cost. The most widely accepted definition of a fuel poor household is one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth. The second approach is also adopted from the UK. According to the second definition 44,4 % of Poles (17,2 mio people) experience energy poverty (Owczarek D., Miazga A., "Ubóstwo energetyczne w Polsce. Definicja i charakterystyka społeczna grupy" *Energy poverty in Poland. Definition and social characteristics of the group*. Warszawa 2015). After methodological correction it is still 32,4% of Polish society (12,7 mio people). With such a definition energy poverty is most eminent in following social groups:

- 1 person households (58%)
- Pensioners (56%)
- Social security beneficiaries (48%)
- Households in rural areas (51%)
- In detached houses (57%)
- In houses erected before 1960 (before 1946: 35%; years 1946 – 1960: 51 %)
- households of 91 up to 120 m² (51%)
- centrally heated households (47%)

According to these findings the most endangered with energy poverty group are people living in detached houses (57% in comparison to 11% living in blocks of flats). It is also more common among people living in houses built before 1960 (51%). The reason for that is low energy performance of the buildings and lack of sufficient insulation, draughty windows. The problem is also more common for big apartments (over 90 m²) – because with poor insulation of buildings heating is more costly. Many administrators of block of flats (which are most often owned by housing cooperatives (spółdzielnia mieszkaniowa) or belong to municipalities (communal housing) and housing unions (wspólnota mieszkaniowa) have made investments in thermal refurbishment of buildings. But private houses, very often old ones belong most often to people whose incomes are too low to afford such an investments.

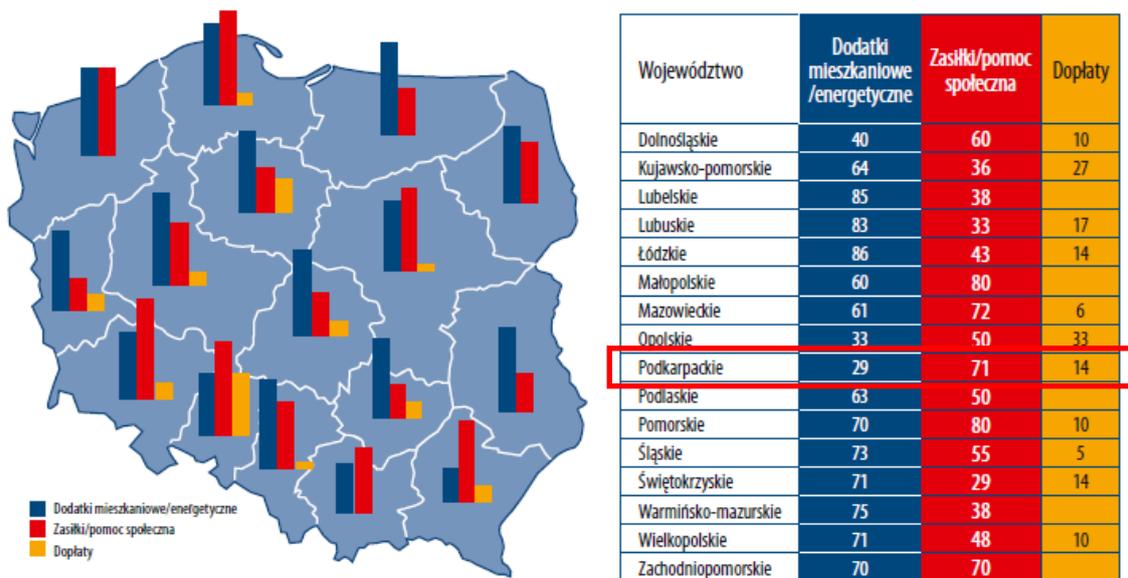
As mentioned at the beginning it is difficult to state with accuracy what is the energy poverty level in Podkarpackie, as we lack sufficient data. There was one survey made by M. Pyka, S. Liszka, J. Czajkowski and M. Kukła ("Ubóstwo energetyczne w Polsce. Wyniki badania ankietowego oraz propozycje dotyczące pomocy osobom ubogim energetycznie", FEWE, Katowice – Warszawa 2014) which based on questionnaires sent to the municipalities. Unfortunately, the response level was low so it cannot be treated as binding. The findings are presented in map below.

Fig. 1. Percentage of households suffering energy poverty in regions.



Source: M. Pyka, S. Liszka, J. Czajkowski and M. Kukla "Ubóstwo energetyczne w Polsce. Wyniki badania ankietowego oraz propozycje dotyczące pomocy osobom ubogim energetycznie", FEWE, Katowice – Warszawa 2014

Fig. 2. Percentage of people using different forms of support provided by municipalities



Explanations:

Dodatki mieszkaniowe/energetyczne – housing/fuel allowance

Zasiłek/pomoc społeczna – benefits/social assistance

Dopłaty – supplement payments

Source: M. Pyka, S. Liszka, J. Czajkowski and M. Kukla "Ubóstwo energetyczne w Polsce. Wyniki badania ankietowego oraz propozycje dotyczące pomocy osobom ubogim energetycznie", FEWE, Katowice – Warszawa 2014

Of key importance here are long-term actions aimed at increasing the level of energy efficiency in residential buildings. In Poland, there are both national and EU funds available for these actions – there are funds from National Fund for Environmental Protection and Water Management (NFEP&WM) programmes such as 'KAWKA' or 'RYŚ' and the most widely-used the Thermo-modernisation and Renovation Fund, as well as EU funds within the framework of the Operational Programme Infrastructure and Environment (OPI&E) and Regional Operational Programmes (ROPs). Unfortunately, the financial support is given in the form of a loan subsidy, so in order to receive it, one has to take out a (substantial) bank loan in advance. It results in the exclusion of those who grapple with the problem of fuel poverty and need the support the most. Moreover in case of ROP for Podkarpackie Voivodship it is impossible for individual people to apply for support within the programme, as in case of thermo-modernisation the only possible applicants are either public bodies (such as municipalities or communal companies) or cooperatives and unions.

Since 2014, the so-called "fuel allowance" has been made available as a direct support to those unable to cover excessive energy costs. However, the allowance is not a solution to the fuel poverty problem for, despite being a temporary financial support (from PLN 11.37 to PLN 18.93 / 2.59 EUR to 4.31 EUR, depending on the number of people in a household), it does not eliminate the causes.

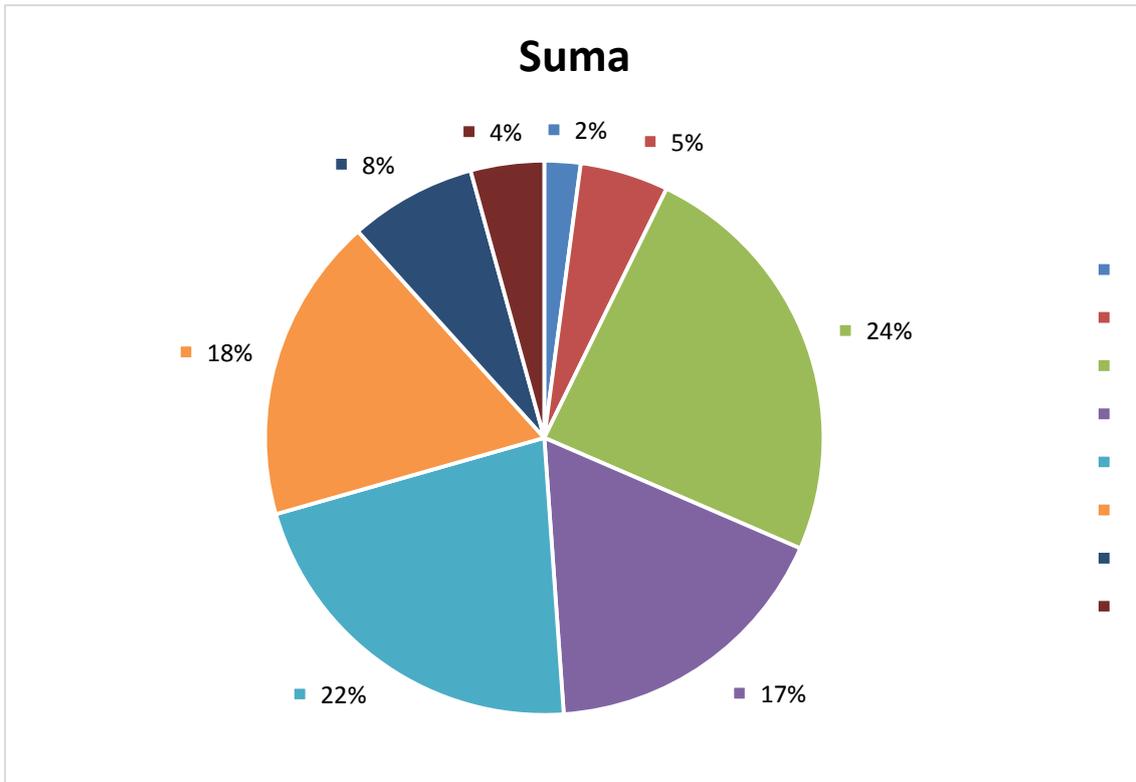
State of buildings

Podkarpackie is a region which can be characterised as one with predominant rural building. Moreover dwellings are dispersed, scattered all over terrain, very often in some distance from one another, which causes problems with supply of different media, such as sewage system or waterworks. It emerges from historical situation of the region, which used to be very poor and overpopulated, with most of farmers living out of very small farms (often smaller than 1 ha). Small farms are still predominant in this area, though situation is changing – with very dynamically developing cities, especially Rzeszów.

The historical situation causes that large part of dwellings, especially in rural areas, but also in smaller towns, and to some extent in cities are old and not insulated at all, or only insulated to lowest standards. This is due to low incomes of their owners/inhabitants. It results in large share of expenditures spent on energy bills.

Age structure of dwellings in Podkarpackie is presented in figure 3 below.

Fig. 3. Age structure of dwellings in Podkarpackie (data for 2011)



Source: elaborated on data of Central Statistical Office.

To better understand the age structure it is necessary to see what were the official norms for energy consumption in given period. However, it is necessary to mention that official standard provisions are not necessarily the ones that were really implemented. It is especially true in case of period until 1990, i.e. communist era, when it was often not verified, and raw materials used for construction of buildings were stolen and replaced with substitutes. Official standards are presented in table 1.

Table 1. Official standards of energy consumption for housing buildings in Poland

Year of building construction	Standard/provision and year of its implementation	Heat Coefficient U required for external wall W/m ² K	Mean energy use for heating	
			Direct energy kWh	Primary energy GJ
until 1966 r.	Construction Law Central and Eastern Poland wall of 2 bricks Western Poland wall of 1 ¹ / ₂	1,16	240-280	1,31-1,61

	bricks	1,40	300-350	1,76-2,05
1967-1985	PN-64/B-03404 since 1.01.1966 PN-74/B-02020 since 1.01.1976	1,16	240-280	1,31-1,61
1986-1992	PN-82/B-02020 since 1.01.1983	0,75	160-200	0,88-1,17
1993-2002	PN-91/B-20020 since 1.01.1992	0,55	120-160	0,73-0,88
2002-2008	Technical and construction regulations (2002)	0,30*	90-120	0,25-0,66
since 2009	Technical and construction regulations (either coefficient U value, or EP value) (2009)	0,30**	90-120	0,25-0,66
		EP	$A/V \leq 0,2$ $EP_{H+W} = 73 + \Delta EP$ $0,2 < A/V \leq 1,05$ $EP_{H+W} = 55 + 90 \cdot (A/V) + \Delta EP$ $A/V > 1,05$ $EP_{H+W} = 149,5 + \Delta EP$	

Source: Podręcznik typologii budynków mieszkalnych z przykładami działań mających na celu zmniejszenie ich energochłonności (Manual of typology of housing buildings with sample actions to decrease their energy consumption), Tabula IEE Project, NAPE, Warszawa 2011

More detailed information is presented below.

Table 2. Changes of the heat transfer coefficient U [W/m².K] for the rooms in the multi-residential buildings, heated more than 16°C.

Polish Norm	Year of coming into force	Exterior wall	Flat roof	Floor above unheated cellar	Flores above attic	Balcon windows and door
PN-57/B02405 ^{*)}	since 1958	1,16 ÷ 1,42	0,87	1,16	1,04 ÷ 1,163)	-
PN-64/B03404 ^{*)}	since 1968	1,16	0,87	1,16	1,04 ÷ 1,16 ³⁾	-
PN-74/B03404 ^{**)}	since 1976	1,16	0,7	1,16	0,93	-
PN-82/B02020 ^{**)}	since 1983	0,75	0,45	1,16	0,40	2,0 ÷ 2,6 ¹⁾

PN-91/ B02020 ^{**)}	Since 1992	0,55 ÷ 0,70 ²⁾	0,3	0,60	0,30	2,0 ÷ 2,6 ¹⁾
Technical requirements – the ordinance ^{**)}	since 16 th of December 2002	0,30 ÷ 0,65 ³⁾	0,25	0,60	0,30	2,0 ÷ 2,6 ¹⁾
Technical requirements – the ordinance	since 1 st of January 2014	0,25	0,20	0,25	0,20	1,3 ÷ 1,5 ⁴⁾
Technical requirements – the ordinance	since 1 st of January 2017	0,23	0,18	0,25	0,18	1,1 ÷ 1,3 ⁴⁾
Technical requirements – the ordinance	since 1 st of January 2021	0,20	0,15	0,25	0,15	0,9 ÷ 1,1 ⁴⁾

Source: Strategic research project entitled "Integrated system for reducing operating energy consumption in buildings" Research Task No. 5: Optimising energy consumption in buildings, A Guide for Students: The impact of automation on energy efficiency in buildings., p.19., Institute of Technique and Construction, dr inż. Krzysztof Kasperkiewicz, Energy consumption in the building sector-present and future.

Not all dwellings are equally equipped with necessary media. The table below presents actual situation (for 2011).

Table 3. Number of dwellings with important energy and other media infrastructure

Region Subregion County	Dwelling in total	Waterworks	sewege	Natural gas from pipeline	Central heating
PODKARPACKIE	386956	373129	348486	261963	272006
PODREGION 33 - KROŚNIEŃSKI	94177	88741	84663	74612	62955
Powiat bieszczadzki	3282	3197	2996	43	2150
Powiat brzozowski	14873	13708	13029	12179	9539
Powiat jasielski	23095	21168	20476	19766	15410
Powiat krośnieński	25853	24396	22987	23179	16282
Powiat sanocki	16140	15557	14728	12735	11374
Powiat leski	5103	4906	4814	1093	3693

Powiat m.Krosno	5831	5809	5633	5617	4507
PODREGION 34 - PRZEMYSKI	72617	69853	64863	42348	48427
Powiat jarosławski	22295	21478	20038	15796	15381
Powiat lubaczowski	11578	11212	10536	3995	7473
Powiat przemyski	16385	15404	14411	8276	10676
Powiat przeworski	17441	16857	15173	11154	10937
Powiat m.Przemyśl	4918	4902	4705	3127	3960
PODREGION 35 - RZESZOWSKI	116139	113316	105705	80136	86190
Powiat kolbuszowski	13586	13340	12128	8461	9503
Powiat łańcucki	17968	17677	16247	13485	13487
Powiat ropczycko- sędziszowski	15166	14675	13495	9168	10682
Powiat rzeszowski	38652	37113	34813	24622	27724
Powiat strzyżowski	13885	13649	12564	9802	9770
Powiat m.Rzeszów	16882	16862	16458	14598	15024
PODREGION 36 - TARNOBRZESKI	104023	101219	93255	64867	74434
Powiat dębicki	23801	22995	21916	19578	17842
Powiat leżajski	13794	13578	12235	7786	9597
Powiat mielecki	22369	21869	20083	12445	16153
Powiat niżański	15304	14719	13279	7367	9892
Powiat stalowowolski	14537	14187	12729	8148	10115
Powiat tarnobrzegi	10145	9823	9191	6228	7468
Powiat m.Tarnobrzeg	4073	4048	3822	3315	3367

Source: Central Statistical Office of Poland

It must be mentioned (which is discussed below, in construction and building market description) that the situation is changing, because new buildings are constructed in higher energy standards. However, the problem of energy poverty still remains, as new dwellings are mostly inhabited by people who can afford mostly very expensive houses or flats.

There is no official register of the buildings that are constructed. However this number can be issued on the basis of data concerning the number of buildings that were given permission to use. In 2012 there were 97323 residential (single and multi), collective residential and public utility buildings. In 2013 that number diminished to 95815 (data for entire Poland, according to Ecofys study "National plan for increasing the number of nearly zero-energy buildings in Poland" by Sven Schimschar, Nesen Surmeli, Andreas Hermelink, Ecofys – European Commission 2013).

1.3 Link to the RIS3

In the Podkarpackie Region there are high-opportunity sectors which, after the required conditions are met, may in the future be recognized as subsequent smart specializations of the region. The potential specializations include automotive, chemical, mineral and metallurgical industries.

It is essentially recognized that a region has a competitive advantage in a certain field if there is above-average concentration of related indicators in comparison to the value observed in the country or a group of countries.⁵⁵ In the Podkarpackie Region an example of this, emphasized previously, is the aerospace industry and all the sectors linked with it (electro-mechanical engineering, metal casting and composite materials production).

The RIS3 strategy defines and justifies the choice of two main smart specializations and one ancillary smart specialization:

Main smart specialization – Aeronautics and Space Technology. Polish aerospace industry today is based on over 120 companies, employing the total of 25,000 people, and its total sales in 2013 will reach the value of 2 billion USD. Approximately 90% of this potential is concentrated in the Aviation Valley cluster with the headquarters in Rzeszów. Aviation Valley ranks among the fastest growing aerospace clusters worldwide. The growth relates to its manufacturing potential, implementation of the most advanced technologies and construction of new research and development centres and design studios.

Aerospace industry from Podkarpacie delivers aircrafts, helicopters, aircraft engines, auxiliary power units (APU), landing gear, aircraft gearboxes, turbine modules, and hundreds of other complex components and units, all of these manufactured with the use of advanced technologies and materials such as monocrystals and composite materials, which in the executed foresight study have been recognized as priority technologies in the development of the sector and Region.

Aircraft industry ranks among the most innovation-oriented sectors not only in Poland but also worldwide. The performed analyses, foresight projects, etc. show excellent opportunities for growth and development in this sector.

Main smart specialization – Quality of Life

The other main smart specialization of the Podkarpackie Region is defined as the sphere of the quality of life. In this Strategy the term comprises four large areas:

1. production and processing of food with top biological and nutritional quality; organic and sustainable agriculture and processing; regional and traditional food products;
2. sustainable and responsible tourism; health and well-being (clinics, sanatorium health centres, nursing homes, recreation and leisure centres, spa centres, nutrition-based treatment centres);
3. eco-technologies: renewable sources of energy (distributed generation, smart grids, wind turbines, water turbines, solar thermal collectors, solar panels, biomass boilers, geothermal energy, etc.);

4. energy-efficient and smart construction (passive, zero-energy and plus-energy houses, etc.).

The main smart specialization, quality of life, for the Podkarpackie Region relates to a number of areas of activity and concepts which are interrelated, and aim at creating a new sustainable model of functioning for the society and the ecosystem, comprising mobility – multimodal transport, climate and energy, food of top biological and nutritional quality, energy-efficient construction, sustainable tourism, information and communication technologies (ICT). This is not a specific sector but a set of complex solutions designed to enable compliance with the EU requirements and to guarantee smart development for the entire Region, in accordance with the new economic and social paradigm of the European Union.

Defined in this way, the main smart specialization 'quality of life' also determines directions for research and innovations. Additionally, it shows close link with majority of the key enabling technologies endorsed by the European Union (they are of horizontal nature and have large potential for inducing transformation).

Auxiliary smart specialization – Information and Telecommunications

ICT sector has been specified as a horizontal area of significant importance for each specialization and sphere of life in the Region. This choice is justified by the explicitly defined needs of the society and economy related to the digital development. It is also justified by the European Union policy. Additionally, it is linked with stimulating the demand for affordable, good quality interoperable services. Development of broadband Internet is of particular importance.

Podkarpackie ranks among regions with excellent resources and potential for scientific research in information and telecommunications technologies. Employees and students of universities in Rzeszów are successful in specialist competitions worldwide. It should be emphasized that the region is home to the largest Polish IT company which has already achieved a status of a large international corporation.

In 2011 Asseco Poland S.A. celebrated its 20th anniversary; during this time it has become the largest IT company in Poland with operations in most countries of the European Union and other areas of the world.

Quality of Life is the smart specialization field which includes emphasis on construction sector. It stresses the aesthetic and other features of the place of residence, preferably linked with economic aspects. Because of this the elements defining quality of life include support for adequate type of construction (passive, zero-energy and plus-energy housing), particularly related to energy supply. Support for this type of operations directly translates into improved living standards; it also enables financial and organizational aid for many vital sectors, such as power supply related to renewable energy sources; production of top quality, A-category home appliances; sector of construction materials based on eco-

innovations; comprehensive support for environment conservation sector. The actions for this area are covered by strategic objective: development of the Podkarpackie Region as an area with the top quality of life. Energy security. Food security and independence. Specific objective CLIMATE AND ENERGY, covering Improved quality of the climate resulting from the use of eco-innovation technologies for acquiring and more efficient use of energy. Energy efficient building sector is addressed in operational goal "Increased number of buildings and other facilities with the applied sustainable and smart technological solutions. Passive, zero-energy and plus-energy buildings."

1.4 Policy Instruments. Regional and National Plans and Policies on Energy Rehabilitation of Buildings

Plan Gospodarki Niskoemisyjnej - PGN (Low Emission Economy Action Plan)

PGN is a document corresponding in principle to Covenant of Mayors' Sustainable Energy Action Plan (SEAP). Main differences are targets – they do not necessarily have to comply the 20% rule for CO₂ reduction, energy efficiency increase and renewables. Additional aim is to reduce air pollution, especially with pollutants such as PM10 or B(a)P. Municipalities are responsible for development of PGN and for their implementation. The document must be approved by the municipal council, after it has been checked by Regional Fund of Environmental Protection and Water Management. PGN is necessary while applying for financial support from EU funds – a climate change related project must result from the action plan in order to be scored. One of the main area of PGN is built environment, including new buildings and refurbishment of existing buildings. Most of municipalities have the plan ready with buildings refurbishment and energy efficiency in built sector as one of the focal points.

Krajowy Plan Działań na rzecz efektywności energetycznej (National Energy Efficiency Action Plan)

NEEAP indicates aims for Poland in different areas of energy efficiency. Among others aims for energy efficiency in buildings are identified.

Table, copied from NEEAP presents projected energy savings for buildings with a useful floor area of more than 500 sq. metres, belonging to central government institutions and occupied by them, which do not meet minimum energy performance requirements set in accordance with Article 4 of Directive 2010/31/EU regarding energy performances of buildings (buildings do not comply with acceptable maximum values of the heat penetration coefficient, and with the acceptable non-renewable primary energy factor "EP" which determines annual demand for non-renewable primary energy per unit of floor area) for 2014.

Table 4. Potential energy savings in different kind of buildings

intended use of the buildings	number of buildings	usable floor area	value of non-renewable primary energy factor "EP"		energy saving
			weighted average	based on the regulations *)	
-	pcs	m ²	kWh/(m ² ·year)	kWh/(m ² ·year)	MWh/year
lodgings	7	19416.20	437.93	220.00	4231.47
	9	30409.69	290.72	195.00	2910.76
multi-apartment residential building	4	3271.15	148.41	115.00	109.30
	11	12030.62	167.96	105.00	757.43
public utility facilities	77	543825.34	260.35	190.00	38256.87
	51	227066.21	263.48	165.00	22361.09
warehousing, industrial, utility	1	874.40	517.46	235.00	246.98
	12	18743.85	309.48	210.00	1864.55
TOTAL	172	855637.46			70738.45

Source: National Energy Efficiency Action Plan

Value of the "EP" factor which determines annual demand for non-renewable primary energy per unit of floor surface is set in the Regulation of the Minister of Transport and Maritime Economy of 5 July 2013, amending a Regulation regarding technical conditions which should be met by buildings and their locations. This requirement was specified in accordance with Article 4 of Directive 2010/31/EU regarding energy performances of buildings.

Krajowy plan mający na celu zwiększenie liczby budynków o niskim zużyciu energii (National plan to increase number of low Energy buildings)

National Plan to increase the number of low energy buildings, constitutes an Annex to Resolution of the Council of Ministers, adopted on 22 June 2015. The document is the realization of the authority stipulated in Article 39(3) of Energy Performance of Buildings Act and the requirement prescribed by Article 9(1) of Directive 2010/31/EU concerning energy performance of buildings. The document analyses situation of Polish regulations in construction sector and norms and standards which apply for this sector indicating pathway towards low energy buildings. Goals are indicated for 2020 and 2030. As the intermediate target it should be treated the successive increase of the technical – building requirements related to the energy consumption, provided in the Ministry of Infrastructure ordinance of 12 April 2002 on the technical requirements that shall be met by the buildings and their location. The first amendment of the ordinance came into force in 1st of January 2014 and provided arising the requirements through next years: 2017 and 2021 or 2019 – in case of the buildings occupied by a public authority and frequently visited by the public. The requirements are related to the thermal insulation of external walls and the formation of a suitably low values of EP [kWh/m²/year]. These requirements have to be fulfilled in order to get a building permit by the building.

In accordance with the binding provisions all of the new buildings have to fulfill the requirements included in the ordinance of the Ministry of Infrastructure of 12 April 2002 on the technical requirements that shall be met by the buildings and their location in

order to get a building permit. The revised ordinance, binding from the 1st of January 2014, establish gradual increase of the technical requirements connected with the heat protection and energy consumption in the new buildings.

The maximum indicator of the prime energy stated the annual demand calculation on the nonrenewable prime energy to heat, ventilation, cooling, domestic hot water and lightning shall be calculated in accordance with following model:

$$EP = EP_{H+W} + \Delta EP_C + \Delta EP_L; [\text{kWh}/(\text{m}^2 \cdot \text{year})]$$

where:

EP_{H+W} - fragmentary maximum indicator of the prime energy on the demand of heating, ventilation, and domestic hot water,

ΔEP_C - fragmentary maximum indicator of the prime energy on the demand of cooling,

ΔEP_L - fragmentary maximum indicator of the prime energy on the demand of lightning.

Table 5. Fragmentary maximum indicator of the prime energy on the demand of heating, ventilation and domestic hot water.

Lp.	The type of building	Fragmentary maximum indicator of the prime energy on the demand of heating, ventilation and domestic hot water [kWh/(m ² ·year)]		
		since 1 st of January 2014.	since 1 st of January 2017	since 1 st of January 2021 ^{*)}
1	Residential building:			
	a) single-family	120	95	70
	b) multi-family	105	85	65
2	Collective residence building:	95	85	75
3	Public building:			
	a) connected with health protection		290	190

	b) rest	390	60	45
		65		
4	Agricultural building, warehouse and production building.	110	90	70

*¹) Since 1st of January 2019 – in the case of the buildings occupied by a public authority and frequently visited by the public.

Source: National plan to increase number of low Energy buildings

The increase of prime energy indicator and easier fulfill of the requirements stated in the abovementioned ordinance, can be achieved by the application of the energy from renewable sources.

The document also indicate policies and measures that should lead to more energy efficient buildings.

1.5 Legislation, Regulation

- Ustawa z dnia 7 lipca 1994 r. Prawo budowlane (Dz.U. z 2013 poz. 1409 z późn. zmianami) (*Construction Law Act of 7 July 1994*).
- Ustawa z dnia 20 maja 2016 r. o efektywności energetycznej (Dz.U. z 2016 poz. 831) (*Energy Efficiency Act of 20 May 2016*)
- Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz.U. 2015 nr 0 poz. 1422) (*Ministry of Infrastructure Ordinance of 12 April 2002 concerning technical conditions that should be fulfilled by buildings and their location*).
- Rozporządzenie Ministra Transportu, Budownictwa i Gospodarki Morskiej z dnia 25 kwietnia 2012 r. w sprawie szczegółowego zakresu i formy projektu budowlanego (Dz.U. 2012 poz. 462) (*Ministry of Transportation, Construction and Sea Economy Ordinance of 25 April 2012 concerning detailed scope and form of building project*).
- Rozporządzenie Ministra Infrastruktury i Rozwoju z dnia 27 lutego 2015 r. w sprawie metodologii wyznaczania charakterystyki energetycznej budynku lub części budynku oraz świadectw charakterystyki energetycznej (*Ministry of Infrastructure and Development Ordinance of 27 February 2015 concerning methodology of*

delimitation of energy performance of buildings or part of buildings and of buildings energy certificate).

1.6 Financial Support and Instruments

Long-term actions aimed at increasing the level of energy efficiency in residential buildings are of key importance. In Poland, there are both national and EU funds available for these actions – there are funds from National Fund for Environmental Protection and Water Management (NFEP&WM) programmes such as ‘KAWKA’ or ‘RYŚ’ and the most widely-used the Thermo-modernisation and Renovation Fund, as well as EU funds within the framework of the Operational Programme Infrastructure and Environment (OPI&E) and Regional Operational Programmes (ROPs). Unfortunately, the financial support is given in the form of a loan subsidy, so in order to receive it, one has to take out a (substantial) bank loan in advance. It results in the exclusion of those who grapple with the problem of fuel poverty and need the support the most.

In 2014-2020, the total budget for the programmes described above is approximately € 3 140 million. The budget is supposed to cover not only investments in multi-family buildings, but also in single family, industrial and commercial buildings, health centres, as well as public administration, educational and religious properties. Approximately 38% of available funding will be allocated to multi-family buildings. This will allow to subsidise the thermo-modernisation of approximately 3.2 13.6% multi-family buildings and 0.2-0.8% single-family buildings at a national level, depending on the amount of support granted.

Thermomodernisation fund

The instrument is managed by Bank Gospodarstwa Krajowego (Home Market Bank – governmental bank for special financial instruments)

The objective of the programme is financial aid for investors who implement projects involving thermomodernisation, repairs, and renovation of individual houses, using credits obtained in commercial banks.

The objectives of thermomodernisation projects include:

- reducing the consumption of energy for heating and service water heating purposes in housing units, multi-apartment units, and facilities owned by local government units and used by them for public tasks;
- reducing the cost of acquiring heat delivered to the buildings – as a result of building a technical connection to a centralised heating source due to the liquidation of a local heating source;
- reducing primary energy losses in local heating grids and local heat sources;
- a complete or partial change of energy sources to renewable sources, or using high-efficiency cogeneration.

The programme covers actions aimed at:

- improvements which result in a reduction in demand for energy delivered for heating and service water heating purposes;
- improvements which result in reducing primary energy losses in local heating grids and local heat sources;
- building a technical connection to a centralised heating source due to the liquidation of a local heating source, which results in a reduction of cost of acquiring heat;
- a complete or partial change of energy sources to renewable sources, or using high-efficiency cogeneration.

The thermomodernisation bonus is a form of state aid for an investor who carries out energy refurbishment of building project. The thermomodernisation bonus only partakes to investors who benefit from a loan granted by banks co-operating with BGK, it cannot be used by entities that carry out energy refurbishment project with their own funds. It is paid out by Bank Gospodarstwa Krajowego at 25% of the loan used for such an undertaking. An investor who carries out a thermomodernisation project only pays off 75% of the amount used for the loan. The clients can be local authorities, housing co-operatives, companies, housing associations, as well as private persons.

Regional Operational Programme of Podkarpackie Voivodeship 2014 – 2020. Priority III Clean Energy

This instrument is managed by Marshal Office of Podkarpackie Voivodship (regional authority).

Objective: Supporting the transition to a lowcarbon economy in all sectors

Characteristics: Deep modernisation of public buildings, deep modernisation of the energy residential buildings (multifamily residential buildings), introduction of energy management systems. Beneficiaries of the programme could be public entities (such as local authorities), housing co-operatives. It is not addressed to private persons. Beneficiaries can get up to 85% of grant for deep energy modernization of buildings.

The policy instrument addressed forms parts of regional energy strategies and planning of the Regional Government. Measures under this priority investment projects contribute also to achieving the objectives of the Europe 2020 strategy. The greatest potential in this respect is seen in public buildings and housing units, which account for 40% of final energy consumption and has a large untapped potential for costeffective energy savings. The investments in energy efficiency in public and multiapartment buildings are in line with Directive 2012/27 and the National Action Plan aimed at increasing the number of buildings with low energy consumption, complying Directive 2010/31 / EU.

Operational Programme Infrastructure and Environment for 2014 – 2020. Measure 1.3, submeasures 1.3.1 and 1.3.2 Support for Energy Efficiency in Buildings

The measure is implemented by Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej – NFOŚiGW (National Fund of Environmental Protection and Water Management).

The measure is addressed for public entities (submeasure 1.3.1) and housing co-operatives (submeasure 1.3.2) and aims at deep energy refurbishment of buildings. Supported projects need to significantly decrease building energy consumption and use low emission heating system. Use of renewables is promoted. Grant can be up to 85% (but in fact it is lower due to the method of calculation of project incomes).

The support is focused on a so-called deep comprehensive energy modernisation of public utility buildings (including public utility buildings which are under obligation to carry out energy modernisation pursuant to Article 5(1) of Directive 2012/27/EU on energy efficiency).

Projects which are to be granted co-financing must be in compliance with low-emission economy plans. In view of the above, measures connected with energy modernisation of public utility buildings will promote its comprehensive dimension (a so-called deep comprehensive modernisation based on monitoring and energy management systems). Taking into consideration synergy effect and increased energy efficiency, as well as ambient air protection, projects involving energy modernisation of buildings should be implemented together with construction/modernisation of heat or cooling distribution networks and highly efficient heat sources.

Co-financing will be granted for investment projects involving comprehensive, cost-effective energy modernisation of buildings. Cooling installations may constitute an element of a project if their purchase and assembly is based on an energy audit for the facility and will not have an impact on the facility's increased demand for energy.

The support for investment projects involving deep comprehensive energy modernisation of public utility buildings, covering such elements as:

- insulation of a building, replacement of windows, external doors, and replacing the lighting with energy-efficient one;
- alterations of the heating system (including changing of the heat source and replacing it with a more energy-efficient end eco-friendly one);
- installation of cooling systems, also including the use of RES;
- modernisation of ventilation and air conditioning systems;
- application of weather-sensitive automatic temperature regulation;
- the use of energy management systems in buildings;
- construction or modernisation of internal receiving installations, and removal of existing heat sources;
- installation of micro-cogeneration or micro-trigeneration for own needs;

- installation of RES in energy-modernised buildings, or if it is supported by an energy audit, in buildings meeting the standards defined in the amended Regulation of the Minister of Infrastructure of 12 April 2002 regarding technical conditions which should be met by buildings and their locations;
- preparation of energy modernisation projects which constitute parts of investment projects;
- installation of individual meters for heating, cooling, and service water;
- installation of central heating valves and thermostats;
- creation of green roofs and "living green walls";
- carrying out energy audits as part of investment projects.

Ryś – thermomodernisation of private houses

The programme is managed by Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej – NFOŚiGW (National Fund of Environmental Protection and Water Management) and will be available to private persons through commercial banks and Regional Funds of Environmental Protection and Water Management. The support for energy refurbishment leading to increased energy efficiency and energy conservation in individual houses will be given in form of low interest loan after energy audit and a grant of 20 up to 40 %. The programme has already started, but is not available for final beneficiaries yet. It will be implemented in years 2015 – 2023.

Lemur – Energy Efficient Public Buildings

The programme is managed by Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej – NFOŚiGW (National Fund of Environmental Protection and Water Management).

The support is aimed to promote new high energy class buildings (both public and residential). It is given in form of low-interest loan (2%) and a grant – in form of loan remission (from 20 to 60%, depending on energy class of new building). Beneficiaries include:

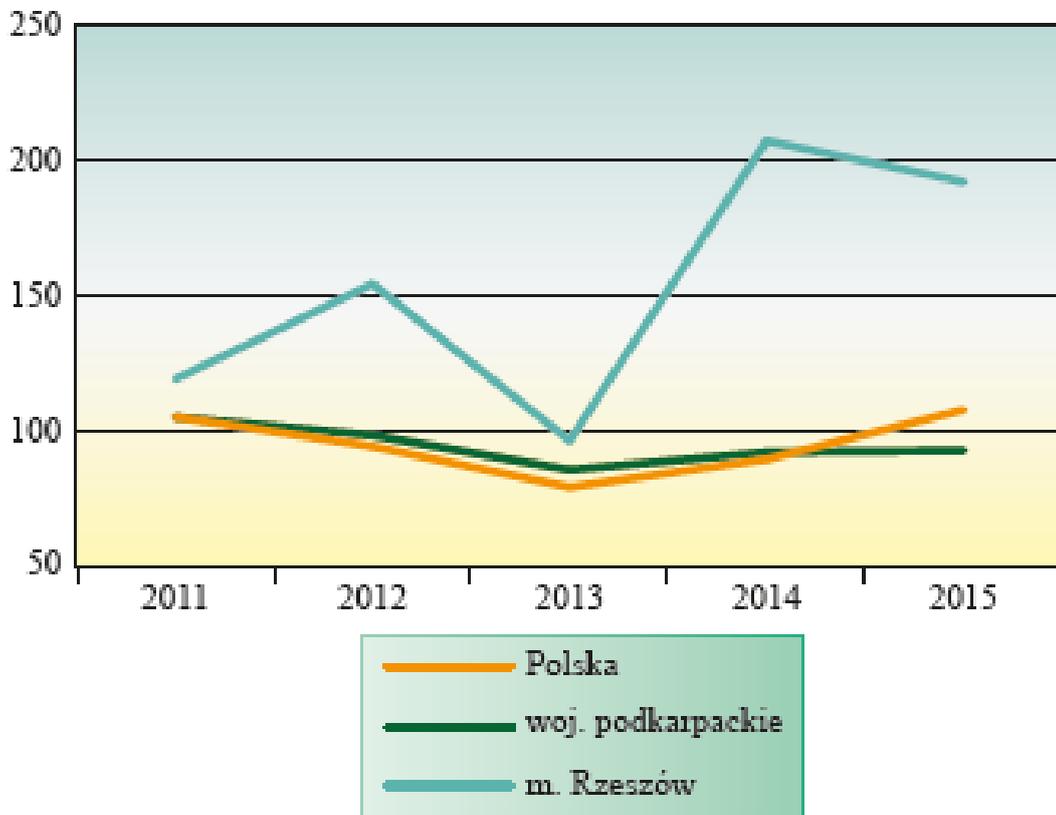
- entities of the public finances sector, excluding State budget entities;
- legal persons of the local self-government, corporations in which local self-government entities have 100 % shares and which are assigned to carry out municipalities' own statutory tasks;
- non-governmental organisations, including foundations and associations, churches, other religious associations entered into a register of churches and of churches, other religious associations, church legal persons which carry out public duties on the basis of separate provisions.

1.7 Construction and Buildings Market Brief Description

The housing construction sector in Podkarpackie constitutes 1.1 % of GDP of the region.¹

According to statistical data for 2015 production in construction sector in Podkarpackie is decreasing in comparison to 2014. The beginning of the year brought about some increase in building installation subsector but it was followed by substantial decrease of the production. This tendency reflects overall Polish tendencies in Polish construction market. It is connected with stagnation on Polish market. However, it has to be seen in wider context. When compared to the year 2010 it is a significant progress in terms of number of new dwellings/flats with use permit (see figure below).

Fig. 4. Dynamics of number of flats with use permits (year 2010 = 100%)

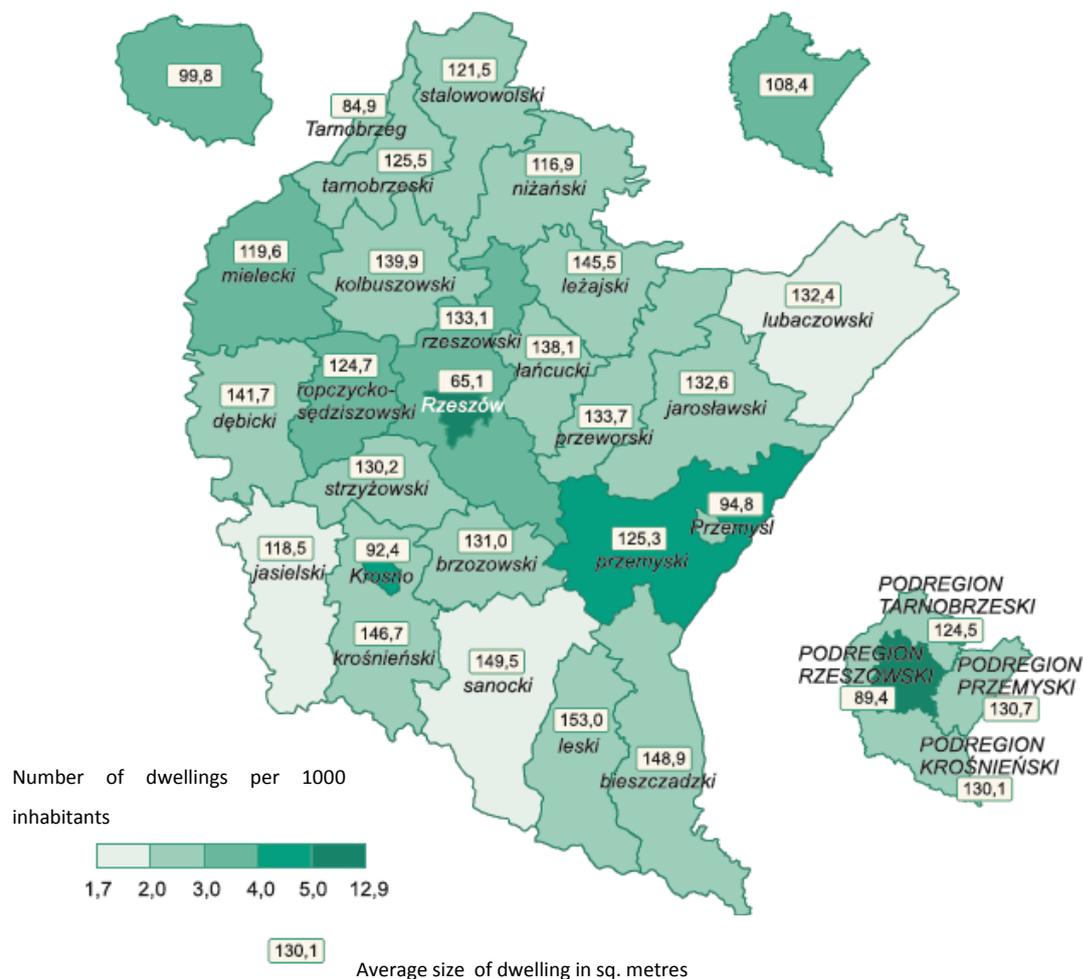


Source: *Raport o sytuacji społeczno-gospodarczej województwa podkarpackiego w 2015 roku (Social-economic status report for Podkarpackie region in 2015)*, Statistical Office in Rzeszów, 2016

¹ Analiza wpływu sektora budownictwa mieszkaniowego na gospodarkę Polski. Analysis of housing construction sector influence on Polish economy. PwC, Warszawa 2015

The number of newly built dwellings is not evenly distributed in the region, though for entire region it was high in absolute numbers: 7640 (18.7 % more than in 2014, and 53.9 % more than in 2010).² Looking on figure below it can be seen that most rapidly, in terms of number of dwellings per thousand inhabitants is, are growing cities and counties (powiat) that surround them. It can be also correlated with migration trends caused by economic situation. People are moving from parts of regions where it is most difficult to find job to places where job is more easily accessible. Another trend is correlation of dwellings' average size and type of predominant special type. In case of rural areas the size in sq. metres is bigger, because these are mostly individual houses while newly built dwellings in cities are mostly in block of flats.

Fig. 5. Dwellings put in use in 2015 in Podkarpackie region divided by subregions (NTS 3) and counties (NTS IV)



² All data starting from here according to „Raport o sytuacji społeczno-gospodarczej województwa podkarpackiego w 2015 roku” (Social-economic status report for Podkarpackie region in 2015), Statistical Office in Rzeszów, 2016

Source: *Raport o sytuacji społeczno-gospodarczej województwa podkarpackiego w 2015 roku (Social-economic status report for Podkarpackie region in 2015)*, Statistical Office in Rzeszów, 2016

As it can be seen the city of Rzeszów is developing most rapidly in terms of new dwellings available for people. It is connected with industries that are developing in the city – aerospace, chemical, pharmaceutical and mechanical and with development of Rzeszów as an academic centre (at the moment it is the city with highest rate of students in Poland). That is also why some construction companies are developing. Despite a big number of very small companies (with 3 to 4 employees – which will be discussed below) there are some that are big.

The value of production sold by the construction sector in Podkarpackie in 2015 was 6361.8 million PLN, and was lower by 0.2 % from 2014. In Poland as a whole the production increased in 2015 by 1.3%.

In terms of refurbishment of dwellings last available statistical data are for 2013.

Table 6. Refurbishment of dwellings in Podkarpackie region (2013)

Ownership	Kind of refurbishment	No of dwellings
Communal	Building insulation	410
Communal	Installation	185
Communal	Roof	207
Communal	Woodwork	467
Cooperative	Building insulation	7854
Cooperative	Installation	5411
Cooperative	Roof	1484
Cooperative	Woodwork	6775
Companies' dwellings	Building insulation	13
Companies' dwellings	Installation	14
Companies' dwellings	Roof	14
Companies' dwellings	Woodwork	18

Union	Building insulation	3651
Union	Installation	3418
Union	Roof	792
Union	Woodwork	3442

Source: own analysis basing on Local Data Bank, Central Statistical Office of Poland

The most important group in case of whole construction sector was subsector of construction and assembly. According to NACE definition it represents new investment in buildings, rehabilitation of buildings, maintenance temporal works on construction fields, which is basically the group of interest for this study. Sold production of this subsector was 3364 million PLN in 2015 and was lower by 13.1 % lower than 2014. Meanwhile the number of companies that construct buildings in the sector has grown by 1.4 % to 37.4 % while other companies (like specialist construction, water and land engineering) has decreased. This means that the demand for building new dwellings and rehabilitation of existing ones is quite stable in comparison to other more specialized types of construction that usually require large investment money.

Basically there three types of relatively big companies in construction and building market in Podkarpackie region:

- Developers – companies specializing In construction of residential buildings, very often whole residential estates of cities. These are both block of flats, individual houses as well as all accompanying infrastructure (garages, service facilities, pavements, inner roads, playgrounds etc.). The biggest developers operating in the region are:
 - BESTA Przedsiębiorstwo Budowlane Sp. z o.o. - BESTA Construction Company Ltd. has been operating in the construction market since 1991 within POLSERVICE Capital Group.

BESTA is a modern company with large technical and personal potential. At the moment the company employs more than 400 people on the territory of Poland and abroad (Germany, Holland, Slovakia) In 2009 the company registers development activity. The company's branches are located in Germany, Holland and Slovakia. In the customers' opinion BESTA is regarded as a perfectly organized and reliable company which realizes its tasks on time and in a competent way with the use of modern technologies and according to high quality standards. The above mentioned advantages influenced the significant increase in the number of home and overseas customers as well as BESTA's position on the construction market, and in consequence resulted in the company's economic success. The company's main fields of business are:

- general contractor in the process of complex realization of building objects
- construction of building shells of objects, i.e. reinforced concrete works, brickworks
- repairs and modernizations of building objects.
- construction of multi-family apartment buildings in full scope of works together with external infrastructure,
- construction, repairs and modernization of industrial facilities, manufacture halls in reinforced concrete structure and steel structure,
- construction, repairs and modernization of public utility facilities, e.g. offices, schools, hotels, health service facilities, multi-storey underground and overground garages,
- construction of commercial and service facilities, including car exhibition rooms,
- realization of industrial floors.

Sample current projects in Poland:

Complex of multi-family residential buildings with underground garage and service premises and land development, exit roads and infrastructure (Warsaw)

Extension and alteration of the existing production facilities in Zakład Produkcji i Dystrybucji Leków Sanofi Aventis Sp. z o.o. (Rzeszów)

Housing estate „Marcinowe Wzgórze" /"Marcin's Hill"/ - Rzeszów
Apartment building in Rzeszów.

The company builds also in Germany, Holland, Slovakia and Czech Republic

- HARTBEX Przedsiębiorstwo Budowlane Sp. z o.o.
The company which specializes in development of housing and accompanying facilities, offices as well as industrial objects. It exists for 23 years. HARTBEX implements new solutions in buildings that it constructs, some of them connected with energy efficiency. It builds not only in Podkarpackie but in whole Poland and abroad, in Germany.
- PPHU CORPORES Sp. z o.o.
The company is mostly developer of residential buildings and estates. It exists since 1989. Corpores fields of activities are Podkarpackie region, Kielce and Warsaw, where it has its branch offices.
- Manufactures of supplies and materials for construction sector. These are production companies that specialise in different elements that are necessary in case of construction of new buildings, but which may be also used in case of refurbishment of existing buildings. The companies mentioned below produce not only for local or home market but they also export abroad:
 - Greinplast sp. z o.o. – produces thermal insulation systems and paints.
The company was established in 1997 and it is located in Krasne, which are suburbs of Rzeszów. Its offer covers among others: Facade paints, Facade plasters, Interior paints, Internal decoration systems, Adhesives for tiles, Masonry mortars, Plaster mortars, Screeds, Hydro-insulations, Gypsum

plasters and adhesives, Surfacers and gypsum finishing coats, Primers and priming preparations, Cleaning preparations and impregnants, External decoration systems, Facade cladding systems, Sealants, Polyurethane foams, cleaners, Adhesives for thermal insulation system. Among regular clients there are a lot of construction, construction and renovation companies, as well as a large number of individual investors from Poland and from abroad.

- Vidok sp. z o.o. – is one of the leading manufacturers of window and door frame woodwork.

The company was founded in 1993 and it is located in Rudna Mała, in the suburbs of Rzeszów. It is not only producer of PVC, wood and aluminium products (windows, frames, doors and other like roller blinders, vertical blinders, door roofing etc.) but also has its own outlets located in Podkarpackie and also throughout Poland with teams of certified installers.

- Śnieżka sp. z o.o. – one of the biggest producers of indoor and outdoor paints. ŚNIEŻKA Paints and Varnishes Plant Joint-Stock Company concentrates its activity in the area of emulsion paints (thinned with water), oil and phthalic paints (solvent paints), and putty substances. The Company offers a wide range of high quality paints and varnishes, at the same time providing its Customers with assistance in the implementation and application of its products. The company specialises in paints for walls and ceiling, facade coats as well as for wood and metal.

It is estimated that the Company has a 28% share in the Polish market of emulsion products in terms of quantity which gives it the leading position in this market segment, equal with Polifarb Cieszyn-Wrocław.

The main market on which the Company places its products is the Polish market. The Company has the strongest position in southern and central parts of the country which results from historical and geographical conditions. However, in the development strategy consistently undertaken by Śnieżka, including the development of a distribution network, cooperation with cross-regional wholesalers and chains of wholesalers, the Company is strengthening its position in all important economic centres across Poland. In the coming years the Company is going to redress the balance of its presence in particular local markets.

The Company mainly provides its products to the individual purchasers market. A much smaller number of products goes to industrial customers. In both cases, distribution takes place through indirect distribution channels (wholesalers, sub-wholesalers, plant warehouses, trading chains, and retail outlets). Particular distribution levels can service the same target groups, however businesses and institutions make purchases mainly in wholesales and sub-wholesales where the widest range of the Company products is offered.

The Company strategy is to successively acquire new sales markets. Currently, the Company exports its products mainly to East European countries (Ukraine, Belarus, Lithuania, Russia, Moldavia). The Company forecasts a further growth of its presence on current markets and extending sales markets to other countries.

- Wholesale and retail building materials. There is one big trade company that specialises in wholesale and retail of materials for construction sector. It has regional reach and is used by both developers and individuals who build/refurbish their houses. The company name is Rzeszowska Centrala Materiałów Budowlanych S.A.

It is owner of trademark MAJSTER which is a network of building supplies and material trade markets. The chain covers most of bigger cities in Podkarpackie region together with neighbouring regions (Lubelskie, Świętokrzyskie and Małopolskie).

There is also an active construction cluster (Świętokrzyski-Podkarpacki Construction Cluster “Innowator”) <http://www.klaster-innowator.pl/> – with 24 participating bodies from Podkarpackie region (including companies, vocational training association and Technical University of Rzeszów). Whole list of cluster partners is available here: http://www.klaster-innowator.pl/pl/baza_firm However, most partners in the cluster are companies located in Świętokrzyskie Voievodship, and some also in Lubelskie or Mazowieckie. The cluster aims to create and facilitate mechanisms that allow better transfer of knowledge and innovation in construction, implementation of newest solutions and decrease of operational costs thanks to cooperation of cluster participants.

Another cluster that is to some respect connected with construction sector, especially in context of in energy efficiency in buildings, i.e. Podkarpacki Cluster of Renewable Energy that develops concept of Inteligentne Eko-Osiedle 2020 (Intelligent Eco-Residential Estate) 2020 <http://ieo2020.pl/> Its aim is development of energy and resources efficient residential estate in Rzeszów, to which purpose it needs different skills and knowledge – from academic and scientific through innovation to practical solutions.

However, most of the companies operating in the construction sector are small, and average employment rate is very low, as presented in the table below.

Table 7. Number of companies and employed in construction sector

budownictwo		2012	2013	2014
Companies	number	9906	9817	10511
Employed	person	36076	35039	38475
Employed per company	person	3,6	3,6	3,7

Source:

<http://swaid.stat.gov.pl/Dashboards/Dane%20dla%20jednostki%20podzia%C5%82u%20terytorialnego.aspx>

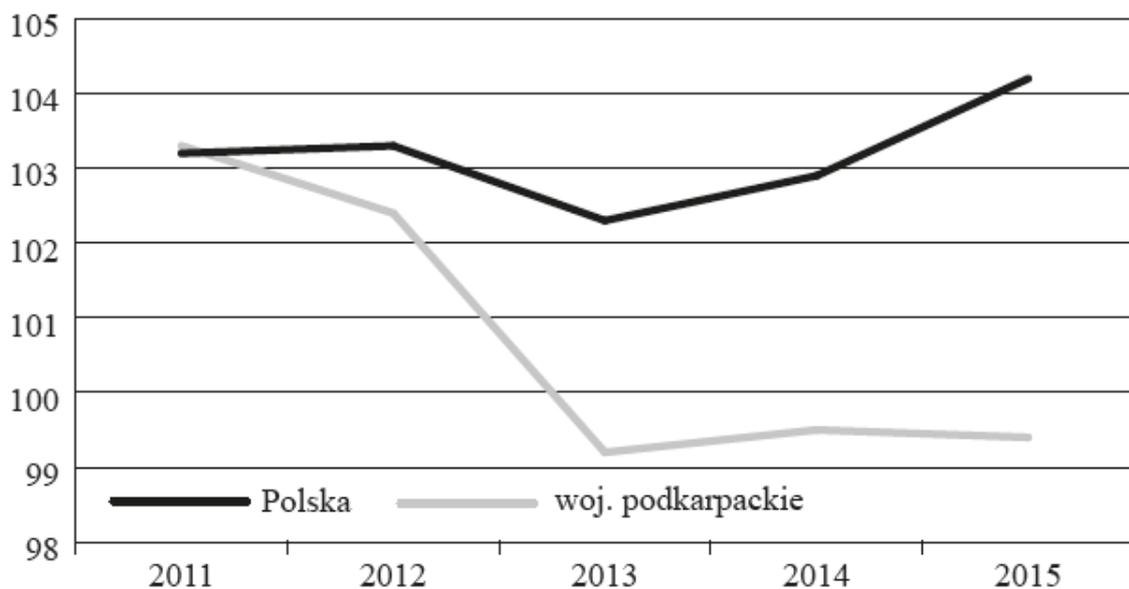
The companies suffer from lack of stable employment. It rises in building season (starting from spring through summer till autumn) and decreases in winter. Most of these companies are self-employed people with only one or two workers. They mostly specialize in construction of individual houses and refurbishments. They also often work as subcontractors for bigger companies.

1.8 Professional Characterization (Labour)

In general Podkarpackie is suffering decrease of employment in industry. The trend is even more visible when compared to Poland as a whole. It has multiple reasons – lower salaries (in comparison to other regions in Poland), which causes internal (within Poland) and external (outside country) emigration, economic crises and weakness of internal (i.e. regional) market.

In case of construction, which in statistical terms is a subsector of industry, average employment rate in percent comparing to former year (where the former year is 100%) in 2014 the rate was 94.7 % and in 2015 only 92.4 %. Total number of people working in Podkarpackie region in construction sector for 2015 was 17.7 thousand.

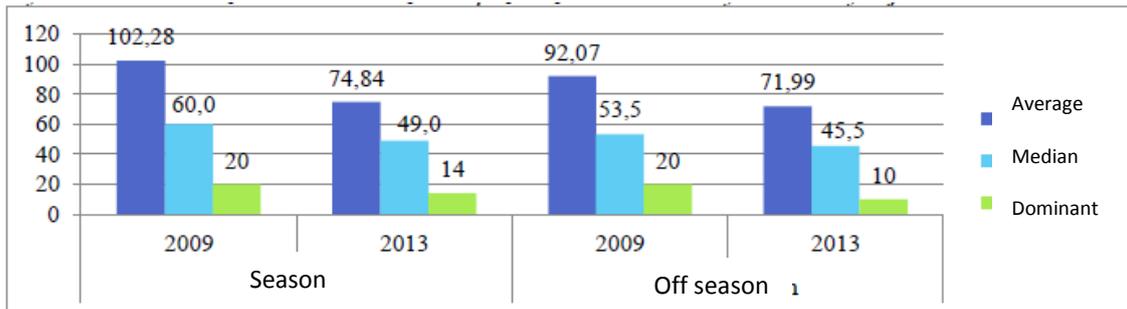
Fig. 6. Dynamics of average employment in industry sector (2010 = 100%)



Source: *Raport o sytuacji społeczno-gospodarczej województwa podkarpackiego w 2015 roku (Social-economic status report for Podkarpackie region in 2015)*, Statistical Office in Rzeszów, 2016

The employment during construction season (spring – autumn) is higher than off season, which means that there is some percentage of seasonal workers. However, the existing statistics does not show all important trends relating to labour itself. It rather concentrates on overall economic situation. On the other hand important information can be retrieved from a study that was commissioned by Regional Labour Office in Rzeszów in 2014. The data reported below is based mostly on this study.

Fig. 7. Employment rate in construction companies (sample 600 companies) in season and off season (2009 and 2013)

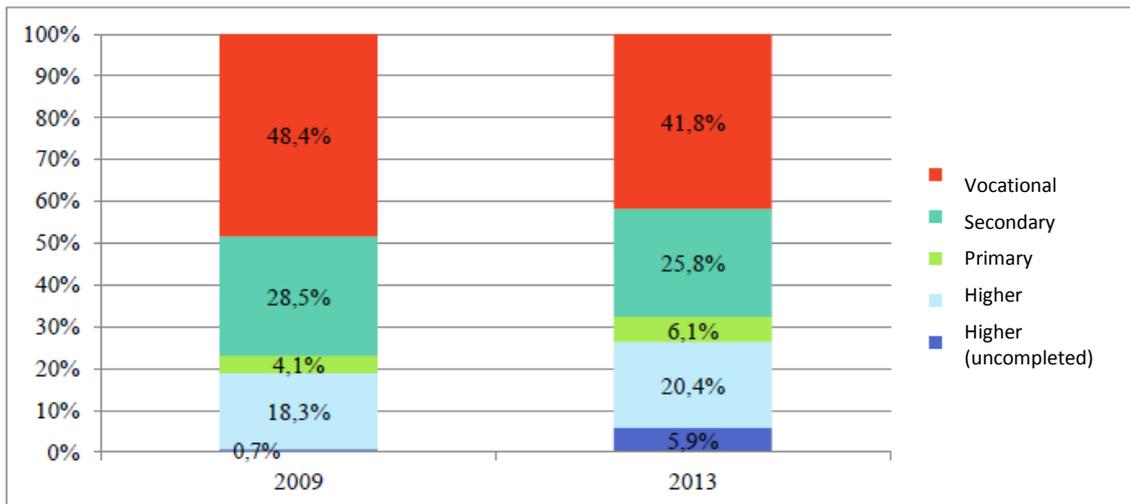


Source: *Branża budowlana w województwie podkarpackim, Analiza porównawcza wyników badań w latach 2009 i 2013 (Building sector in Podkarpackie Voivodship. Comparative analysis of research outcomes in years 2009 and 2013), Wojewódzki Urząd Pracy w Rzeszowie, Rzeszów 2013*

The highest percentage of workers in the occupational structure of construction companies in Podkarpackie is represented by representatives of typical executive positions relating to the work on construction sites (2009: construction workers doing finishing work and related tasks (14.9%), ironworkers (13.8%) and operators of machinery and equipment and vehicle drivers (12.4%). In 2013 general employment was dominated by: workers doing shell works and related workers (16.3% of the employed), construction workers doing finishing works and related tasks (13.5%) and casual workers in general construction (13.1%).

The highest percentage of workers in the construction industry are the representatives of the manual labour, so the distribution of workers according to the level of education is dominated by people with vocational education (2009 - 48.4% 2013 - 41.8%). Still only a small percentage of people in the construction industry possesses higher education (including: 2009 - 19.0% 2013 - 26.3%).

Fig. 8. Structure of education in construction sector in Podkarpackie region (comparison 2009 – 2013)



Source: *Branża budowlana w województwie podkarpackim, Analiza porównawcza wyników badań w latach 2009 i 2013 (Building sector in Podkarpackie Voivodship. Comparative analysis of research outcomes in years 2009 and 2013), Wojewódzki Urząd Pracy w Rzeszowie, Rzeszów 2013*

The professional characterisation of people working in construction sector is presented below (percentage, 2013)³:

Finishing works workers	13.5 %
Shell building workers	16.3 %
Machine operators and drivers	6.8 %
Office and administrative staff	8.4 %
Managerial staff	4.9 %
Supportive workers (simple manual works)	13.1 %
Installation and networks fitters	7.1 %
Bricklayers and alike	2.9 %
Construction engineers	5.2 %
Other specialists (e.g. ITC)	2.4 %
Other shell works workers	2.5 %
Carpenters, joiners and alike	1.3 %
Construction technicians	4.4 %
Concreters	1.9 %

³ Based on: *Branża budowlana w województwie podkarpackim, Analiza porównawcza wyników badań w latach 2009 i 2013 (Building sector in Podkarpackie Voivodship. Comparative analysis of research outcomes in years 2009 and 2013), Wojewódzki Urząd Pracy w Rzeszowie, Rzeszów 2013*

Other finishing works workers 1.0 %

According to surveyed business owners from the first and second wave of the study quoted above, the employment situation in surveyed companies is suitable for existing demand (2009 - 83% 2013 - 84%). The study indicates also that most contractors realise the need for improving qualification by current employees (total of "definitely yes", "yes" and "probably yes": 2009 - 86% 2013 - 60%). According to them employees should be involved most of all in vocational training related to the construction industry (88.3%). At the same time, employers are the least interested in sending employees of their companies to the so-called "soft" skills trainings (2013 - 30%). This may be partially due to the enormous number of the ESF founded trainings available free of charge (or almost free of charge) during years 2007 – 2013. But despite the apparent lack of interest shown by employers in relation to sending their employees to so-called "soft" trainings and their opinion as if completion of this type of training supposedly was not valuable in the construction industry, within four years (i.e. the time elapsed between the first and the second edition of the study) the employees' interest in trainings not associated with the construction industry and "soft" skills training has increased. It must be added that 14% of employers (among those who see the need to improve qualifications of employees) in stated that they had not raised the qualifications of employees yet. As to the employees themselves the analysis of the survey showed that in 2009 47.2% were rather or definitely planning to take part in training / skills enhancement courses, and in 2013 the will to embark on this type of initiative was declared by 55.2%. In both editions of the study respondents were mainly interested in courses related to the construction industry.

Already in 2009 the dominant form of training for workers was sending them to external trainings organized by expert companies (2009 - 72% 2013 - 40%). But nowadays very few employers choose this form of training for their employees, currently the vast majority of respondents (2009 - 60% 2013 - 68%) train their employees in-house through regular work.

Comparing the results of the study carried out among the employees of the construction industry it can be seen that in 2009 the percentage of respondents declaring that over the past two years they had raised qualifications was higher than in 2013 (37.8% and 22.8% respectively).

Overall the labour in construction and building industry is slowly changing its structure towards more professional in terms of education, though it suffers from market instability. Although energy efficiency issues, especially connected with insulation of buildings is known and applied, mostly thanks to public tenders for energy rehabilitation of public buildings that have been made for several years due to support schemes both from the EU and national funds, the sector still lacks some deeper knowledge of energy efficient solutions and know-how.

1.9 Preliminary Best Practices

1. Comprehensive use of renewable energy sources in the Community Center Association "Emmaus-Rzeszów"
2. The expansion of energy infrastructure at The University of Law and Public Administration using renewable sources of energy
3. PODKARPACKIE ACADEMY CERTIFICATION
4. Podkarpackie Transfer Center Low Energy Technology in Construction

1.10 References

Regional Innovation Strategy of the Podkarpackie Voivodeship for smart specialization (RIS3) 2014-2020, Urząd Marszałkowski Województwa Podkarpackiego w Rzeszowie i Politechnika Rzeszowska, Rzeszów 2015

Branża budowlana w województwie podkarpackim, Analiza porównawcza wyników badań w latach 2009 i 2013 (Building sector in Podkarpackie Voivodeship. Comparative analysis of research outcomes in years 2009 and 2013), Wojewódzki Urząd Pracy w Rzeszowie, Rzeszów 2013

Analiza wpływu sektora budownictwa mieszkaniowego na gospodarkę Polski. Analysis of housing construction sector influence on Polish economy. PwC, Warszawa 2015

Regional Operational Programme of Podkarpackie Voivodeship for 2014 – 2020, Urząd Marszałkowski Województwa Podkarpackiego w Rzeszowie, Rzeszów 2015

Podręcznik typologii budynków mieszkalnych z przykładami działań mających na celu zmniejszenie ich energochłonności (Manual of typology of housing buildings with sample actions to decrease their energy consumption), Tabula IEE Project, NAPE, Warszawa 2011

Krajowy plan mający na celu zwiększenie liczby budynków o niskim zużyciu energii (National plan aiming to increase number of low Energy buildings), Rada Ministrów, Warszawa 2015

Wpływ na rynek pracy programu głębokiej modernizacji energetycznej budynków w Polsce. Raport końcowy (Influence of deep energy rehabilitation of buildings programme on labour market in Poland. Final report), European Climate Foundation, Budapest 2012

Statistical queries:

Regional Statistical Office <http://rzeszow.stat.gov.pl>

Central Statistical Office: <http://stat.gov.pl>

Local Data Bank of CSO: <http://bdl.stat.gov.pl>

2 SWOT Analysis

General remark considering SWOT analysis: the analysis was performed with mixed procedure with first step basing on the BUILD2LC workshop with stakeholders who provided their diagnosis and expressed needs. On a later stage the diagnosis was structured and further developed to make it more accurate. Some missing elements were also added.

2.1 Strengths

Main strengths of the region:

- Growing share of construction sector in regional GDP
- 12 advanced laboratories for vocational training located at secondary schools. The schools are located in different parts of the region and some of them represent
- Faculty of Civil and Environmental Engineering and Architecture at the Rzeszów University of Technology. It provides courses and specialisations in Civil Engineering:
 - Building and engineering structures
 - Computer aided design and theory of structures
 - Bridge building and maintenance
 - Road construction
 - Urban building engineering
 - Building engineering and shaping the greens
 - Marketing in building engineering and building objects realization

As well as Environmental Engineering:

- Water conditioning
- Sewage treatment and waste materials utilisation
- Water supply and sewage disposal
- Heat engineering and air conditioning
- Alternative sources of energy
- Infrastructure and eco-development

Rzeszów University of Technology is well equipped with modern laboratories and has highly skilled and experienced researchers and scientists

- Clustering activities: active construction cluster (Świętokrzyski-Podkarpacki Construction Cluster "Innowator") <http://www.klaster-innowator.pl/> – with 24 participating bodies from Podkarpackie region (including companies, vocational training association and Technical University of Rzeszów. Apart from this cluster there are also other clusters that partially are engaged in energy efficiency in buildings, e.g. Podkarpacki Cluster of Renewable Energy that develops concept

- Inteligentne Eko-Osiedle 2020 (Intelligent Eco-Residential Estate) 2020
<http://ieo2020.pl/>
- Well-developed IT sector, with established companies such as Asseco
<https://pl.asseco.com/en/> - which is the largest Polish IT group (with many branches abroad). The potential can be used to develop new smart solutions for energy management systems in buildings.
 - Presence of some big building developers – experienced companies with strong financial background:
 - BESTA Przedsiębiorstwo Budowlane Sp. z o.o.
 - HARTBEX Przedsiębiorstwo Budowlane Sp. z o.o.
 - PPHU CORPORES Sp. z o.o.
 - Presence of manufacturing companies producing for construction sector:
 - Greinplast sp. z o.o. – produces thermal insulation systems and paints
 - Vidok sp. z o.o. – is one of the leading manufacturers of window and door frame woodwork.
 - Śnieżka sp. z o.o. – one of the biggest producers of indoor and outdoor paints.
 - Presence of big wholesale and retail building materials trade company - Rzeszowska Centrala Materiałów Budowlanych S.A.
 - Presence of some architect studios that offer low-energy and passive building projects.
 - Financial mechanism within Regional Operational Programme that supports deep thermal valorization of buildings.

2.2 Weaknesses

- Podkarpackie is one of the poorest region in Poland in terms of GDP per capita and due to predominance of people living in the country to urban population which combines with very small farms (less than 3 ha) income level is low, resulting in threatening with energy poverty (especially in rural communities).
- Low incomes of region inhabitants, which results in insufficient financing for refurbishment.
- Lack of sufficient regional and local policy measures supporting development of energy rehabilitation of buildings.
- Insufficient knowledge among professionals about energy efficient solutions in buildings.
- Large number of companies in construction sector (10511) but very small in size (overall 38475 workers, 3.7 worker per company in average according to CSO data for 2014). Large number of workers work only during construction season (spring – autumn) and they are hired only for the season. It results in lack of sufficient

professionalization (in terms of low energy construction) of the workforce. The problem is especially with small companies.

- Lack of interest of professionals in trainings.
- Lack of accessible and simple financial support schemes for private house owners
- Large number of private houses and block of flats requiring thermal modernisation
- Insufficient knowledge of stakeholders on low energy buildings, especially in context of old buildings' refurbishments. Stakeholders include: house owners, construction and development companies, financial schemes managerial bodies etc.
- No energy management systems in buildings nor awareness about them (especially in public bodies)

2.3 Opportunities

- Potential availability of financing from both Structural Funds and national sources
- EU regulations promoting energy efficiency in buildings.
- Affordable financial schemes better suited for house-owners
- Increasing role of co-operation between R&D institutions based in Podkarpackie and construction sector
- Growth of existing big companies – with better trained staff and knowledge of low-energy building
- Changes in both energy and building material markets resulting in better profitability of energy rehabilitation of buildings.
- Growing environmental awareness of people.
- Shift of habit patterns towards less energy-consuming and more environment oriented ones.
- Development of new and inexpensive materials for insulation

2.4 Threats

- Legal system instability. Regulations regarding energy efficiency and renewable energy sources are changing.
- Confusing policy towards small-scale RES implementation (implementation of law with supporting schemes – feed-in tariffs and changing them drastically after a year, turning them almost unprofitable).
- Decreasing number of vocational schools.
- Climate change resulting in deep shift of building energy usage patterns.
- Decreasing profitability of construction and building sector due to overcompetitive market; depreciation of capital expenditures, decreasing number of net profit-

making companies. It causes companies to struggle for survival and not for development. It is especially true for small companies.

- Deep thermal modernisation of buildings not cost-efficient due to high cost of necessary elements (professionals, technologies, materials) – therefore no interest in such rehabilitation on the part of house owners.
- Long and complicated building procedures.
- Raising costs of labour and of building materials, especially regarding energy efficient building solutions.
- Stricter building envelope rules not followed by financial incentives that support implementation of the changes.
- Lack of sufficient knowledge of energy consumption in buildings resulting in lack of interest in energy rehabilitation of buildings.

3 Needs

- Need for incentives to strengthen SMEs in construction sector
- Better suited financial schemes – simpler, more accessible
- Support schemes for individual persons, with grants
- More money for financial schemes
- Clear regulations supporting energy rehabilitation of buildings
- Establishment of regional energy efficiency plan covering issues of buildings both old and new
- Simpler and shorter building permits procedures
- Education and promotion for house owners
- Strengthening vocational education especially in building sector to adjust it to the needs of market changes
- Implementation of energy management systems
- Development of co-operation of R&D institution with companies sector
- Better recognition of energy poverty issues and preparation mitigation measures