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ENERGY SECURITY IN REGIONAL POLICY IN WIELKOPOLSKA REGION OF POLAND

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ABSTRACT: The global economy taking into account civilizational changes will be shifting in the twenty-first century to low-carbon development path. Poland also is heading in this direction, both as a member of the international community and the European Union state abiding energy and climate regulations. Basing on energy balance and strategic energy technology more and more often in the country / region energy security issues power market becomes visible. It shapes the conditions of market economy and contributes to its development. Article refers to the Wielkopolska Region and market analysis capacity (for the years of 2005 to 2013) installed here and the prospects for its development. This affects the energy security and localization of business activities of enterprises.

KEYWORDS: strategic energy technologies, energy market, the balance of power in the region, energy consumption, energy production, energy diversification.

Introduction

The Wielkopolska Region (also known as Greater Poland Voivodeship, Wielkopolskie Voivodeship or Wielkopolskie Province) located in the central-western part of Poland. It is the second largest and third most populated region with the area of 29,826.5 km^2, which represents 9.5% of the country. The greater part of its area – about 65% consists of agricultural, then forests and forests with shrubs – 26.7%. Only 5.2% of its area is built-up and urbanized land (as of 1.01. 2013 Statistical Office in Poznań).

The administrative structure of the Wielkopolska Region shape 35 districts, including 31 rural districts and 4 cities and towns: Poznań, Leszno, Kalisz and Konin. The smallest administrative units are 226 municipalities, including 19 urban, 90 rural-urban and 117 rural. There are 109 cities in the voivodship – the largest number in Poland as well as 5,456 rural municipalities (Voivodeship. Subregions – the districts – the municipalities in 2013, the US in Poznań, 2013; Pająk, Ziomek, Zwierzchlewski, 2013).

Rural areas in the Wielkopolska Region cover an area of 28,335 km^2, which represents 95% of its surface. Rural settlement network consists of 3,851 villages, 117 of them are rural municipal centers. These areas have a population of 1,531.5 thousand people representing 43.9% of the total number of inhabitants of the province and 10% of rural areas of the country (Greater 2013-2020 Rural Renewal, Office of the Marshal of Wielkopolska 2013). 64% of rural population is of working age and the number of people working in the country is over 620 thousand. It remains at a similar level in recent years. The vast potential of human resources in the region is a prerequisite for the development of new economic activities in rural areas, including renewable energy.

Farmers in the Wielkopolska Region work on an area of 1,939.3 thousand hectares, of agricultural land, which accounts for 65% of the whole province. In 2013, 1,475.1 thousand hectares, was a sowing area. Nearly 1.23% of farmland in the Wielkopolska Region is occupied by orchards, and less than 14% by permanent meadows and pastures (GUS 2013). In addition, farmers in the region carry the highest in Poland agricultural production, occupying leading positions in crop production and livestock. They also excel on the country level in the collection of cereals (15.5% of the harvest in Poland), sugar beet (23%) and outdoor vegetables (14.1%), whose acreage is significant on a national scale. Greater agriculture also has a dominant position in the production of animals for slaughter – 20.5% nationally. Participation in cattle production is 22.2% and 24.1% in pigs. In addition, the region pro-

duces the highest in Poland number of poultry chicken and chicken eggs, which shares in the country amounts to 27.7% sequentially and 33.1% (Yearbook of agriculture, GUS 2014). A high percentage of arable land and a large crop and animal production in the region provide excellent conditions for the use of biomass energy. In 2013 around 123,228 agricultural holdings were located in the Wielkopolska Region (GUS 2014). More than 76% of them are holdings of up to 10 hectares, so the small-area and not the strongest economically ones. Only 0.93% of farms were large holdings (Local Data Bank in 2014).

The Wielkopolska Region has the largest number of cities in Poland. According to GUS data from 2013. 109 cities, representing 13.1% of all cities in the country are located here. It is inhabited by a total of 1,920.1 thousand people or 8.23% of the urban population of the country. The region's urbanization level measured by the share of urban population in the total population of the region is 55.5%. Compared to other provinces this percentage is relatively low, as compared to the average of the country, which has a value of about 60.6%. The low level of urbanization of the Wielkopolska Region comes from the presence of small towns up to 20 thousand residents on its territory. Average number of inhabitants is almost 17,616 people, one of the lowest rates compared to the average of the country being placed at the level of 25,701 people (Area and population in territorial in 2013, CSO 2013).

Greater settlement network creates a hierarchical system, and its largest conurbation is Poznań. Due to the significant role in the Polish settlement system and socio-economic contribution to the processes of development, the city gained the status of metropolitan center. Its significant contribution to socio-economic and cultural life of the region is mostly due to the population potential as well as the economic, and scientific ones. This resort in conjunction with the district of Poznań creates an area which is home to the most intense urbanization processes in the whole region. Poznań is therefore a key element of the spatial structure of the Wielkopolska Region and together with functionally interdependent environment creates Poznań Metropolitan Area. This area is considered the most important generator of growth for the whole region, bringing together the largest part of the development potential and providing the competitive potential of the region. Evidence of this are high growth rate in economics, investments, science, technology, and social and cultural life (Report on the development and growth of the Wielkopolska Region in 2010, Wielkopolska Spatial Planning Office, 2011; Board of the Wielkopolska voivodship, Wielkopolski Regional Operational Programme 2007-2013, The detailed description of the priorities of the Operational Programme).

The consumption of electricity and heat in the Wielkopolska Region in the years 2005-2013

The energy consumption of heat and electricity in the Wielkopolska Region is a derivative of many factors related to local government, level of industrialization, population of the region, its labor market and the processes urban development. Total electricity consumption each year is on average about 10.8-11 GWh. Detailed calculations by industry is presented in table 1.

From the data in table 1 the indication is that in the Wielkopolska Region there is a significant on a national scale electricity consumption. Especially high percentage of the transport sector, agriculture, mining and quarrying. On the other hand quantity the biggest consumers of electricity and heat are industrial and construction industries and households. Worth noting is that in these sectors lie at the same time greatest opportunities to save energy and heat, thereby reducing the amount of CO2 emissions.

The largest heating networks in the Wielkopolska Region are located in Poznań, Kalisz, Konin, Leszno and Piła. The average annual heat sales are almost 21,262 TJ. In detail is presented in table 2.

Table 1. Consumption of electricity in the Wielkopolska Region in 2013

L.p.	Specification	Province (voivodship)																Total
		dolnośląskie	kujawsko-pomorskie	lubelskie	lubuskie	łódzkie	małopolskie	mazowieckie	opolskie	podkarpackie	podlaskie	pomorskie	śląskie	świętokrzyskie	warmińsko-mazurskie	wielkopolskie	zachodnio-pomorskie	
1	Total consumption	12,874	7,429	5,559	3,306	11,644	12,459	22,970	4,781	5,065	2,754	7,229	25,078	4,590	3,515	11,287	5,848	146,390
1.1	Own consumption in power plants and thermal-electric power station (including power plants of heating boilers)	1,359	138	46	77	3,484	516	1,955	550	164	67	213	2,940	691	23	1,240	642	14,104
1.2	Own consumption in heat plants	15	15	16	0	16	14	23	8	9	19	16	31	9	23	28	31	272
1.3	Mining and quarrying	2,097	34	273	41	1,218	328	13	38	51	32	17	3,931	63	11	593	12	8,754
1.4	Industry and construction	3,368	3,573	2,378	1,383	1,951	4,318	8,297	1,953	1,849	790	2,700	7,390	1,879	966	3,289	1,834	47,918
1.5	Water supply, management of waste	292	130	70	63	143	215	389	54	79	69	146	488	50	97	206	141	2,631
1.6	Transport	281	169	116	100	353	288	849	99	75	89	329	469	126	61	475	227	4,104
1.7	Small final customers sector	5,462	3,371	2,659	1,642	4,479	6,781	11,444	2,079	2,838	1,689	3,809	9,829	1,772	2,334	5,457	2,963	68,607
1.7.1	Agriculture (only use for production purpose, without consumption in households of farmers)	103	79	70	41	96	114	243	58	55	49	92	153	35	87	207	57	1,539
1.7.2	Residential (with consumption in households of farmers)	2,119	1,435	1,392	718	1,906	2,631	4,587	810	1,186	862	1,774	3,556	754	990	2,567	1,155	28,442
1.7.3	Others	3,241	1,858	1,198	883	2,477	4,036	6,615	1,210	1,597	777	1,943	6,119	982	1,256	2,684	1,751	38,626

Source: GUS 2014: Consumption of fuels and energy carriers in 2013, Warsaw, p. 13.

Table 2. Heat consumption in the Wielkopolska Region comparing with other regions

L.p.	Specification	Province (voivodship)																Total
		dolnośląskie	kujawsko-pomorskie	lubelskie	lubuskie	łódzkie	małopolskie	mazowieckie	opolskie	podkarpackie	podlaskie	pomorskie	śląskie	świętokrzyskie	warmińsko-mazurskie	wielkopolskie	zachodnio-pomorskie	
1.	Total consumption	23,592	43,324	28,556	9,693	21,717	33,347	103,860	17,799	13,164	11,948	37,218	45,521	7,455	12,649	29,405	22,744	461,994
1.1	Industry and construction	6,853	31,146	18,815	4,194	4,901	19,585	66,525	13,073	6,011	4,777	23,019	15,491	1,948	4,452	14,257	11,959	247,005
1.1.1	in which of own production	4,816	30,447	18,235	2,657	3,509	17,036	61,162	9,523	4,610	4,341	21,671	10,727	1,620	4,243	10,276	8,429	213,301
1.2	Transport	94	81	57	6	121	122	781	34	36	39	205	180	24	21	103	86	1,989
1.3	Small final customers sector	16,645	12,096	9,685	5,494	16,695	13,641	36,554	4,692	7,118	7,132	13,995	29,850	5,483	8,176	15,045	10,700	213,000
1.3.1	Agriculture	402	-	-	-	191	86	-	-	69	242	-	-	-	10	-	-	1,000
1.3.2	Residential	13,485	10,043	8,040	4,561	13,702	11,252	30,347	3,896	5,851	5,720	11,617	24,781	4,551	6,780	12,490	8,882	176,000
1.3.3	Others	2,758	2,054	1,645	933	2,802	2,302	6,207	796	1,197	1,169	2,377	5,069	931	1,386	2,556	1,817	36,000

Source: GUS 2014: Consumption of fuels and energy carriers in 2013, Warsaw, p. 13 and next.

Power lines setup in the Wielkopolska Region

In the Wielkopolska Region national transmission grid system consists of the lines of 400, 220 and 110 kV, and of an extensive system of electric substations and transformers. These objects are important elements of the transmission network, they also allow for transferring of the substantial power from the power plant. The electricity in the region is transferred via a distribution network of stations 400/220/100 and 220/110 kV. The main energy producers in the region include:

- Pątnów Power Stations Groups I and II – Adamów-Konin SA (ZE PAK), having about 14% share of the Polish electricity market and the second largest domestic producer of electricity manufactured from lignite. The total installed capacity of ZE PAK is 2,734 MW, which represents about 12% of national power.
- Dalkia Poznań ZEC – electrical power and heating stations Karolin and Garbary in Poznań; total thermal energy produced amounts to 979 MW, electrical one to 276 MW.
- Power Station Kalisz – Piwonice, generating 106 MW of thermal power and 7 MW of electric power, Energy Poznań, Zakład Elektrowni Wodnych Sp. z o.o. – a team of 5 hydroelectric power stations on the Gwda river (Podgaje, Jastrow, Ptusza, Dobrzyca, Kosice) with a total power of about 30 MW (Wielkopolska Spatial Planning Office in Poznań in 2010; Pająk, 2015, Pająk, Kvilinskyi, Fasiecka, 2016).

Energy Infrastructure in region includes grid operated by three companies:

- PSE Zachód SA with its corporate seat in Warsaw (West Branch in Poznań) managing the high voltage electricity network of 400 kV and 220 kV.
- Grupa Energetyczna ENEA SA, managing electricity network in the subregions of Piła, Poznań and Leszno.
- Energetyka Kaliska SA, a Energa Group company managing electricity network in the area of Konin and Kalisz subregions (Greater Regional Action Plan on Sustainable Energy in the field of renewable energy sources and energy efficiency, Marshal Office of the Wielkopolska Region, 2011).

The state of the region's energy infrastructure is unsatisfactory, both qualitatively and quantitatively, which can lead to risks in the supply of energy and fuel. Especially medium and low voltage power lines indicate insufficient technical condition, mostly in rural areas (Executive Board of the Wielkopolska Region in 2014) requiring modernization and reconstruction.

Further development of electricity transmission systems as well as expansion and improvement of the functioning network is necessary in order to increase energy security and reduce energy losses in transmission and distribution. Priority in the development of renewable energy sources is also building a smart energy networks to enable reception of energy from microgeneration and development of electricity prosumption (Smart Gird), (Wind energy in Poland, TPAHorwath, 2013; Power market, 2015; Niedziółka, 2010).

Table 3. Power lines setup in the Wielkopolska Region, 2005-2013

Installed capacity of electricity and heat [kW]									
	2005	2006	2007	2008	2009	201	2011	2012	2013
The meter for Wielkopolska Region	3,091,400	3,085,700	3,082,000	2,908,800	2,858,000	3,035,200	3,057,600	3,101,900	3,270,100
Population numer in Wielkopolska Region	3,372,417	3,378,502	3,386,882	3,397,617	3,408,281	3,446,745	3,455,477	3,462,196	3,467,016
The meter per capita in Wielkopolska Region	0.9167	0.9133	0.91	0.8561	0.8385	0.8806	0.8849	0.8959	0.9432
The meter for Poland	35,404,900	35,714,700	35,844,800	35,596,400	35,762,300	36,058,200	37,595,200	38,203,400	38,654,100
Population number in Poland	38,157,055	38,125,479	38,115,641	38,135,876	38,167,329	38,529,866	38,538,447	38,533,299	38,494,659
The meter per capita in Poland	0.9279	0.9368	0.9404	0.9334	0.937	0.9359	0.9755	0.9914	1.0041

Source: Own work on the basis of the data of GUS (Central Statistical Office); www.stat.gov.pl [20-08-2016].

Content analysis of Table 3 shows that the installed capacity of electricity generation and heat is increasing in recent years. For the Wielkopolska Region, metered energy consumption for specified period increased by 178,700 kW, while for Poland by 3,249,200 kW. Increase of power in the region grew by 5.78% while in the country by as much as 9.17%. A significant decrease in the total installed capacity between 2007 and 2008, which amounted to almost 173,200 kW is also worth mentioning. Another positive phenomenon associated with economic development is the fact that in the years 2005-2013 the metered consumption per capita both in the Wielkopol-

ska Region and in the country was consequently growing. In the Wielkopolska Region it increased from 0.9167 to 0.9432 kW per capita. The same dynamics is observed in Poland, where the meter of 0.9279 kW per capita in 2005 rose to 1.0041 kW in 2013. The growth rate of the test meter standalone basis for the Wielkopolska Region amounted to 2.89% and 8.21% of annual consumption in Poland.

Table 4. Electricity production from renewable energy sources in the Wielkopolska Region, 2005-2013 [MWh]

Electricity production from renewables [MWh]									
	2005	2006	2007	2008	2009	2010	2011	2012	2013
The meter for Wielkopolska Region	90,400	136,000	314,900	513,800	586,400	927,600	1,009,500	1,319,300	1,280,600
Population number in Wielkopolska Region	3,372,417	3,378,502	3,386,882	3,397,617	3,408,281	3,446,745	3,455,477	3,462,196	3,467,016
The meter per capita in Wielkopolska Region	0.0268	0.0403	0.093	0.1512	0.1721	0.2691	0.2921	0.3811	0.3694
The meter for Poland	3,847,300	4,291,200	5,429,300	6,606,000	8,678,700	10,888,800	13,136,900	16,878,900	17,066,600
Population number in Poland	38,157,055	38,125,479	38,115,641	38,135,876	38,167,329	38,529,866	38,538,447	38,533,299	38,494,659
The meter per capita Poland	0.1008	0.1126	0.1424	0.1732	0.2274	0.2826	0.3409	0.438	0.4433

Source: Own work on the basis of the data of GUS (Central Statistical Office); www.stat.gov.pl [20-08-2016].

The period between 2005 and 2013 shows the increase in investment in renewable energy. While in 2005 the rate in Poland per capita amounted to 0.1008 MWh in the Wielkopolska Region it reached 0.0268 MWh size in 2013. Table 5 presents detailed power from RES as of March 31, 2014.

Installed capacity in the Wielkopolska Region affects the energy economy of local government units. Taking into account market values such as demand and supply, its detailed development is presented on the figure 1.

Table 5. Types and capacity of the RES installation in the Wielkopolska Region (state as 31.03.2014)

Type of installation	Number of installation	Power [MW]
Producing biogas from wastewater treatment plants	7	5.877
Producing from the agricultural biogas	5	4.985
Producing from landfill biogas	10	6.062
Producing from biogas of agricultural, forestry and garden residues	1	1.862
Producing from mixed biomass	3	119.5
Producing from solar radiation	2	50
Wind plants on land	137	441.64
Run-of-the-river hydroelectricity < 0,3 MW	25	1.774
Run-of-the-river hydroelectricity < 1 MW	3	1.32
Run-of-the-river hydroelectricity < 5 MW	5	8.69
Executing co-firing technology (fossil fuels i biomass)	3	0
Total	201	591.760

Source: (Renewable Energy Map, URE; TOE Raport, 2015; Energy Regulatory Office Bulletin, 2014).

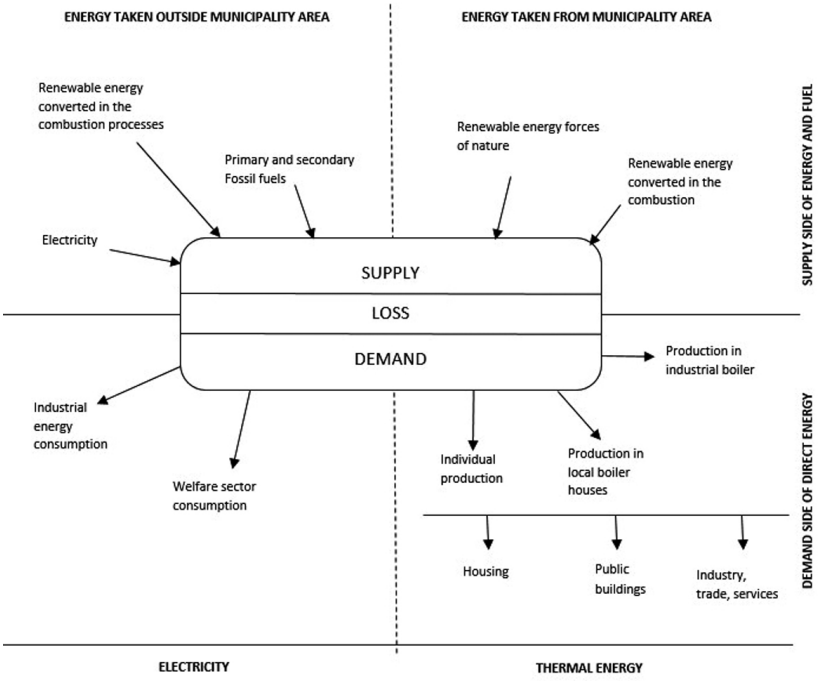

Figure 1. Energy management by local government

Source: (Gospodarowanie energią, 2015; Krawiec, 2010).

The Wielkopolska Region has favorable conditions for the development of the energy sector. The updated strategy for development of the region by 2020, a document adopted in 2012 by the Board of the Wielkopolska Region as a basis for territorial contract determines its development potentials. It includes the strategic objective of "Better management of energy", among others:

- Optimization of energy management (operational objective 3.1).
- Development production and use of alternative energy sources (operational objective 3.2).
- Improving the region's energy security (operational objective 3.3).

To others, significant in terms of renewable energy strategic objectives should be improving the environment and the rational management of natural resources (strategic objective 2), including, among others, operational objectives: protection of forest resources and their rational use, reduction of emissions of substances into the atmosphere, protection of water resources and an increase in flood security, or promotion of ecological habits. These objectives constitute evidence of RES in the region of Wielkopolska, others – causing certain limitations in this sectors' expansion.

While the Regional Operational Programme for 2014-2020, is a document – "Strategy for the operational programme's contribution to the Union strategy for smart, sustainable and inclusive growth", referring to the ongoing climate and energy strategy directly. It indicates the priority axis "3 Energy". Almost 352.2 million has been allocated to its support from the European Regional Development Fund, it represents 14.39% share in total support of the program. Priority Energy axis, covers the thematic objective "CT4. supporting the transition to low-carbon economy in all sectors ", which consists of the following investment priorities with specific objectives assigned to them:

- 4.1 Support the creation and distribution of energy from renewable sources – Increase the share of renewable energy in energy consumption.
- 4.2 Promote energy efficiency and use of renewable energy sources in enterprises – Reducing energy intensity of the economy.
- 4.3 Promoting energy efficiency, intelligent power management and the use of renewable energy sources in public infrastructures, including public buildings and housing sector – Reduce energy intensity of the residential and public sectors.
- 4.4 Promote low-carbon strategies for all areas types of territories, in particular urban areas, including the promotion of sustainable multimodal urban mobility and adaptation measures to mitigate the impact of climate change – reducing greenhouse gas emissions (Board of the Wielkopolska Region, 2014; Energy Regulatory Office Bulletin, 2014; Ministry

for Regional Development; Report of the Third Forum of Low-Carbon Economy, 2015).

It is worth noting that ENEA SA as a modern energy group will spend in 2014-2020 almost 20 billion PLN for investments, including 4.5 billion for investments in "green energy", which should further increase by 1.9 GW of generation capacity. The prospect of the development of renewable energy sources by the year 2025 is shown in table 6.

Table 6. Prospective amount of energy produced from renewable sources by 2025

Microgeneration of installed capacity below 40 kW					
Name of source of energy	Number of hours of operation of the plant during the year [h]	Installed capacity	Energy produced during the year [MWh]	The estimated number of units in the study area	The electricity produced during the year in total [MWh]
Sun energy	1,500	10	15	400	6,000
Wind	2,700	3	8,1	30	243
Biomass	7,500	20	150	20	3,000
Water	7,200	10	72	100	7,200
Geothermal	3,800	10	38	50	1,900
				600	18,343
Large plants with installed capacity exceeding 40 kW					
Name of source of energy	Number of hours of operation of the plant during the year [h]	Installed capacity	Energy produced during the year [MWh]	The estimated number of units in the study area	The electricity produced during the year in total [MWh]
Sun energy	1,500	1,000	1,500	35	52,500
Wind	2,700	1,000	2,700	5	13,500
Biomass	7,500	500	3,750	8	30,000
				48	96,000

Source: Office Automation Engineering, Alternative Energy for the Family, Advertising Company, 2015, www.biuro-inżynierski.com [10-08-2016].

The role of the region in the development of energy potential cannot be underestimated. There are both planning issues, the provision of administrative decisions as well as financial support. ENEA Operator with its stable network expandability also participates in this process. Annually, it provides more than 17 million MWh of electricity to nearly 2.5 million customers in an area of over 58 thousand km2. Infrastructure of the company consists of 111 thousand. km of power lines, including 4.600 km of high voltage 110 kV lines, 36 thousand distribution transformer stations, including 228 stations of 110 kV / MV – the main feeding points. Geographically, this is an area of 6 regions consisting of 353 municipalities.

Impact of installed power capacity on the investment attractiveness and development of the Wielkopolska Region

Taking into account the reports Research on the market economy and presented in them conditions for investment attractiveness of the Wielkopolska Region stays at the forefront of Polish regions. In the years 2010-2014 the Wielkopolska Region was regarded as a region of above-average attractiveness. The strengths of the area are the resources and labor costs, activity towards investors and the availability of transport. Details are presented in figure 2.

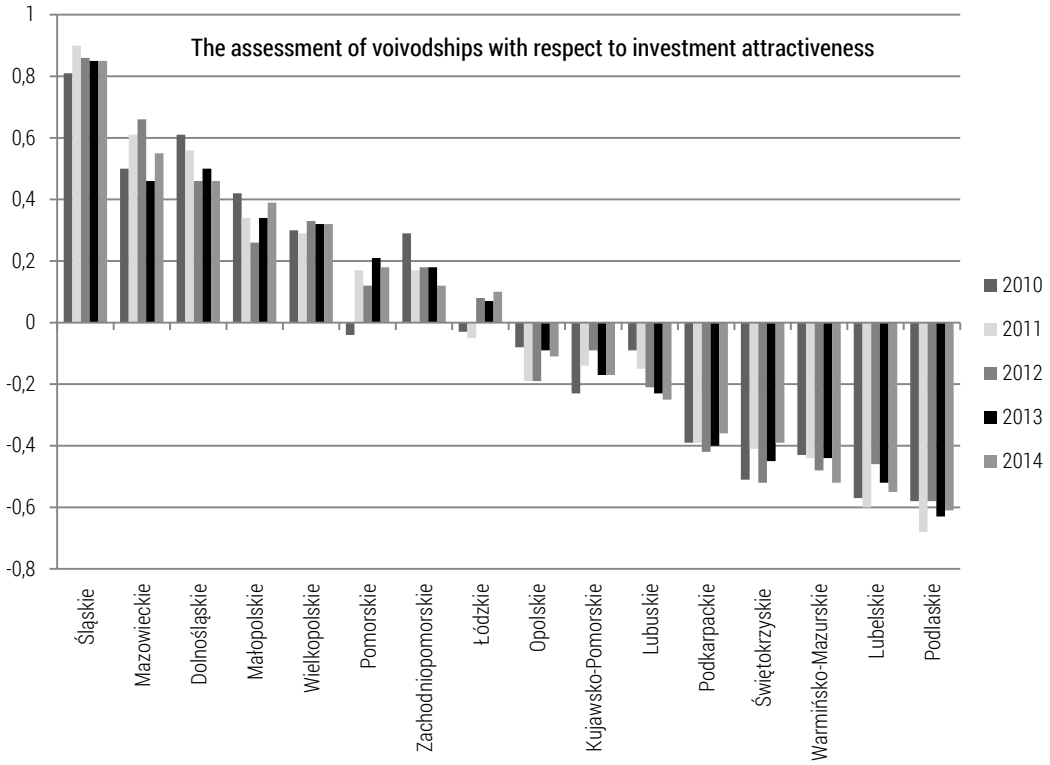

Figure 2. The assessment of voivodships (provinces) with respect to investment attractiveness

Also, resources and labor costs in the Wielkopolska Region are at a high quality level. From 2010, the region ranks third in the ranking, ranking behind provinces (voievodships): Śląskie and Małopolskie. This position is influenced by, among other things: the number of workers, vacancies, the percentage of unemployed, wages and the influx of graduates of secondary schools

and universities. Detailed specification of market needs demonstrates in detail figure 3.

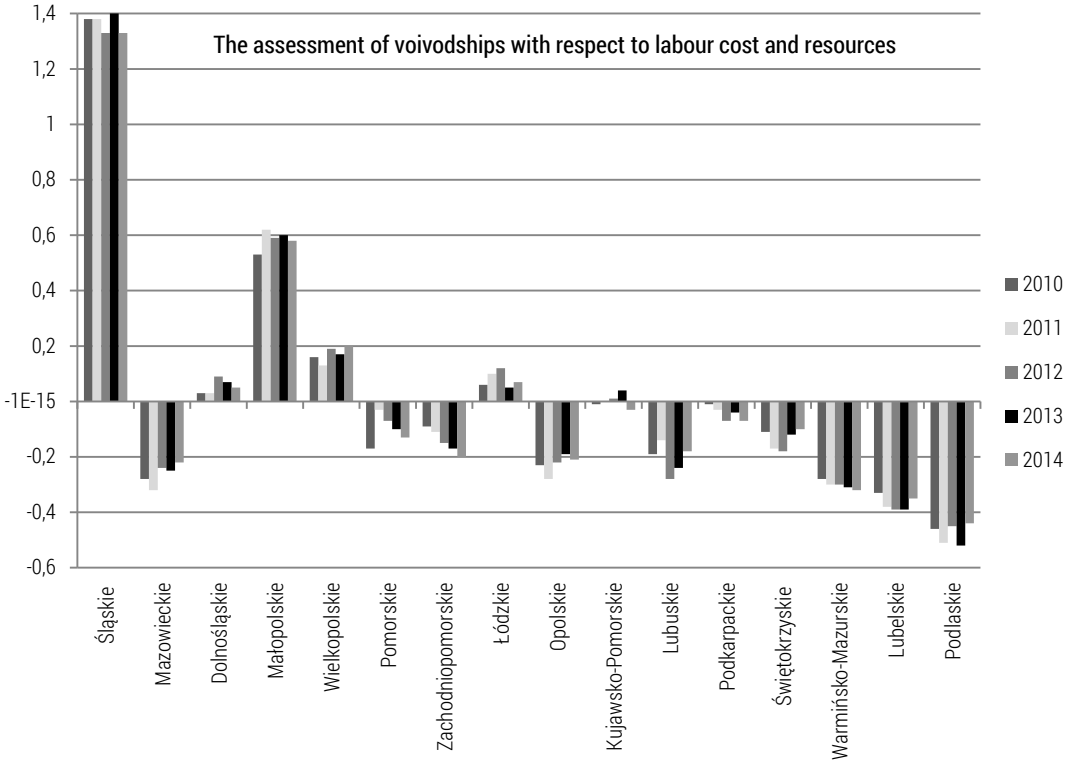

Figure 3. The assessment of voivodships (provinces) with respect to labour cost and resources

Among the determinants of investment attractiveness stands out the market capacity, which means the possibility of selling goods and services by a potential investor in the region. This allows for faster return on investment, reducing the final cost of goods through a reduction in transport costs. Parameters such as the size of the market, business investment spending and wealth of households rank among the regions of the Wielkopolska Region in detail is shown in figure 4.

Also, economic infrastructure has a significant impact on the investment process. Taking into account such indicators as density of business environment institutions, the number of fairs and exhibitions, the presence of research centers and functioning of special economic zones, you will notice that in the Wielkopolska Region is at a satisfactory level. Analyzing further the existence of special economic zones and the use of highly advanced tech-

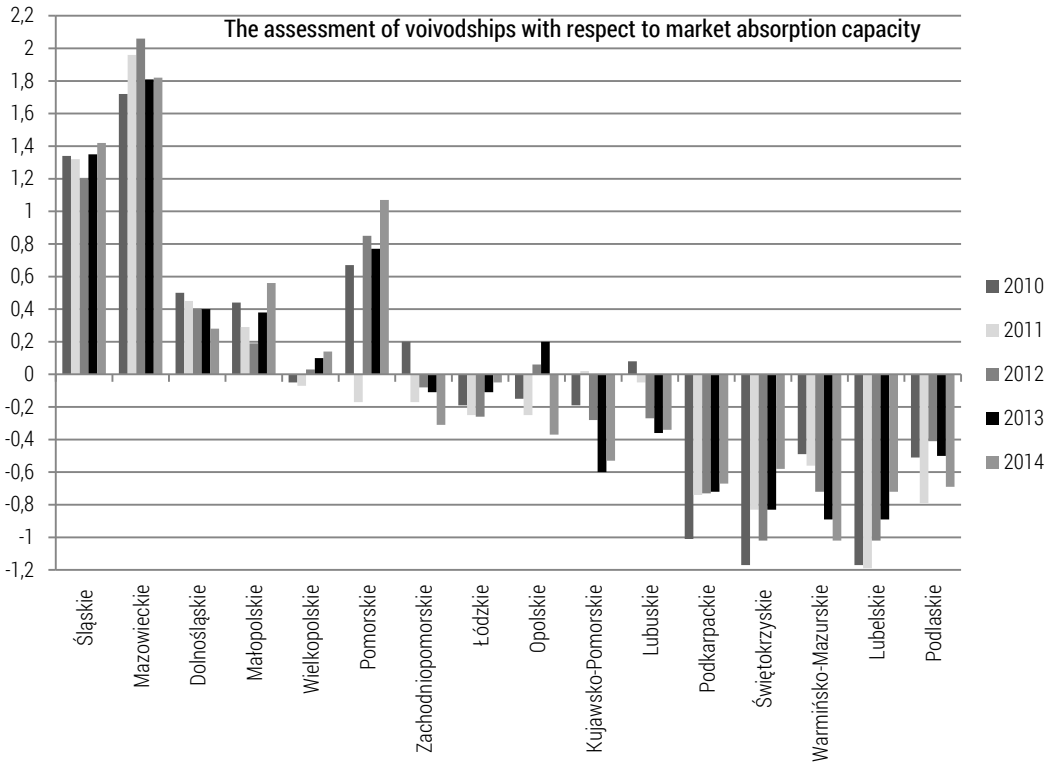

Figure 4. The assessment of voivodships (provinces) with respect to market absorption capacity

nology and cooperation with R & D centers, this region deserves to be innovative every detail with respect to other provinces is shown in figure 5.

Conclusions

Intelligent Energy – Europe Programme (IEE), it is one of the main specific programs and the Framework Programme is an instrument for the implementation of the energy policy of the European Commission. The program aims to increase energy efficiency and use of renewable energy sources. It contributes to ensure sustainable, competitive and secure energy for Europe and Polish in particular. The Wielkopolska Region in Poland, in turn, takes one of the leading positions in the direction of low-carbon economy development.

Subsidized projects may be aimed at the promotion and dissemination as well as projects for the dissemination of best techniques, processes, products and practices.

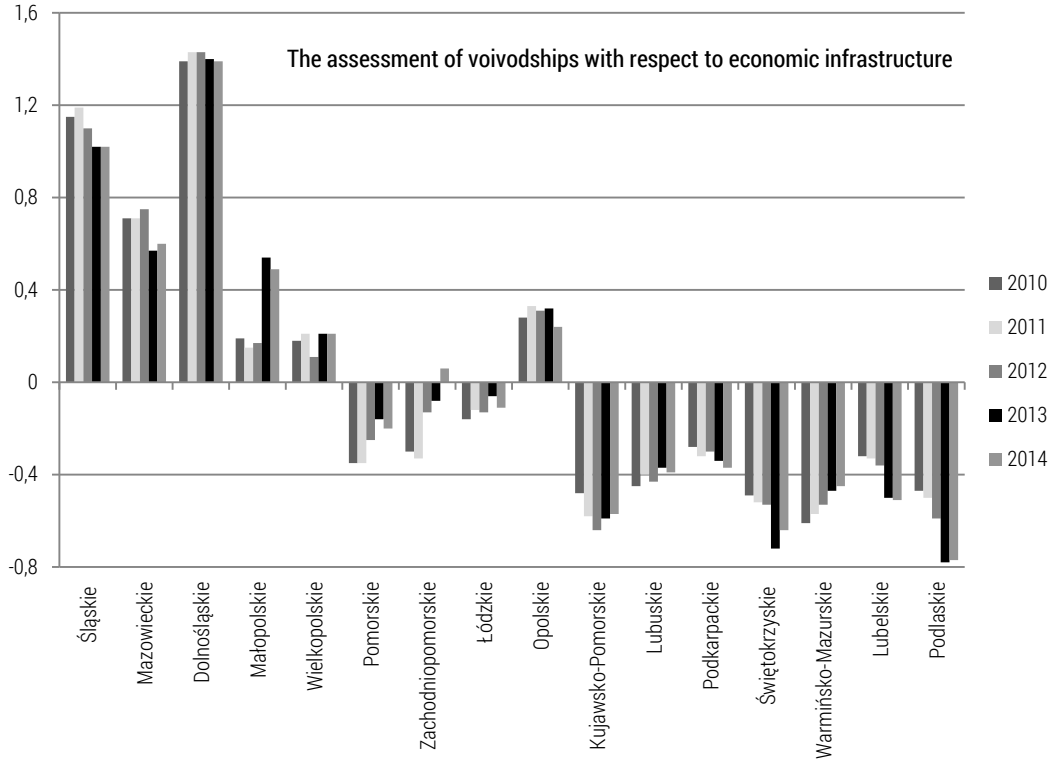

Figure 5. The assessment of voivodships (provinces) with respect to economic infrastructure

The main objectives of the IEE program are:

- Improving energy efficiency and the rational use of energy resources.
- Promoting new and renewable energy sources and supporting the diversification of energy sources.
- Promoting energy efficiency and the use of new and renewable energy sources in transport.

Projects are carried out within the following areas:

- SAVE – energy efficiency projects and energy spending efficiency.
- ALTENER – projects for the promotion of new and renewable sources of energy.
- STEER – energy-saving projects for transport.
- Integrated actions.

Within these areas there can be distinguished issues: construction industry, consumer products, renewable energy, heating and cooling and biofuels. Projects for the promotion and dissemination as well as projects for the dissemination of the best techniques, processes, products and practices are pro-

jects which affect the most effective way to change the mindset and habits of consumers of energy. This applies both to consumer collective and individual.

These problems are actual and important for the Wielkopolska Region, for Poland, for the European Union.

The contribution of the authors in the article:

Kazimierz Pająk – concept and objectives, literature review, research (25%)
Oleksii Kvilinskyi – concept and objectives, literature review, research (25%)
Olga Fasiecka – concept and objectives, literature review, research (25%)
Radosław Miśkiewicz – concept and objectives, literature review, research (25%)

Literature

Board of the Wielkopolska voivodship, Wielkopolski Regional Operational Programme 2007-2013, The detailed description of the priorities of the Operational Programme, www.wrpo2007-2013.wielkopolskie.pl [04-08-2016]

TOE Raport (2015), *Electricity and gas market Poland, Warszawa,* www.toe.pl/en/ [10-08-2016]

Energy Regulatory Office Bulletin (2014*), Information about investment plans in new generation capacity in the years 2014-2028, Warsaw,* www.ure.gov.pl [15-08-2016]

Krawiec F. (ed.) (2010), *Renewable energy sources in the light of world energy crisis. Chosen problems,* Warszawa

Ministry for Regional Development, Operational Programme, The Detailed description of the priorities of Human Capital Operational Programme 2007-2013, Warszawa, 1 Jun 2010 r., www.nauka.gov.pl [15-08-2016]

Niedziółka D. (2010), *Electricity market in Poland*, Warszawa

Pająk K., Ziomek A., Zwierzchlewski S. (eds) (2013), *Ekonomia i zarządzanie energią a rozwój gospodarczy,* Warszawa

Mazurkiewicz J., Pająk K. (eds) (2014), *Gospodarka niskoemisyjna – uwarunkowania i wyzwania*, Toruń

Pająk K. et al. (2015), *Carbon efficiency in modern economic policy*, Toruń

Pająk K., Kvilinskyi O., Fasiecka O. (2016), *Regional Energy Security (Based on Polish Experience)*, "Economic Herald of the Donbas" No. 4 (46), p. 47-55

Power market (2015), *Main factors and the model of the electricity market in Poland,* Kazimierz Dolny

Report of the Third Forum of Low-Carbon Economy (2015), *Innovation and low-carbon economy*, Warszawa

RWE Polska (2014), *Report on the market of electricity and natural gas in Poland in 2013,* Warszawa, www.innogy.pl [12-08-2016]