The development scenarios for renewable energy in the Gorlice County

The support analysis for the development of the energy strategy of the Gorlice County

GORLICE 2013

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Elaboration:

PPUH „BaSz"

26-200 Końskie, ul. Polna 72

www.basz.pl

The authors:

dr Ziemowit Pochitonow

mgr inż. Bartosz Szymusik

mgr Agnieszka Dzwonnik-Zatora

mgr inż. Iwona Fijałkowska

mgr Agata Pacak

mgr Agnieszka Ciszek

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SPATIAL PATTERN REPORT 3.3.1

1. Evaluation of an energy demand in a business activity in the Gorlice County.

An energy-intensive industries such as steel and pulp and paper industry are not present in the Gorlice County. The estimated demand for an electricity or a natural gas for the entire business activities is only about twice as big as demand for the households. Available statistics preclude detailed analysis of energy demand for specific sectors of the business activities on the local level (a municipality or a county). No data are available for the purchase or consumption of fuels and other energy carriers in the households and in the business facilities. A comprehensive data exist only in the cases when the area is serviced by one or at most a few distributors (like in gas and electricity distribution). In the case of fuel, purchases cannot be assigned to the specific administrative unit. The comprehensive energy demand in the entire county is very difficult to estimate. Sufficient data to draw up a simplified energy balance are available only for households and public buildings. Estimates can also be made for the entire business activities and industries, but only in reference to certain energy carriers. A comprehensive balance for the whole of the sector would be burdened with a very big mistake. For sectors of the business activities like trade, services, transport, where energy is consumed in various forms (liquid fuels, coal, gas, electricity) there are no data on energy consumption at the municipal and county level

Estimated energy demand for the Gorlice County was prepared on the basis of available statistical data and the industry reports. The energy demand forecast was based on an analysis of trends in energy consumption (electricity, gas) in recent years and expected macroeconomic development. The demand for space heating was estimated on the basis of statistical heat consumption per square meter of floor surface for buildings of all ages and technical conditions.

1. Electricity

The current electricity consumption of the entire business activity was estimated on the basis of statistical data and the information provided by distributors (consumption split by the type of power grid: low, medium and high voltage). The total annual electricity consumption in the Gorlice County stands at about 206.2 GWh (as of 2010), of which the consumption of electricity by customers supplied from the high-voltage grid is approximately 28 500 MWH, medium-voltage grid -53 560 MWh and low-voltage grid 124 176 MWh. From this the estimated energy consumption of the entire business activity is about 132 585 MWh.

Projected energy consumption will depend on the pace of economic development of the district. In the forecast timeline increase in electricity demand will be caused by the development of existing and emerging business facilities.

Projected demand for energy and electric power was determined on the basis of the actual consumption of electricity in 2010 and projections of demand and energy consumption by 2030, attached as Annex 2 to the "Polish Energy Policy until 2030". Changes in the demand for electricity consumed by businesses, due to the lack of information on the development of existing and locating new production / industry are difficult to determine. It was assumed that the demand for electricity supplied to businesses with High-voltage, Medium-voltage and Low-voltage grids will increase gradually by about 3% per year.

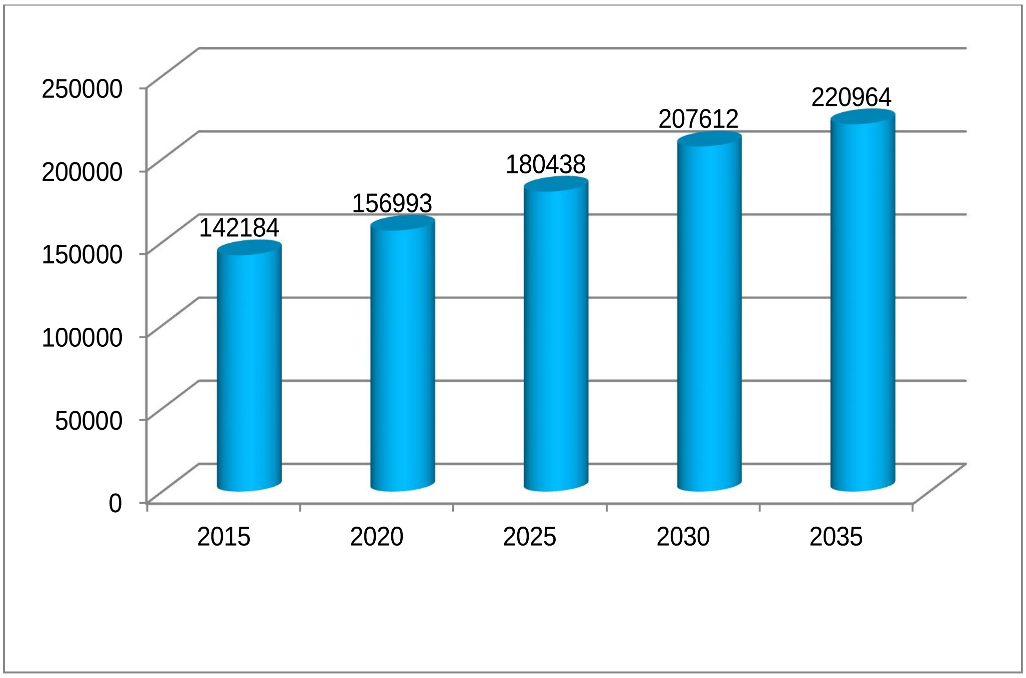
In addition, it was assumed that economic development will takes place according to the indicators of macroeconomic development for the whole country. Projections for energy consumption in Poland ("Polish Energy Policy until 2030") indicate that the demand for electricity (compared to the base year 2006) will grow at an average annual rate close to 2.3% and the growth will be relatively lower in the first 10-year period of the forecast.

Table 1: Forecast of electricity consumption of the entire business activity in the Gorlice County

2011	2015	2020	2025	2030	2035
(MWh)					
132 580	142 184	156 993	180 438	207 612	220 964

Source: CSO and electricity suppliers

Graph 1: Forecast of electricity consumption of the entire business activity in the Gorlice County up to 2035 [MWh]



Source: CSO and electricity suppliers

2. Natural gas

The total annual gas consumption by all consumers connected to the gas system in the Gorlice County in 2010 reached a value of 30.3 million Nm3 (according to the gas supply company).

The current consumption of natural gas by the entire business activity in the Gorlice County is approximately 19 264.9 thousand of m^3 per year (about 64% of the total consumption in the district). The consumption was determined on the basis of information obtained from the gas supply company and the Central Statistical Office data.

No major limitations of access to natural gas resources are foreseen in the forecast timeframe. According to the document "Polish Energy Policy until 2030" temporary restrictions may arise due to logistics of import contracts and investments in the grid. The estimates of the demand for gas (in the long term perspective) include objectives of energy policy, i.a. energy from unconventional sources.

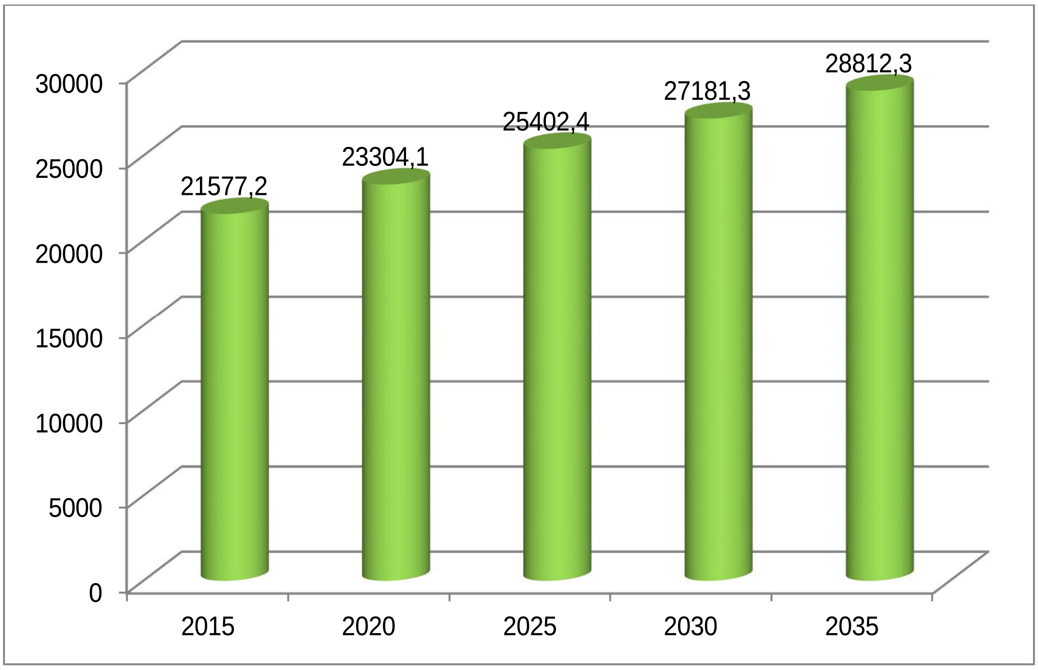
In order to determine the estimated consumption of natural gas by 2035 it was assumed that the consumption by industrial end-users will rise gradually, not exceeding 3% per year.

Table 2: : Forecast of natural gas consumption of the entire business activity in the Gorlice County

2011	2015	2020	2025	2030	2035
[th. m^3]					
19 264,9	21 577,2	23 304,1	25 402,4	27 181,3	28 812,3

Source: CSO and gas suppliers

Graph 2: : Forecast of natural gas consumption of the entire business activity in the Gorlice County up to 2035 [th. m^3]



Source: CSO and gas suppliers

3. Space heating

Usable floor space in the entire business activity in the Gorlice district is about 220 000 m^2.

To estimate the demand for power and heat for a period up to 2035, the following assumptions were made:

- about 50% of the objects have been completely retrofitted (replacement of windows and doors, insulation of external walls);
- given the diverse energy standard, the demand for heat was calculated assuming 90 W/m^2 for old buildings and 60 W/m^2 for new buildings and those retrofitted;

- heat demand indicators are dependent on the age of the building, as some construction techniques have evolved in a certain way over the time. The buildings age can be attributed (to some extent) to the thermal energy consumption indicator. Approximate indicators of heat demand based on the age of the building are presented in the following table:

Year of construction	Average heat demand (kWh/m^2a)
before 1966	240 – 350
1967 – 1985	240 – 280
1985 – 1992	160 – 200
1993 – 1997	120 – 160
after 1998	90 – 120

- heat demand for commercial buildings was calculated in the same way like for single-family dwellings. The thermal quality of these buildings are similar to the average area of a residential building; and commercial facilities are often located in residential buildings;
- indicator for an annual energy consumption for space heating is at a level of 500 to 650 MJ/m^2;
- the demand for hot water equals 10% of the demand for space heating;
- the estimated rate of decrease in thermal energy demand as a result of thermal retrofitting is 1% per year (compared to 2010).

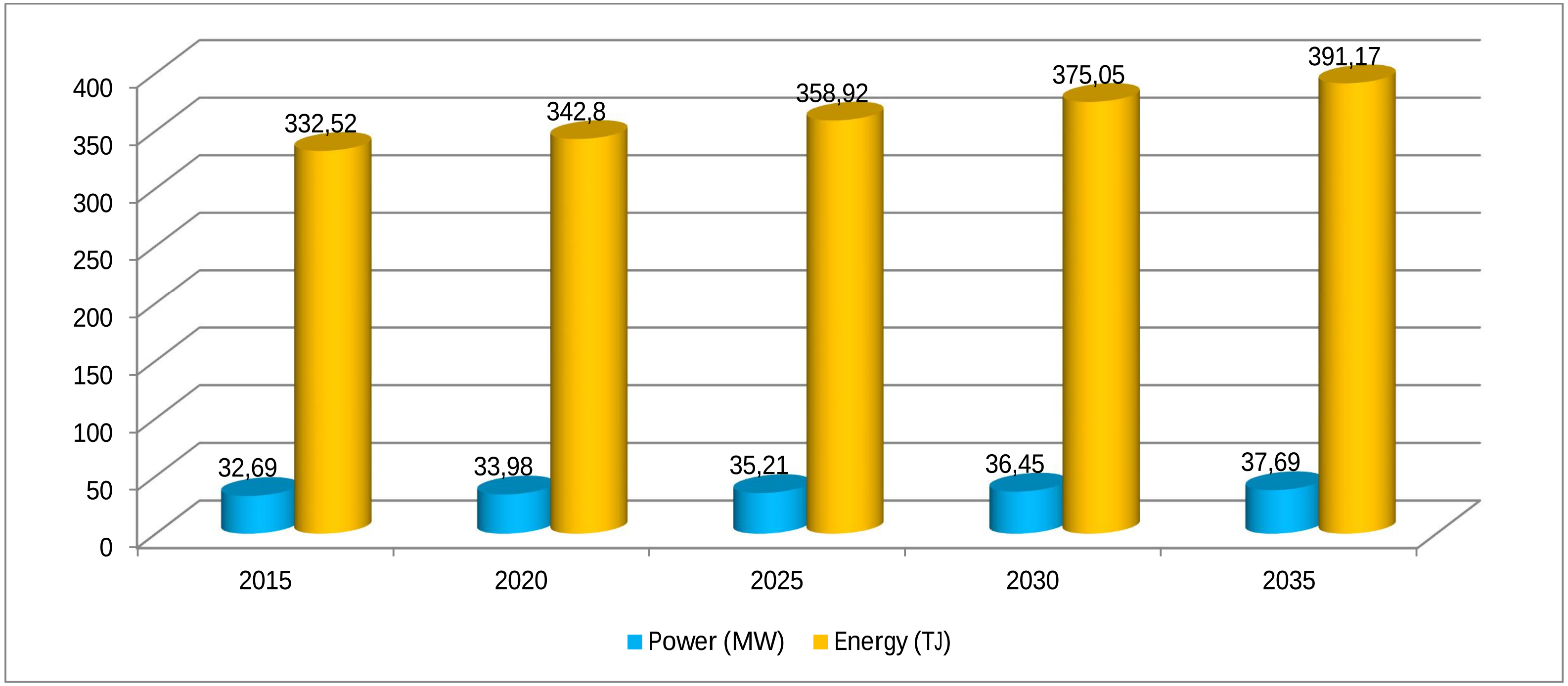
Based on the a.m. assumptions thermal power demand for commercials building and facilities (trade and services) in the Gorlice County was estimated to be about 32 MW and an estimated annual consumption of thermal energy for about 317 TJ.

Table 3: Forecast of demand for thermal power and heat in business facilities (trade and commerce, except industrial processes) in the Gorlice County up to 2035.

#	Increasing due to a number of buildings					Decrease due to thermal retrofitting					Total (current + increase/decrease))				
	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035
Power (MW)	1,50	4,14	6,72	9,31	11,90	0,81	2,16	3,51	4,86	6,21	32,69	33,98	35,21	36,45	37,69
Energy (TJ)	15,52	41,40	67,27	93,15	119,02	5,85	15,60	25,35	35,10	44,85	332,52	342,8	358,92	375,05	391,17

Source: authors' elaboration

Graph 3: Forecast of demand for thermal power and heat in business facilities (trade and commerce, except industrial processes) in the Gorlice County up to 2035



2. The demand for energy in public buildings in the Gorlice County.

1. Electricity

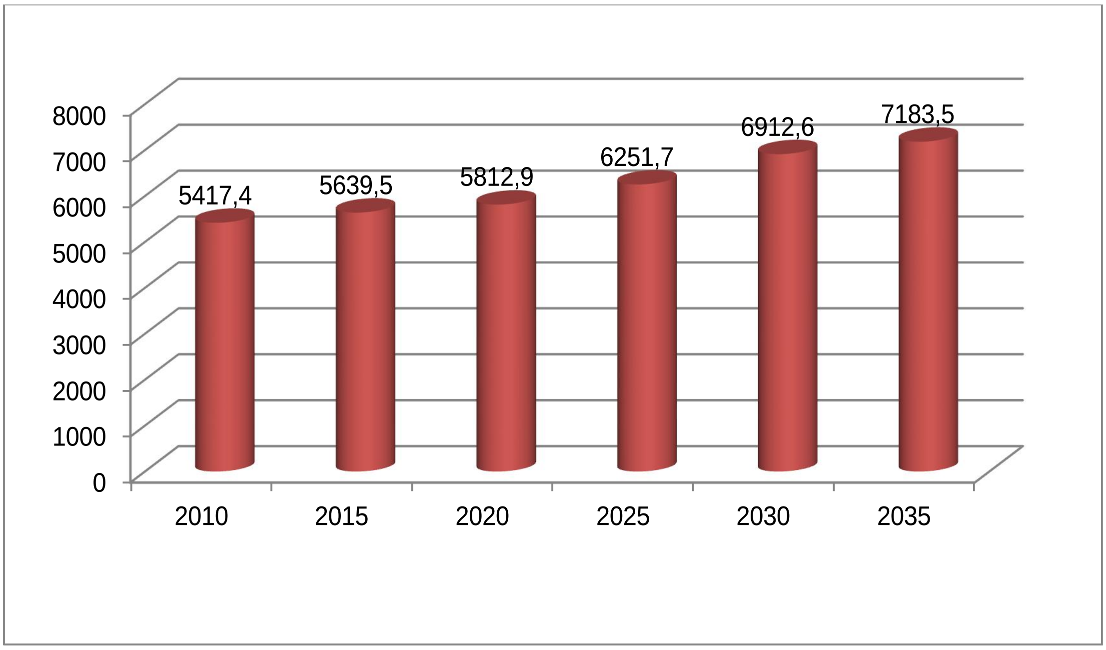
Current demand for electricity for public buildings managed by the county is 1 486.6 MWh (based on the district office data). For all other public buildings managed by other local energy consumption per annum was based on the estimated average electricity consumption per 1 m^2 of buildings managed by the county (approximately 24.7 kWh/m^2). Usable floor space of these buildings is approximately 159 141 m^2 and therefore electricity consumption is about 3 930,8 MWh.

By 2035 estimated energy consumption in public buildings will increase by approximately 32.6% compared to the base year (2010). It was assumed that the electricity consumption in the base year will increase by 4.1% in 2015, 7.3% in 2020, 15.4% 2025 27.6% to 2030 and about 32.6% by 2035 (according to: Polish Energy Policy until 2030). The results of the forecast for electricity consumption in public buildings by 2035 are shown in the following table.

Table 4: Forecast of electricity consumption of the public building in the Gorlice County.

2010	2015	2020	2025	2030	2035
Consumption (MWh)					
5 417,4	5 639,5	5 812,9	6 251,7	6 912,6	7 183,5

Graph 4: Forecast of electricity consumption of the public building in the Gorlice County.



2. Natural gas

In public buildings there is practically no gas consumption for social and living purposes. Gas used for heating is one of the energy carriers that has been included in the balance of the heat demand for these buildings.

3. Space heating

The current heat consumption in public buildings in 2010 is based on information supplied by managing authorities. Usable floor space of public buildings in the county is 219 641 m^2.

To estimate the demand for power and heat for the period up to 2035, the following assumptions were made:

- about 50% of the objects have been completely retrofitted (replacement of windows and doors, insulation of external walls);
- given the diverse energy standard, the demand for heat was calculated assuming 90 W/m^2 for old buildings and 60 W/m^2 for new buildings and those retrofitted;
- heat demand indicators are dependent on the age of the building, as some construction techniques have evolved in a certain way over the time. The buildings age can be attributed (to some extent) to the thermal energy consumption indicator. Approximate indicators of heat demand based on the age of the building are presented in the following table:
- the demand for hot water equals 10% of the demand for space heating;
- the estimated rate of decrease in thermal energy demand as a result of thermal retrofitting is 1% per year (compared to 2010).
- in the period up to 2035, it was assumed that the floor area of public buildings in the Gorlice County will be unchanged.

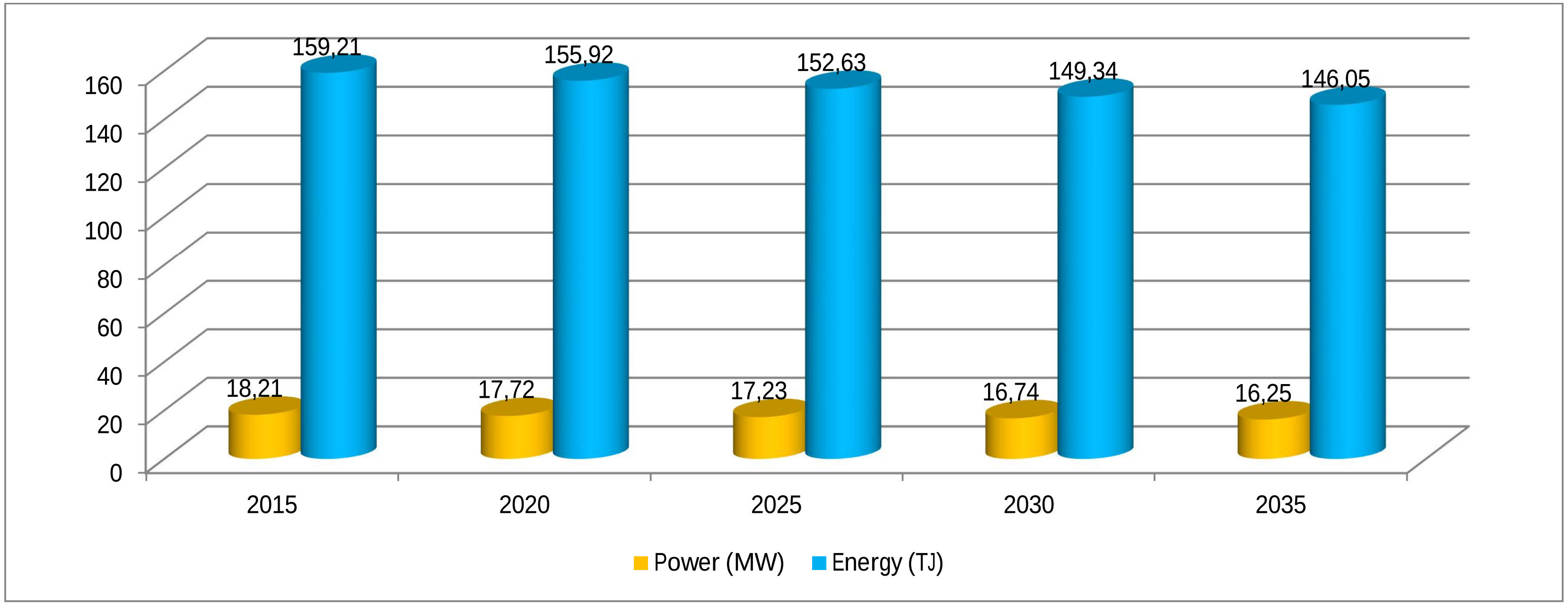
Current demand for thermal power is estimated at 18,7 MW, and the annual heating energy consumption is estimated at around 162,5 TJ (including hot water production at 23.2 TJ).

Table 5: Forecast of demand for thermal power and energy for space heating and hot water production in public buildings in the Gorlice County up to 2035.

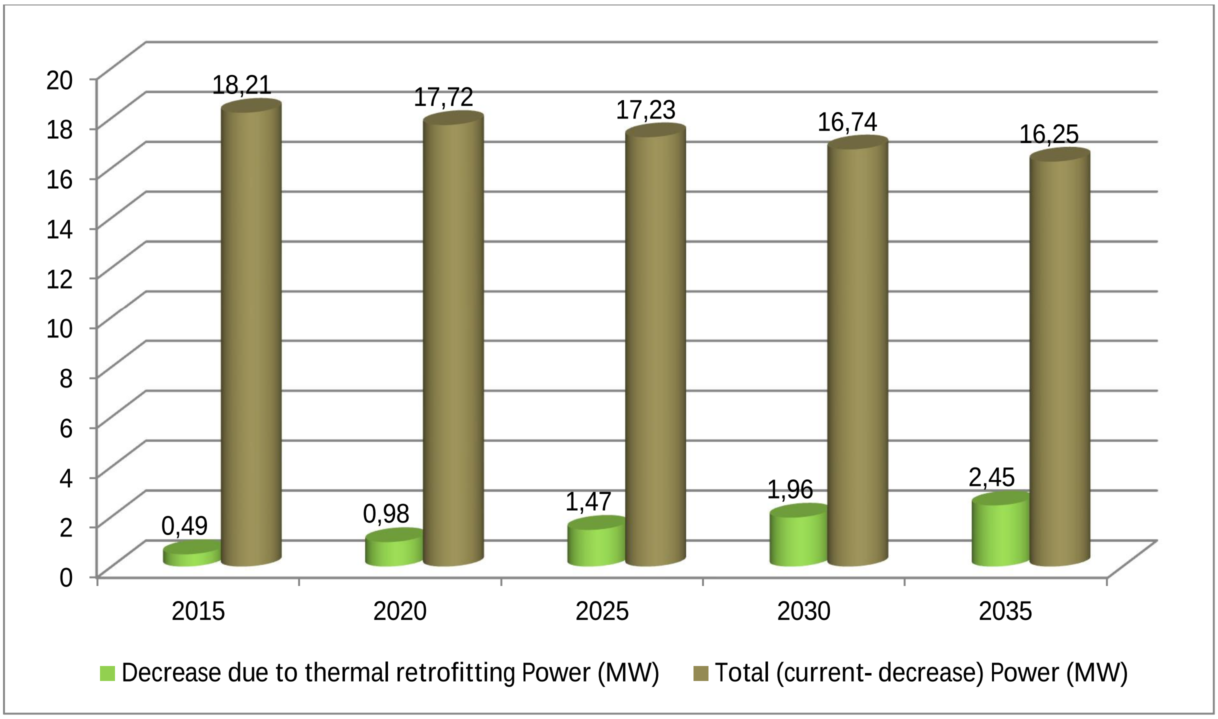
#	Decrease due to thermal retrofitting					Total (current - decrease))				
	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035
Power (MW)	0,49	0,98	1,47	1,96	2,45	18,21	17,72	17,23	16,74	16,25
Energy (TJ)	3,29	6,58	9,87	13,16	16,45	159,21	155,92	152,63	149,34	146,05

Source: authors' elaboration based on data supplied by local authorities

Graph 5: Forecast of demand for thermal power and energy for space heating and hot water production in public buildings in the Gorlice County up to 2035.

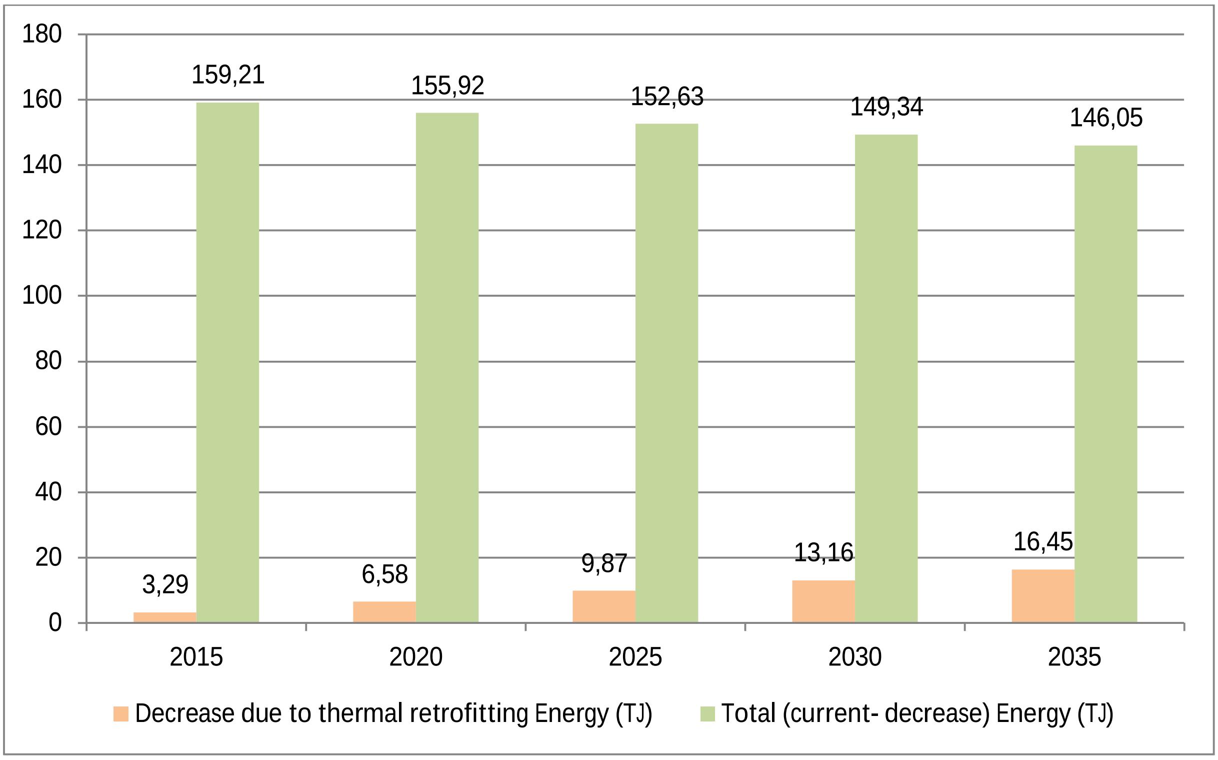


Graph 6: *Forecast of demand for thermal power in public buildings in the Gorlice County up to 2035 [MW]*



Source: authors' elaboration based on data supplied by the local authorities

Graph 7: Forecast of demand for heat in the public buildings in the Gorlice County up to 2035 TJ]



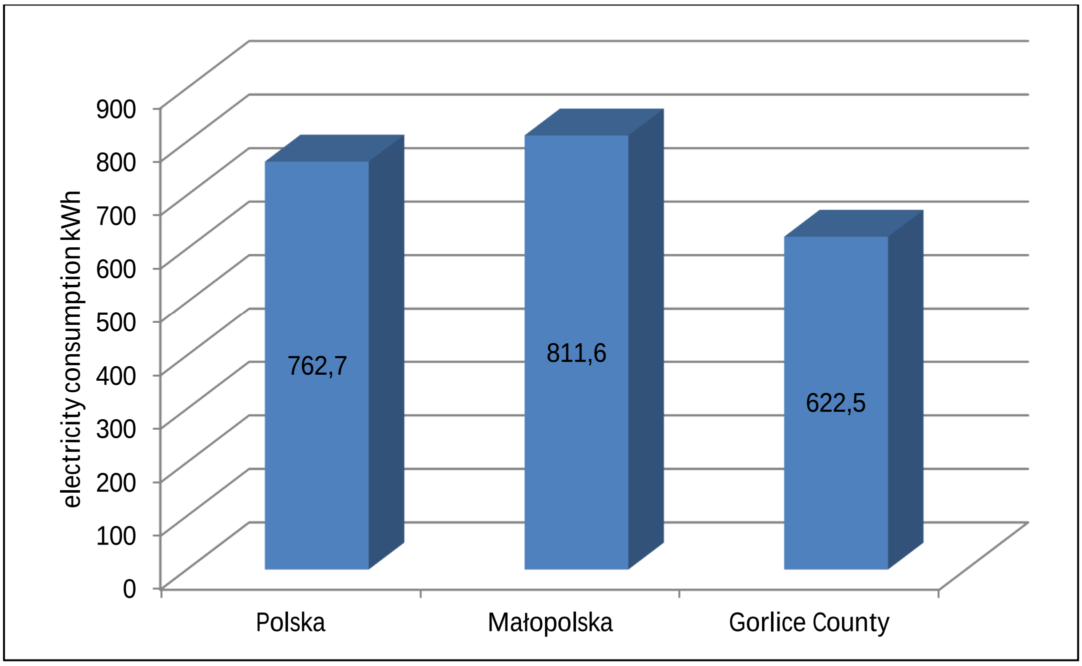
Source: authors' elaboration based on data supplied by the local authorities

3. The energy demand in households in the Gorlice County.

1. Number of end-users and electricity consumption in households.

Total number of customers - households – in the district is 33 027, and the annual electricity consumption is at a level of 67 955 MWh (as of 2011, CSO). The average consumption of electricity in the district per capita stands at 622,5 kWh and is lower in comparison to the scale of consumption in the Małopolska and across the country.

Graph 8: The average electricity consumption in the Gorlice County compared to Małopolska and Poland.



Source: CSO, 2011

Forecast of demand for electricity

<u>General assumptions:</u>

1. the demand for electricity for individuals is related with lighting, power household appliances and hot water production. The structure of the electricity consumed by households, used mainly for social and living purposes, will be maintained in the period of the forecast;
2. use of electricity for heating purposes is and will be in the near future marginal;
3. baseline electricity consumption was adopted at the county level in 2011 (67 955 MWh.)

<u>Variants</u>

Given these assumptions and suggestions variant forecast electricity demand in Gorlice County is proposed:

Variant I

Assumptions and forecasts incorporating the effects of the economic downturn are adopted, as well as the implementation of the EU energy policy, including climate package published as the document "Polish Energy Policy until 2030".

Variant II

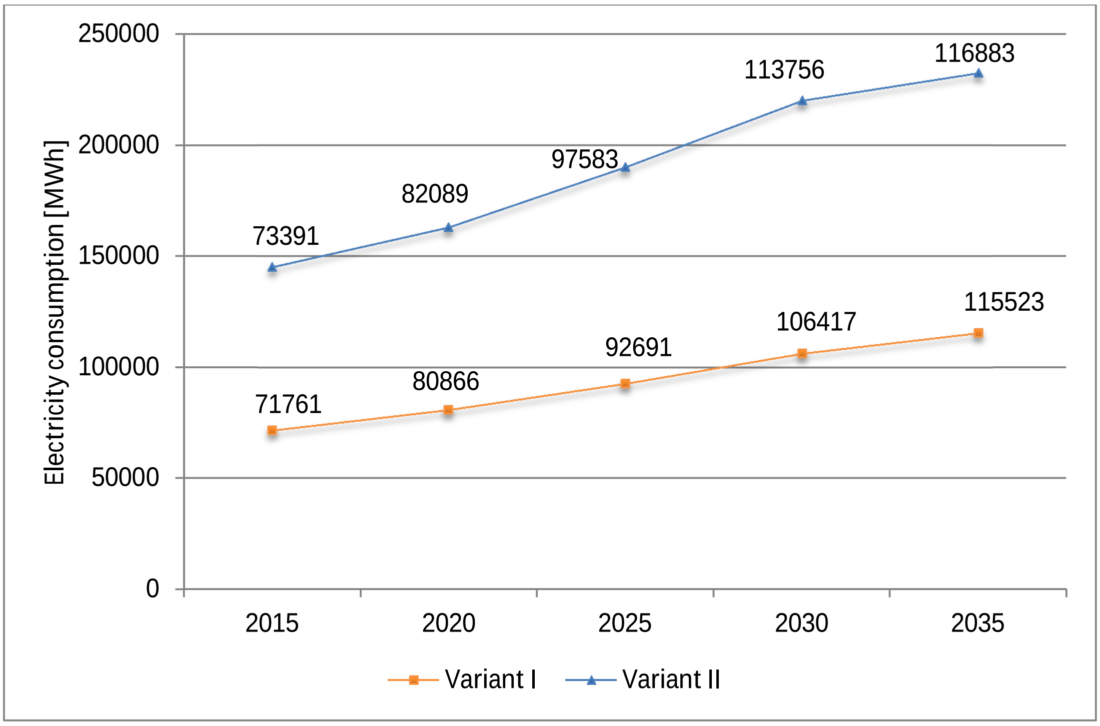
Includes forecasts published in the document "Polish Energy Policy until 2030" and the recently observed changes in the demand for electricity in the county based on the increase in of new customers, the pace of development of land investment provided for housing and business. At the same time, it is assumed that 20% share of renewable energy in the total energy needs of the county will be achieved in 2030.

Table 6: Theelectricity of the future electricty consumption by the households in the Gorlice County.

2011	Variant	2015	2020	2025	2030	2035
(MWh)	#	(MWh)				
67 955	Variant I	71 761	80 866	92 691	106 417	115 523
	Variant II	73 391	82 089	97 583	113 756	121 639

Source: Authors' elaboration based on CSO data

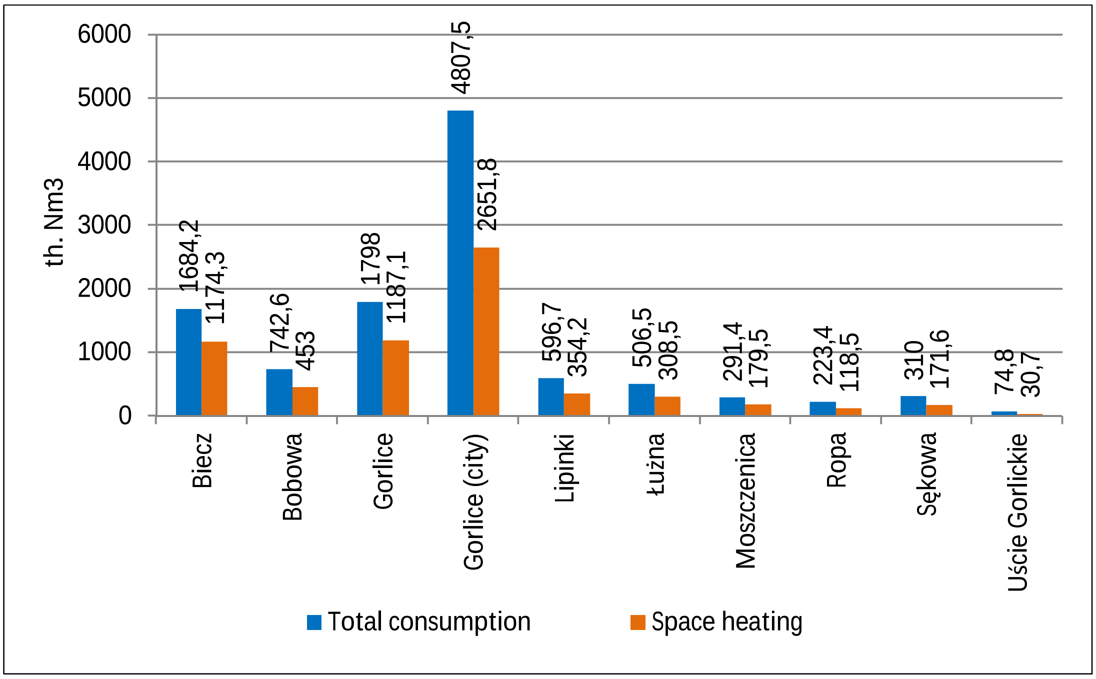
Graph 9: The variants of the future electricity consumption by the households in the Gorlice County. [MWh]



2. Natural gas

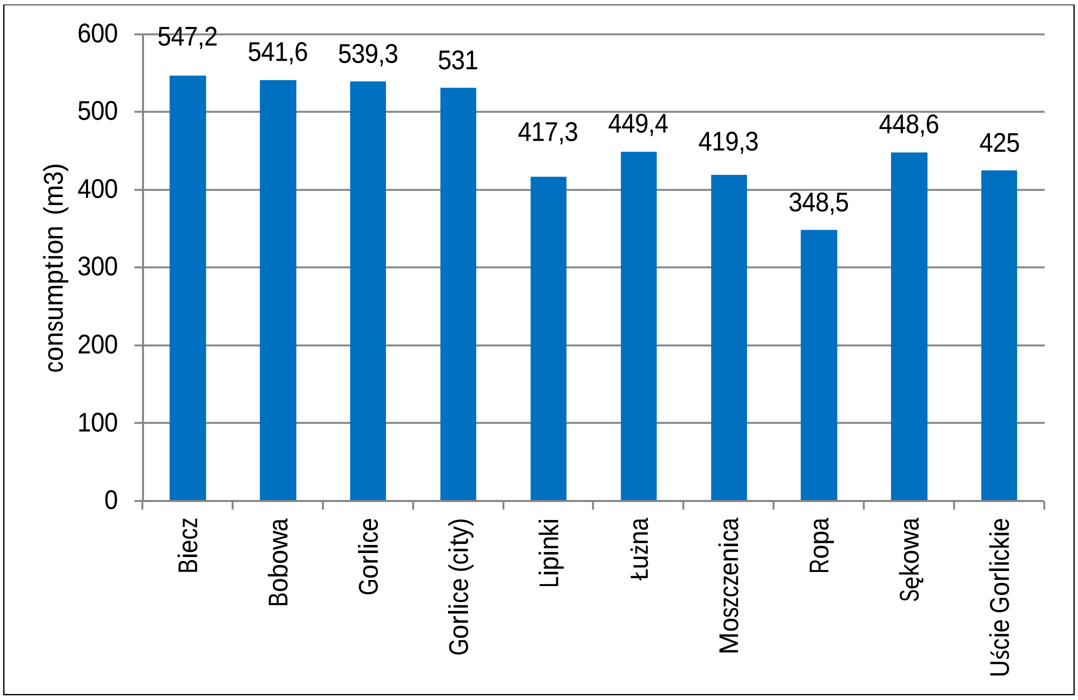
Length of the gas network in the county is 1 105.262 km and 17 191 buildings is connected to the network. There are 21 597 gas customers (households), of which 8 527 use the gas for space heating. Gas consumption in 2011 by households amounted to 11 035 100 m³, of which for space heating – 6 629 200 m³. The gas network serves 77 262 inhabitants (CSO, 2011).

Graph 10: The gas consumption by the households in communities of the Gorlice County in 2011.



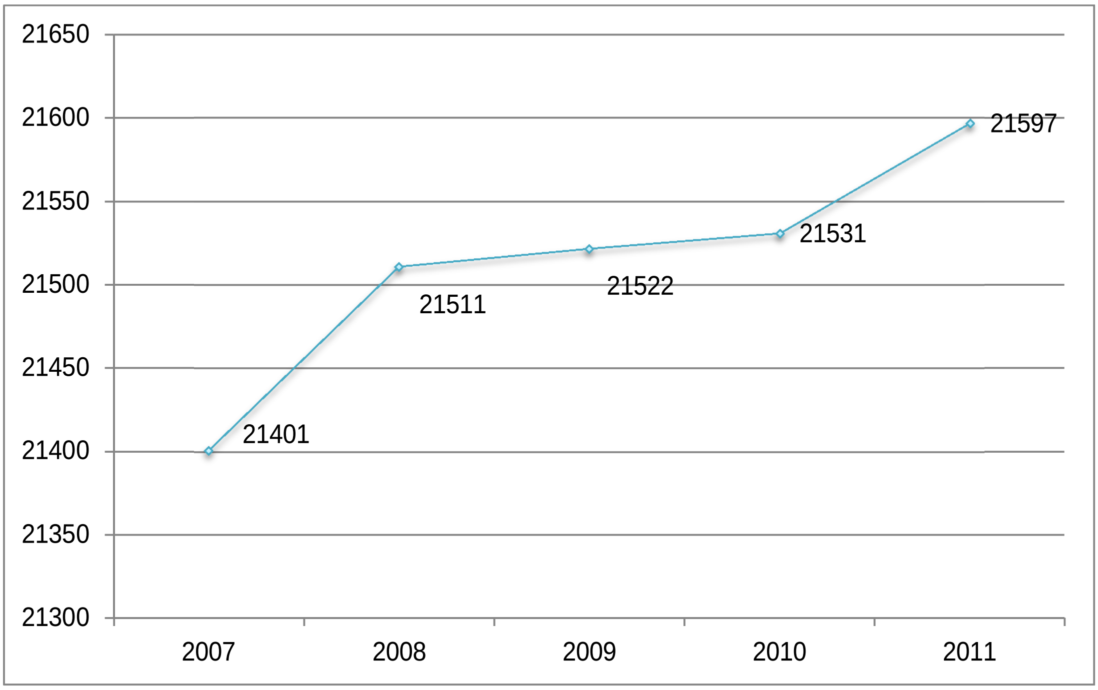
Source: CSO, 2011

Graph 11: The natural gas consumption per capita in the communities of the Gorlice County in 2011.



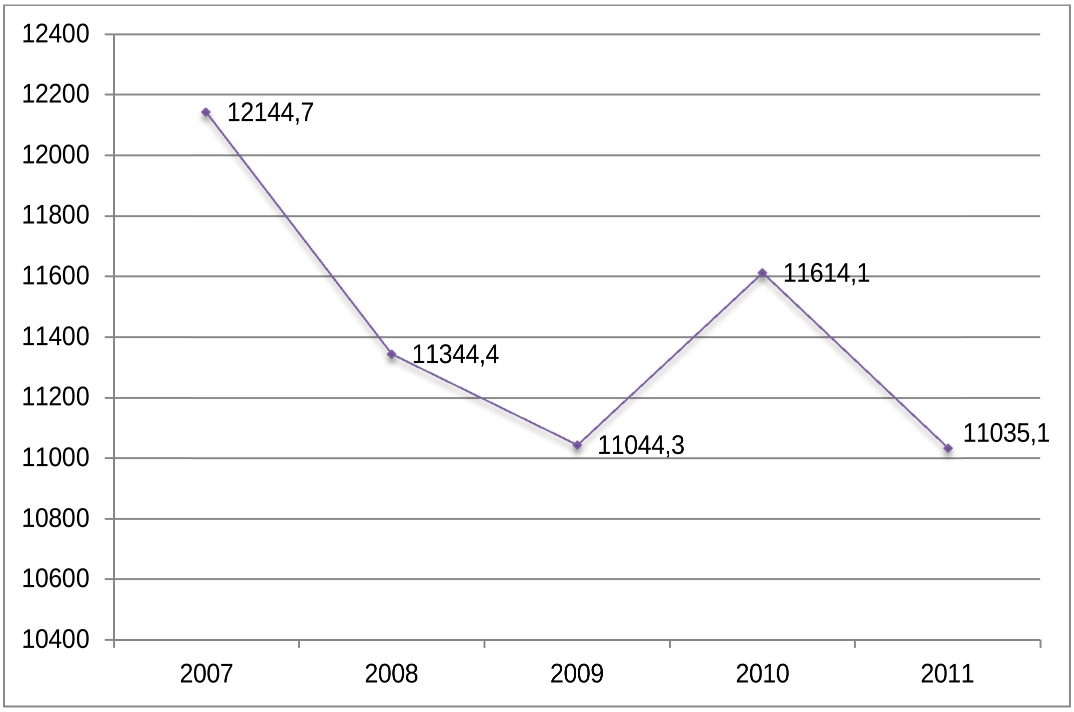
Source: CSO, 2011

Graph 12: The number of the households connected to the gas grid in the Gorlice County 2007 – 2011.



Source: CSO, 2007- 2011

Graph 13: The natural gas consumption by households in the Gorlice County 2007 – 2010 [th. m³]



Source: CSO, 2007- 2011

<u>Forecast of demand for natural gas - general assumptions:</u>

- at the end of 2011, the gas was supplied to 21 597 customers – households,
- gas consumption in 2011 by households stood at 11035,10 thousand m^3,

- during the forecast period any major limitations of access to natural gas resources are not foreseen. According to the document "Polish Energy Policy until 2030" time constraints that may arise due to logistics supply of import contracts and investment in the network,
- normative indicators of consumption of natural gas:
    - to prepare meals - 57m3/person/year
    - the preparation of hot tap water - 128.5 m3/ person/year;
    - for space heating - usable floor space 10-20 m3/m2 / year.
- to estimate the demand for gas (especially in the long term perspective) plans included energy policy, in which the emphasis is on the possibility of generating energy from unconventional sources (even for the domestic hot water)
- a further assumption is that demographic trends will remain at the current level, the number of households that uses gas for heating purposes (including by reducing the cost of heating due to thermal retrofitting the buildings) will increase,.

The following table shows the forecast of natural gas consumption by households in the district of Gorlice by variants: basic and the efficiency.

- Baseline variant - gas consumption forecast is based on the assumptions set out above
- Efficiency Variant (RES) - it takes into account further reduction in gas demand due to use of renewable energy in the energy mix (Polish Energy Policy until 2030).

In order to estimate the size of the natural gas consumption in the group of households, it was assumed that gas consumption in the base year (2011) according to the approved variant will increase as follows:

- Baseline variant - natural gas consumption increase by about 12% by 2015, 21% by 2020, 32% by 2025, 41% by 2030 and 49% by 2035;
- Efficiency Variant (RES) - successive increase in natural gas consumption, but growth will be relatively lower compared to the baseline, due to the partial substitution of gas for renewable energy sources. The increase in gas consumption will be around 12% by 2015, 15.5% for 2020, 16.5% 2025 18.8% 2030 and 22.2% by 2035

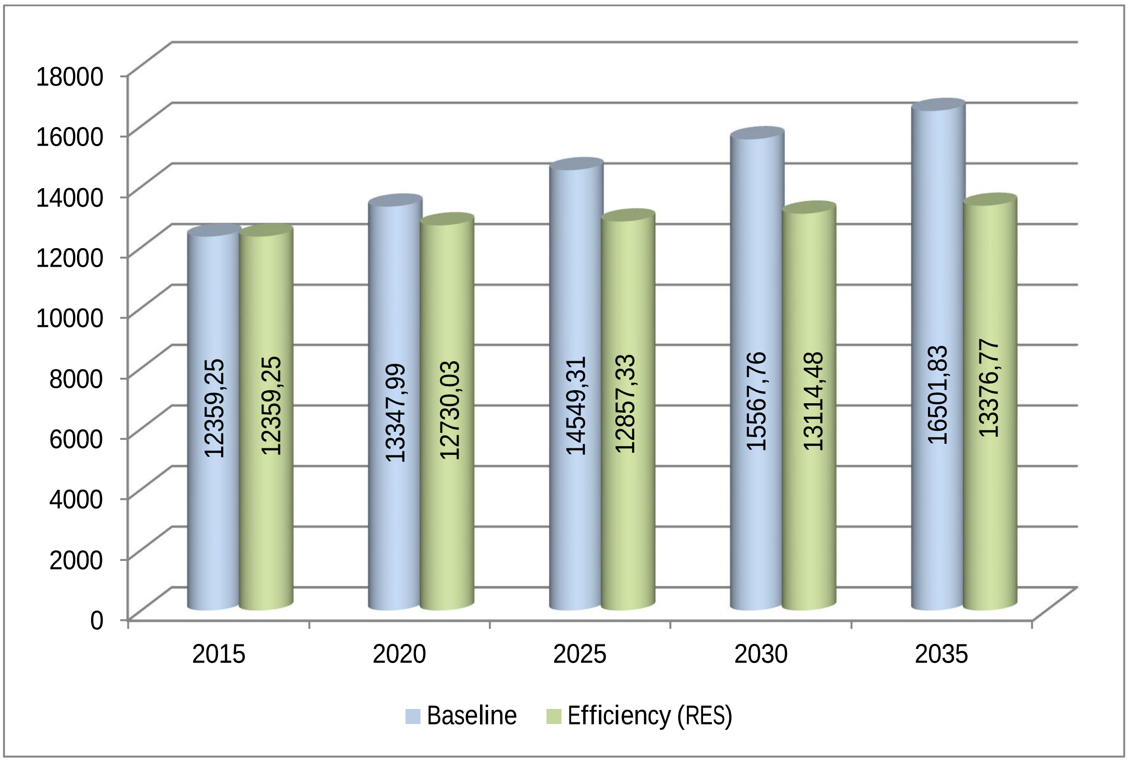
Table 7: The variants of the future gas consumption by the households in the Gorlice County.

2011	Variant	2015	2020	2025	2030	2035
[th. m^3]		[th. m^3]				
11035,10	Baseline	12359,25	13347,99	14549,31	15567,76	16501,83
	Efficiency (RES)	12359,25	12730,03	12857,33	13114,48	13376,77

Source: Authors' elaboration based on CSO data

These projections also take into account the expected gradual decline in the share of coal in the production of heat in favour of the gaseous fuels and electricity. In an efficiency variant the greater use of renewable energy was adopted.

Graph 14: The variants of the future gas consumption by the households in the Gorlice County [th. m^3].



Source: Authors' elaboration based on CSO data

3. Space heating

<u>The current heat demand by households in Gorlice County</u>

Assumptions to estimate the power requirements and heat

- about 20% of housing built after 1990 (it is assumed that the energy-efficient technologies were applied) - in about 70% of the buildings partial thermal retrofitting were made. New buildings are about 32% of the total floor area (and volume) of housing in the county;
- the average size of a dwelling built after 1990 is in the range of 120-150 m2;
- buildings in the county were constructed at different period of time, in accordance with the regulations and standards applicable to the period of their construction. Since it is not possible to reliably determine the age of the buildings, it was assumed average annual indicators of thermal energy to heat $1m^2$ multi family building of 315 kWh/m2. This corresponds to the power demand of 0.05 kW/m2
- heat demand for detached houses and the homestead was defined similarly but with a higher rate of heat supply per unit - 0.07 kW/m^2;
- the demand for heat is dependent on the age of the building, as some construction techniques have evolved in a certain way at the time.

Table 8: Indicators of heat demand of buildings in relation to the year of construction.

Year of construction	Average heat consumption (kWh/m^2a)
before 1966	240 – 350
1967 – 1985	240 – 280
1985 – 1992	160 – 200
1993 – 1997	120 – 160
after 1998	90 – 120

- annual energy consumption for heating in residential buildings (single-family and multi-family) was set at 500 to 650 MJ/m2/year;
- an average water consumption rate was set at 80 dm^3/inhabitant/day. In determining the total heat consumption for domestic hot water in households it was assumed average energy equal to 4000MJ/inhabitant/year. In other buildings, such as public buildings and business facilities (trade and services) demand for hot water was taken as 10% of the demand for heating.

Given these assumptions and estimates, the current demand for thermal power by households in the Gorlice County was estimated at about 211 MW, and the annual energy consumption of heat for 1 938,43 TJ, of which energy consumption for heating 1 501,37 TJ, and for hot water 437,06 TJ.

Forecast of power and heat demand up to 2035::

Assumptions:

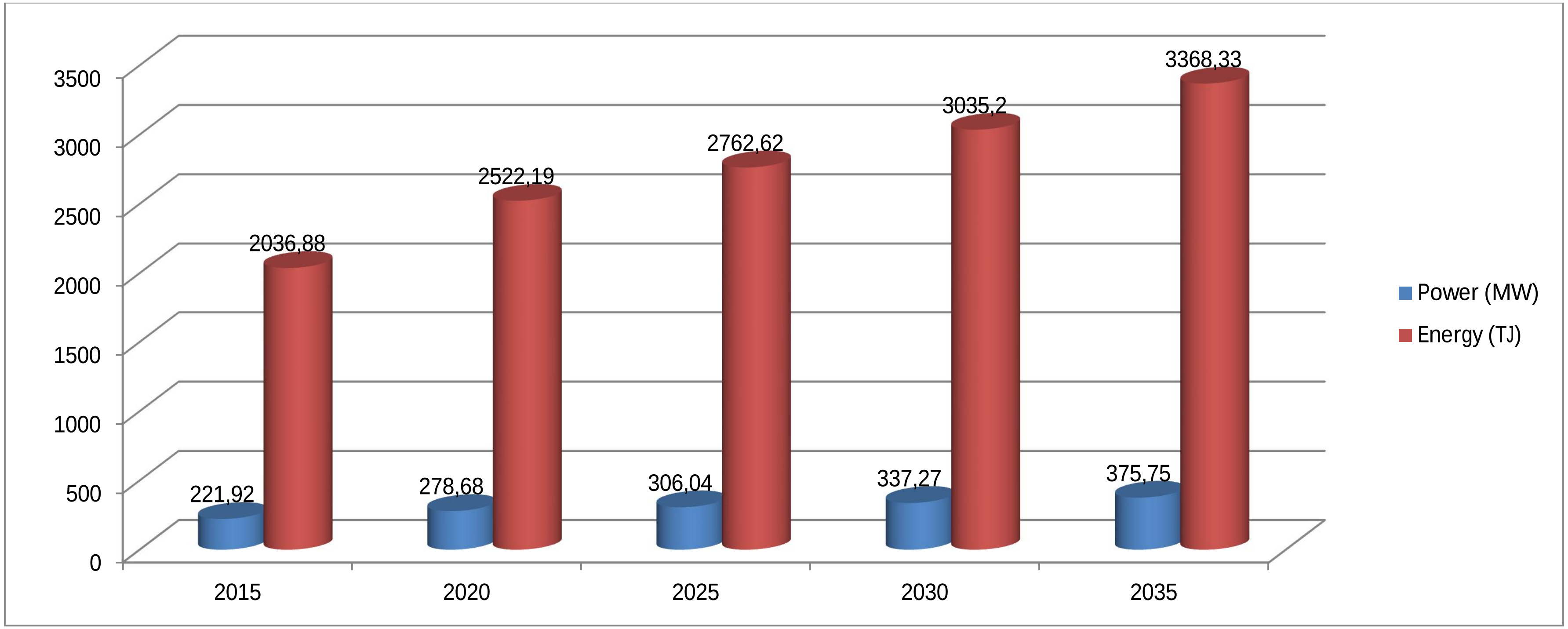
1) Currently, the average usable floor space of a dwelling per inhabitant is 22.71 m^2. In the years 2005-2012 a total of 1,996 apartments was built with a total floor space equal to 267 682 m^2, which gives the average size of new housing equal to 134.1 m^2.
2) The current demand for heat in the whole area of the county is 211 MW
3) The estimated annual energy consumption for heating and hot water is set at 1938.43 TJ (of which space heating - 1501.37 TJ and tap hot water - 437.06 TJ)
4) Calculation of heat power demand for space heating and domestic hot water for residential construction was based on the ratio of the average annual energy consumption for heating 1 m^2 of building, which was adopted at the level of 130 kWh/m^2. Specific heat demand will thus be 0,037 kW/m2.
5) Heat demand for hot water preparation was determined on the same basis as for the status quo;
6) In addition, the ratio to reduce demand was estimated - compared to 2012. The heat demand will decrease as a result of thermal retrofitting the residential buildings: 3% by 2015, 8% in 2020, 13% by 2025, 18% by 2030 and 23% up to 2035;
7) Power and heat demand are calculated based on estimates of the number and the usable floor space for the Gorlice County, published in Chapter 8. It is assumed that increase of the housing resources in the county will fulfil the housing needs of society.

Table 9: Forecast of demand for thermal power and energy for space heating and hot water production by the households in the Gorlice County up to 2035.

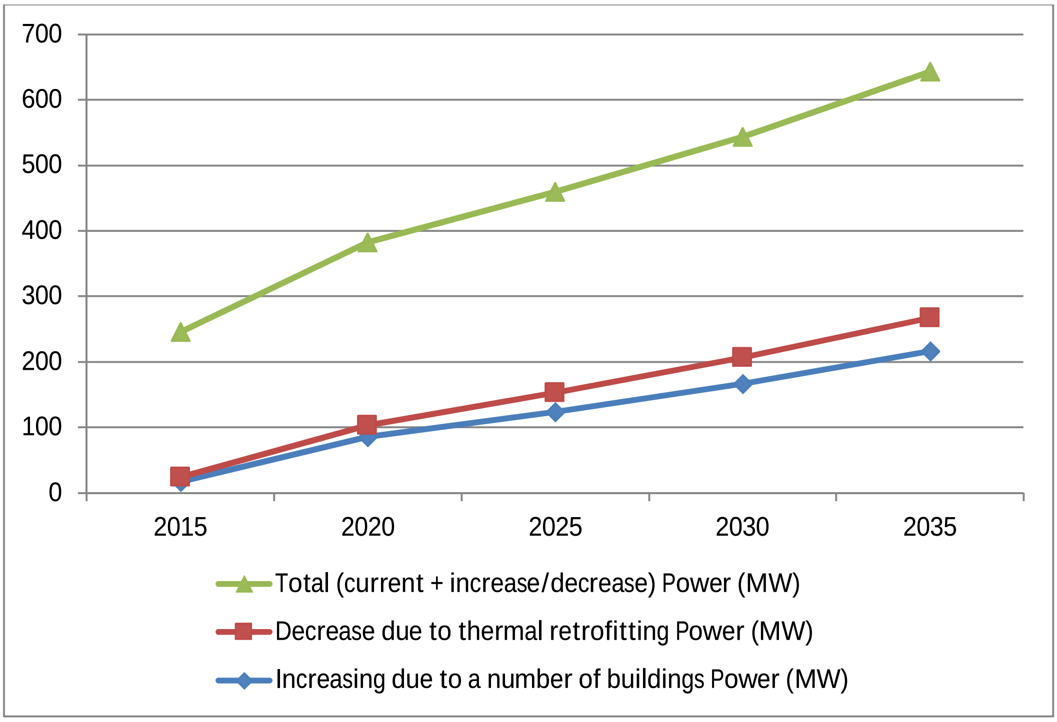
#	Increasing due to a number of buildings					Decrease due to thermal retrofitting					Total (current + increase/decrease))				
	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035	2015	2020	2025	2030	2035
Power (MW)	17,62	85,54	124,07	166,46	216,11	6,70	17,86	29,03	40,19	51,36	221,92	278,68	306,04	337,27	375,75
Energy (TJ)	146,84	712,80	1033,89	1387,12	1800,90	48,39	129,04	209,70	290,35	371,00	2036,88	2522,19	2762,62	3035,20	3368,33

Source: authors' elaboration based on CSO data and the housing forecast.

Graph 15: Forecast of demand for thermal power and energy for space heating and hot water production by the households in the Gorlice County up to 2035.

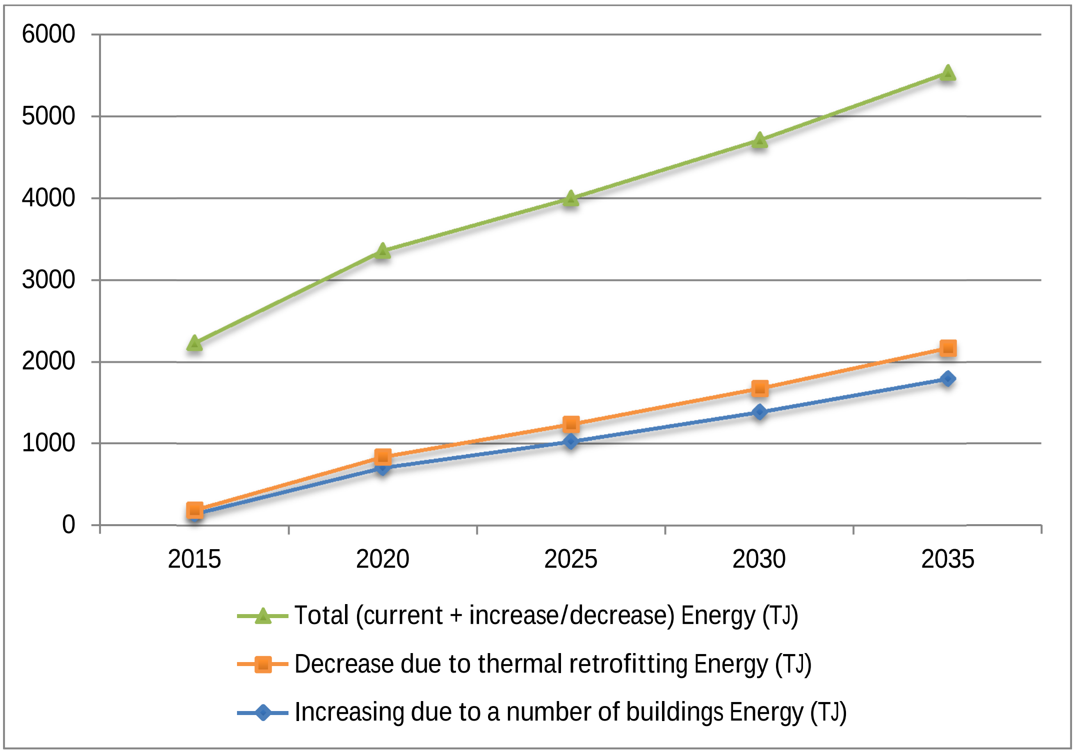


Graph 16: Forecast of thermal power demand by households in the Gorlice County up tp 2035 [MW]



Source: authors' elaboration based on CSO data and the housing forecast.

Graph 17: Forecast of energy demand by households in the Gorlice County up to 2035 [MW].



Source: authors' elaboration based on CSO data and the housing forecast.

4. Energy demand vs. spatial development.

The demand for energy in statistical terms is considered in relation to the five main sectors:

- Industry
- Transport
- Households
- Agriculture
- Trade and services

Industry:

The Gorlice County does not have energy-intensive industries. Trade and services are the predominant economic activity. Business activity is concentrated in the cities and the larger villages. There is the Special Economic Zone "Europark" Mielec - Industrial Area Gorlice of about 30 hectares. SEZ is located in the district of Glinik Mariampolski on both sides of the national road No. 28 (Wadowice - Nowy Sacz - Krosno - Przemyśl). This land is owned currently by the City (formerly by Machinery Factory "Glinik" SA). We do not anticipate that the company will invest there to run high energy production or services.

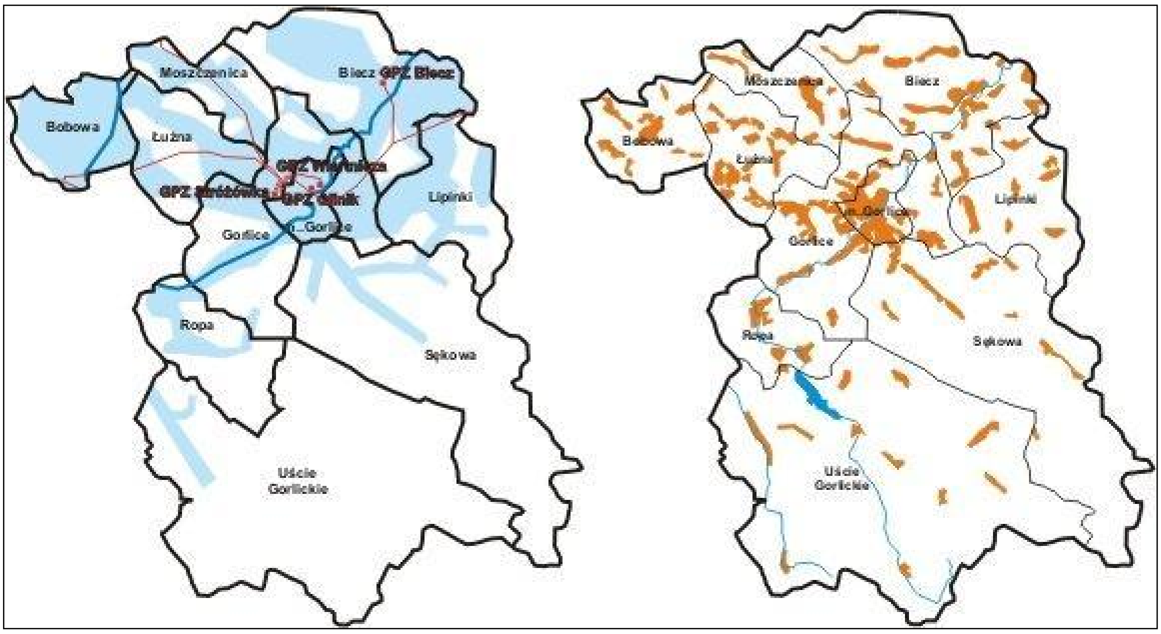
One can assume that in the Gorlice County demand for energy is highly correlated with the degree of urbanization and the population density.

Table 10: Number of persons per 1 km^2 area in the communities of the Gorlice County in 2012.

Community	Number of persons per 1 km^2
Gorlice (city)	1214
Biecz (city and village)	174
Bobowa (city and village)	192
Gorlice	166
Lipinki	102
Łużna	149
Moszczenica	130
Ropa	109
Sękowa	25
Uście Gorlickie	23
Powiat ogółem	113

Source: CSO, 2012

Graph 18:The high voltage electricity grid and the natural gas grid vs. urbanization and population density.



<u>Transport:</u>

The energy used in transport comes mainly from liquid fuels (petrol, diesel, LPG), to a small extent it is electricity (rail).

The number of vehicles registered in 2011 in the Gorlice County totaled 62 838, of which trucks – 4 930 and 44 942 cars.

Unit fuel consumption depends on so many factors that it is not possible to estimate on that basis the demand for fuel for the entire district.

<u>Households:</u>

Households use energy for:

- space heating – mainly coal, wood, natural gas, in less extent fuel oil or electricity;
- lighting and small appliances - electricity; cooking – natural gas, LPG and coal (in less extent electricity).

The demand for energy in households is highly correlated with the degree of urbanization and the population density.

<u>Agriculture</u>

The demand for energy in agriculture is fulfilled by the basic energy carriers: wood and coal for space heating, diesel - transport, electricity - lights and drive machinery. Energy demand in individual farms depends heavily on their size and production profile.

<u>Trade and services:</u>

Services and commerce are located in areas with a higher urbanization concentrated in cities and major villages. This part of the business activity consumes all types of energy.

Energy use in the county is based almost exclusively on traditional sources - renewable energy has a negligible share in the overall energy balance. It is difficult to change this ratio due to low potential for the development of big scale RE production. More opportunities provide a small scale RE production located in individual farms or buildings. In this case, the improvement in the energy balance ratio is more likely due to a large number of potential sites suitable for micro scale renewable energy production.

The analysis took into account two types of energy generated from renewable sources - electricity and thermal energy.

It is expected that the highest potential for the production of heat from renewable sources is at the point of use i.e. at buildings (solar panels and heat pumps). There are the boilers producing heat from biomass in hospital in Gorlice. This installation is regarded as “good practice” in the use of renewable energy. Transport of biomass fuel for long distance is unprofitable both for home boilers and boiler houses securing thermal energy for end users connected to the grid.

Electricity generation (small photovoltaic systems and small wind turbines) for household own use with the possibility of selling the excess of electricity to the grid is feasible in buildings throughout the county. Large scale electricity generation (large wind turbines and photovoltaic farms) must be located in areas that provide an easy access to the grid. Such condition one can find in the northern part of the county.

The adopted a dozen or so years ago studies/plans of spatial development and land use did not designate areas for the development of RES. This is one of the main obstacles to the development of large scale RE generation.

5. Potential conflicts and barriers for renewable energy development in the county.

1. Conflicts

According to the analysis of the current conflicts over investment in renewable energy sources in Poland there are of two types of such conflicts:

- arising from the neighbourhood of the new installations - here the main actors of the conflict are local residents contesting the burden and constraints in development (e.g. tourism) on the one side and the investor on the other side (sometimes supported by local governments looking for an opportunity to increase tax revenue);
- "doctrinal" - here are the main actors of the conflict are environmental organizations highlighting the risk to human health or the environment due to the location or adopted technology solutions on the one side and investors on the other side, supported by a thriving industry organizations.

Of course, in certain cases, the both types of conflict can coexist.

<u>The conflicts over investment in renewable energy in the Gorlice County.</u>

The current conflicts

So far, the only investment in renewable energy in Gorlice County causing conflicts were investments in wind farms (Grudna Kępska and Rozdziele).

The investment process in Rozdziele (the municipality of Lipinka) began in 2007. In 2011, subsequent investor of the project, the company Business Training Prospero SC, was awarded a grant from National Fund for Environmental Protection and Water Management in the amount of 22.6 million PLN for "Rozdziele wind farm with a capacity of 4,5 MW - the second stage. "

The characteristics of this potentially conflict-situation:

- difficult to access information about the details and progress of the investment process;
- uncertainties of location - especially in relation to small distance between wind turbines and residential buildings.

Similarly, poor information and too small, according to residents, distance of buildings from wind turbines wind power plant with a capacity of 1.7 MW were the cause of the conflict in Grudna Kępska. The lack of consent of the Municipal Council in Biecz to changes in the land use plan makes it impossible to continue the investment. In this way conflict ended in April 2012.

Poor information, lack of a clear determination of the impact of the location of wind turbines on the health of local residents as well as a regulation of the location in relation to residential buildings (more liberal in Poland than in other countries) are a source of and a key element of the conflicts.

The Ombudsman in his address to the Minister of Transport, Construction and Maritime Economy (RPO-716190-IV/12) of 11 March 2013 noted the lack of a separate regulation of wind turbine towers distance from other structures.

It should be noted that the above remarks apply to most of the major investments in renewable energy sources in Poland, especially in professional wind power.

Final report "Evaluation of the public consultation carried out in the construction of wind farms in Poland" prepared by the Polish Sociological Association in October 2011, on request of the Ministry of Regional Development, describes the course of the public consultation in 15 locations related to wind power and conflict areas.

Among the identified, main problems related to public consultation the authors of the report indicate:

- minimalistic approach to public consultation - the quality of public consultations, which are often carried out only to fulfil the legal requirements, is not sufficient in terms of transfer of complete information to the local community;
- lack of a clear source of information - the lack of a clear position regarding the impact of wind turbines on the vicinity and the environment;
- unclear financial links and the lack of transparency in the preparatory process of the construction of wind turbines;
- limited possibilities of the investor - the availability of appropriate energy infrastructure and environmental aspects to the placement of wind farms.

The future conflicts

" A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice" leads to the conclusion that in the District there should be no serious conflicts over location of renewable energy investment, especially in a situation where the preferred direction is the development of small household renewable energy installations.

However, this does not relieve the local authorities of preparation and implementation of procedures for public consultations for investment in renewable energy in order to prevent and resolve potential conflicts.

2. Barriers

The main barriers to renewable energy development in the Gorlice County have been identified in the paper "A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice".

Forestry biomass

The main barrier to the development of this energy source is the inability to increase the supply of forest biomass. This potential is now almost completely used.

However, the development is possible but only by more efficient energy use of biomass (improved combustion technology - a new, specialized furnaces, increase public awareness).

Straw biomass

The main barrier is the limited supply coupled with organizational barriers (supply logistics and storage), economic (investment, production level and stability of prices) and technology (specialized ovens or pre-furnaces).

Professional wind power generation

The main barrier is the limited availability of areas of sufficient wind conditions for the professional wind power as well as with access to the electricity grid. This limited availability is due also to the presence of various forms of nature conservation. The high risk of conflict is also a barrier to development.

Small wind turbines

The main barrier to the development of small wind power generation is low awareness amongst the potential users of the advantages and limitations of this technology.

Other barriers are:

- financial barriers (significant upfront costs)
- legal barriers; mainly related to wind energy installations connected to the grid (the need of doing business and complicated rules for connection); for installations producing electricity for their own use (autonomous systems) the only barriers are related to the mast height and its assembly to the ground.

It should be expected that the introduction of changes in the law (Act on RES) will eliminate some of these barriers.

Solar panels

Barriers to the development of solar panels are:

- awareness barriers among the potential users - a limited knowledge of technological and organizational aspects,
- financial barriers - the need to incur significant capital expenditures.

Photovoltaics

Barriers to the development of photovoltaics are:

- barrier of awareness - a small knowledge of the possible applications,
- financial barriers - still too expensive for widespread use especially in the absence of financial incentives from the State.

Hydro power generation

The main barrier is a supply side barrier - a low hydropower potential of the rivers in the county.

Deep geothermal energy

The main barrier is financial barrier - the high cost of investment.

Shallow geothermal energy

The main barriers are:

- financial barriers - now relatively large capital expenditures limit the number of potential users (private or institutional),
- technological barriers - troublesome preparation for use of the ground source.

Table 11: The main barriers in RES development in the Gorlice County

RES / Barriers	Avareness	Legal and administration	Supply	Environmental	Organizational	Financial
Biomass - forestry	X		X			
Biomass - straw			X		X	
Professional wind power generation	X	X	X	X		
Small wind turbines	X	X		X		X
Solar panels	X					X
Photovoltaic farms		X				
Small photovoltaic	X	X				X
Hydro power generation			X			
Deep geothermal energy						X
Shallow geothermal energy	X					X

Source: authors' elaboration

The main barriers to renewable energy development in the Gorlice County can be assigned to one of three groups:

I. supply barriers and environmental constraints - these are the barriers which the local government and residents have virtually no impact,

II. legal, administrative and financial barriers - these are the barriers the removal of which is primarily the responsibility of the legislature and government,

III. awareness and organizational barriers - these types of barriers can be removed or greatly reduced by actions initiated by local government and non-governmental organizations.

6. Areas with high potential for renewable energy development.

The following analysis applies only to renewable energy sources have been identified as strategic in "A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice".

RES – individual sources

The document " A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice" recommends that the county leading strategies should be those involving the production of energy at the point of use (ie, solar, photovoltaic, small wind turbines and heat pumps).

The analysis of energy demand in the Gorlice County in conjunction with an analysis of potential conflicts and barriers to renewable energy development shows that the greatest potential for growth without conflict have individual sources based on solar energy (solar panels, photovoltaic), wind energy (small wind turbines) and shallow geothermal energy. The construction of such installations does not require passing cumbersome administrative procedures.

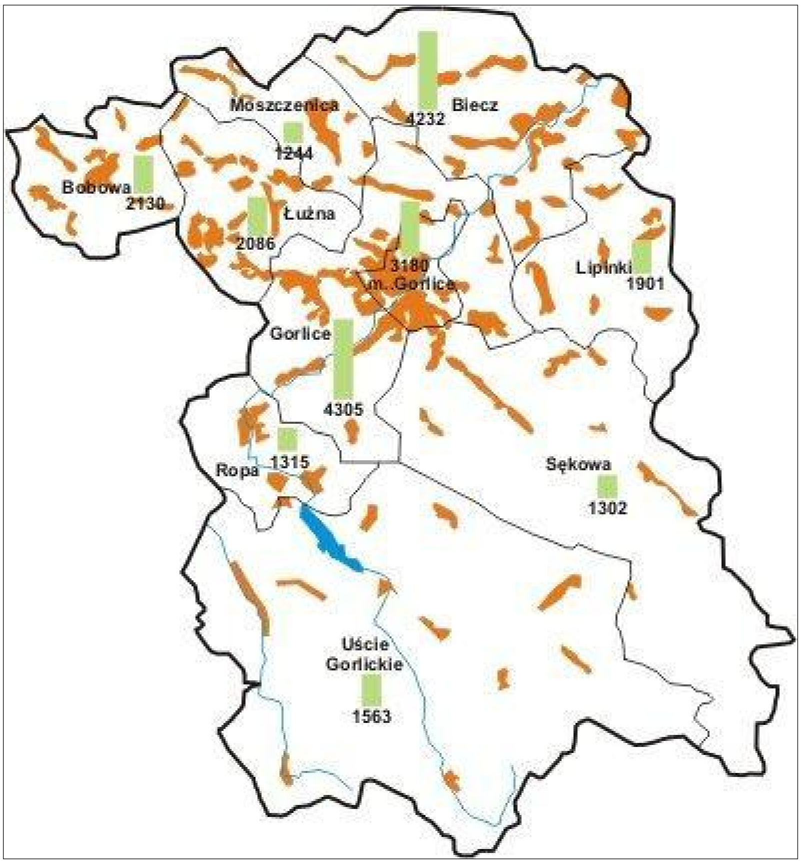
The following figure presents the number of residential buildings in the individual municipalities. Due to the small number of RES installations in the county can be assumed that the numbers shown is the potential of individual renewable energy sources. The possibility of installing a solar thermal or a PV system depends on the technical conditions within the building, the exposure of the roof, etc.. And the installation of heat pumps depends, among others on the geological conditions and the size of land owned by the investor. It is estimated that a.m. causes can eliminate from the pool of potential sites for renewable energy around 25-30% of the buildings.

Electricity generation in small wind turbines should be done in areas of low and scattered buildings. Such areas can be found all over the county, except in urban areas

Biomass resources in the county were estimated as a significant but dispersed sources of energy. Biomass is used practically in most households, with individual heating systems as auxiliary fuel (firewood). Other types of biomass could be a resource for development.

The overall barrier for the development of RES is a lack of financial resources in most households.

Graph 19: The number of buildings in the Gorlice County.



RES – professional generation

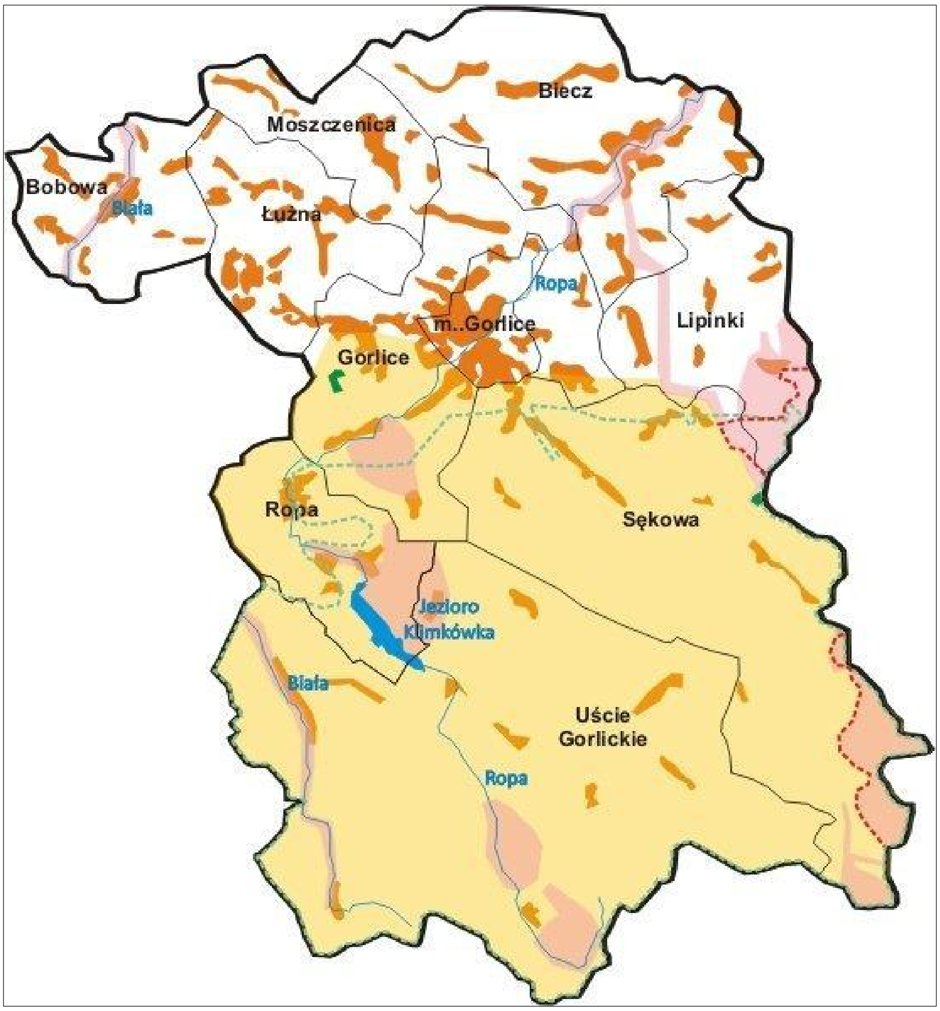
Two possible sources were analysed: wind (wind turbines with an output exceeding 100 kW) and solar energy (photovoltaic farms).

Professional wind power generation

Currently construction of a wind farm is carried out in Rozdziele (the municipality of Lipinka). The main barriers to the development of "large" wind power generation is the acoustic impact of windmills and environmental constraints – various forms of nature conservation in the county. The following figure shows the protected areas and major urban areas, it means areas excluded from this type of investment. In addition, there are areas of low density housing (not shown on the drawing) which further limits the pool of wind farm sites. In addition, technical factors such as an access to adequate wind resource and energy grid reduce the number of suitable locations.

Consequently one should not expect a significant development of professional wind power generation in the county.

Graph 20: Urbanization and nature conservation areas in the Gorlice County.



Photovoltaic farms

Much higher potential for growth - compared with wind energy - is associated with the photovoltaic farms. In the absence of a negative impact on the environment, there is no need to designate an impact area although in the case of farms with a size of over 0,5 hectares in areas of nature conservation or 1,0 ha in other areas PV farm may have a significant environmental impact and are considered as an industrial development in accordance with the Regulation of the Council of Ministers of 9 November 2004 concerning the types of projects that may have a significant impact on the environment. (Dz. U. 199, poz. 1227).

The district is undulating, so there are significant amounts of sites suitable for the construction of such PV farms: the slope with southern exposure and a low quality soil. Construction of a wind farm with a capacity greater than 100 kW is possible only in an area that is specified in the municipal land use plan as a site for the development of renewable energy sources. In most municipalities there are no such areas and to amend the planning documents sometimes takes several years. Such restrictions do not exist for farm small (up to 100 kW), but the profitability of such investment is much lower.

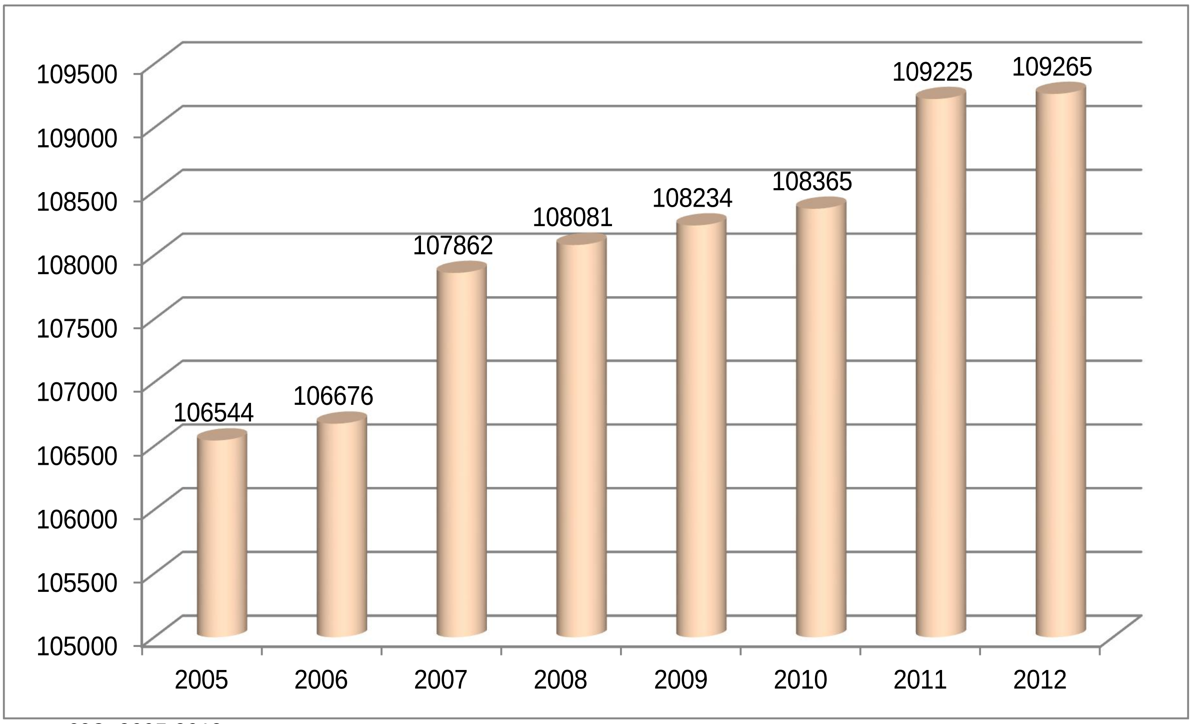
In planning of solar farms the factors related to the connection to the grid should also be taken into account.

DEMOGRAPHIC AND ECONOMIC SCENARIOS 3.3.2

7. The analysis of demographic processes in the Gorlice County.

The analysis of demographic processes was based on the CSO data for the years 2005-2012. This timeframe allows to capture demographic trends in the county and use them in the forecast of demographic changes.

Graph 21: Population of the Gorlice County in 2005- 2012



Source: CSO, 2005-2012

According to the records of the population of the Central Statistical Office (CSO), which takes into account the actual place of residence the Gorlice County in 2012 was inhabited by 109 265 people. In terms of population the county ranks 14th among the 22 counties in Małopolska. The Gorlice County accounts for about 3.3% of the population of Małopolska.

Table 12: Population in w 2012 by community

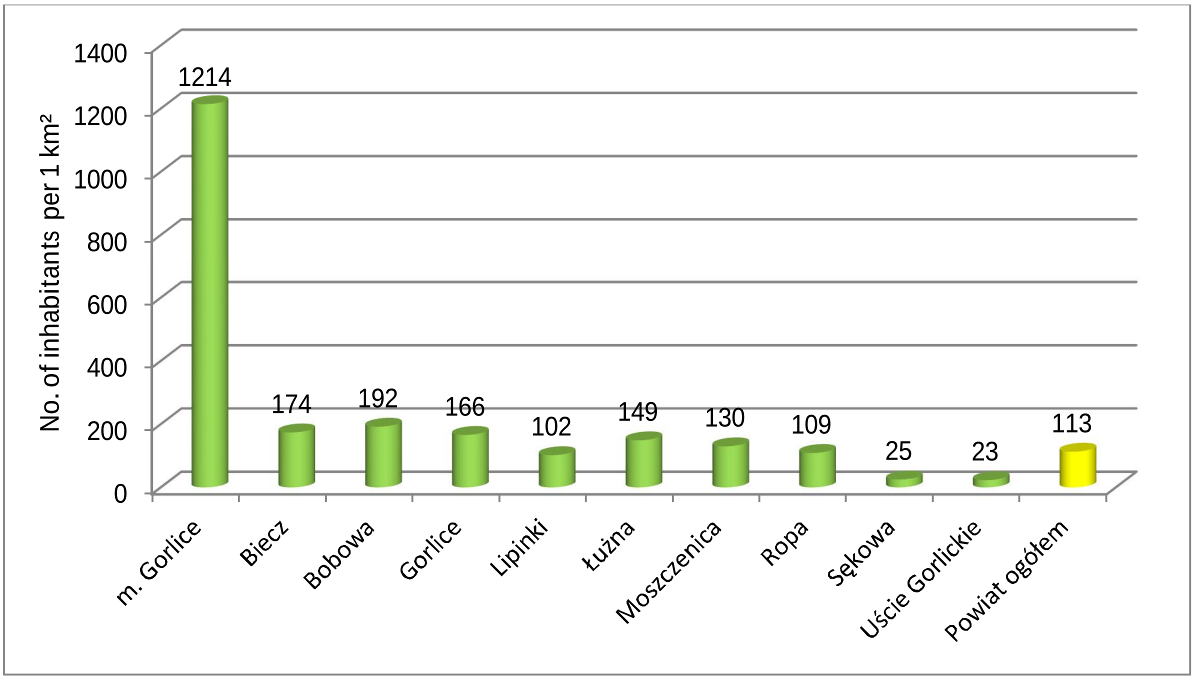
Community	Men	Women	Total
Gorlice - city	13712	14843	28555
Biecz	8372	8684	17052
of which: city	*2276*	*2424*	*4700*
village	*6096*	*6256*	*12352*
Bobowa	4855	4709	9564
of which: city	*1549*	*1447*	*2996*
village	*3306*	*3262*	*6568*
Gorlice	8516	8529	17045

Lipinki	3323	3479	6802
Łużna	4242	4145	8387
Moszczenica	2455	2430	4885
Ropa	2697	2638	5335
Sękowa	2439	2482	4921
Uście Gorlickie	3408	3311	6719
County total	54029	55250	109 265

Source: CSO, 2012

Among the rural communities of the Gorlice County, most of the population lives in the municipality of Gorlice (approximately 31.5%) and the smallest number in the municipality of Moszczenica (about 9%).

Graph 22: Population in 2012 by community.

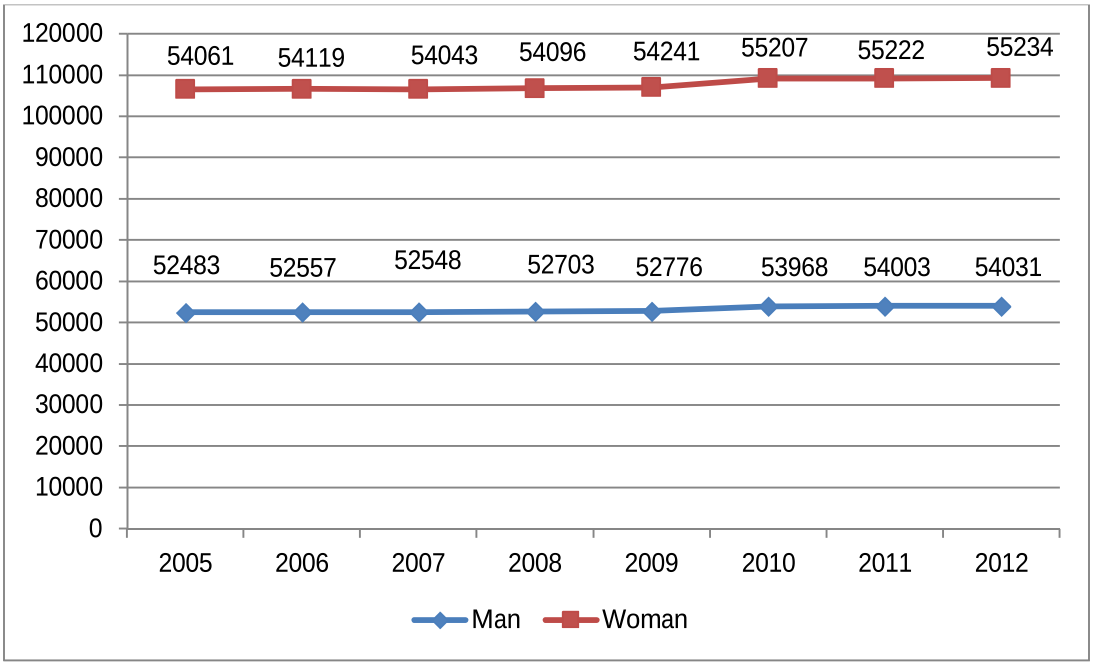


Source: CSO, 2012

The average population density in the Gorlice County stands at 113 persons per km^2, and is also one of the lowest in the Małopolska (average 221 persons per km^2).

The structure of the population by sex and age

Graph 23: Women and men in the Gorlice County 2005- 2012



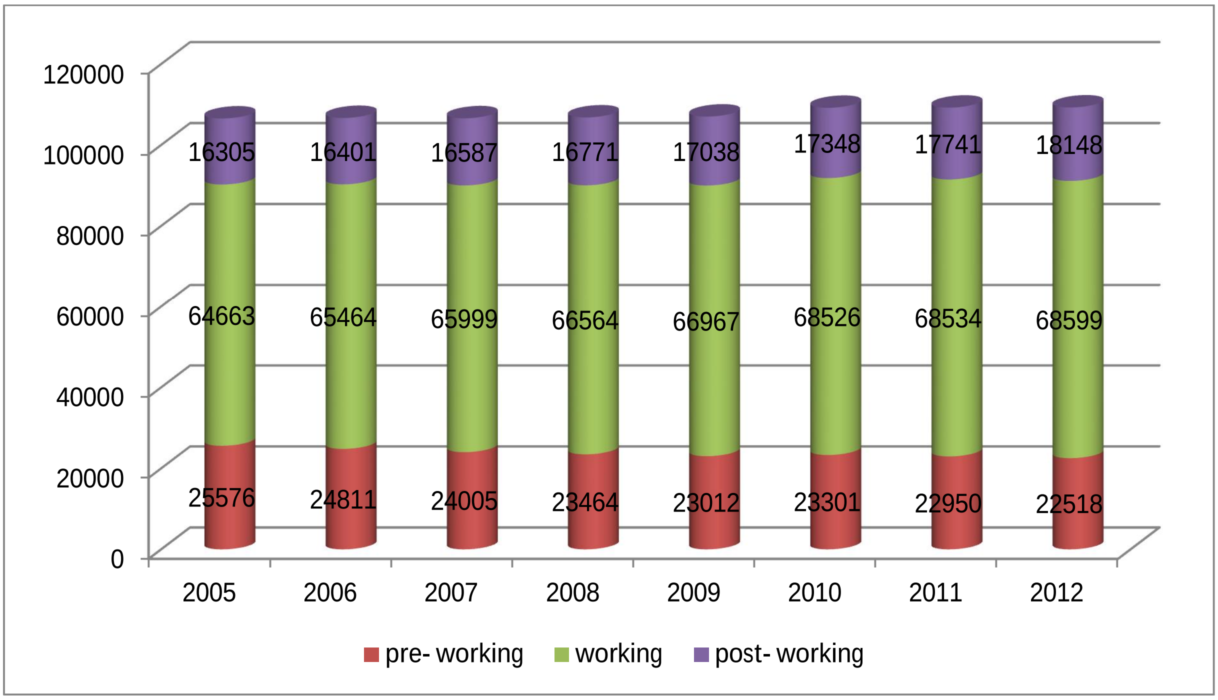
Source: CSO, 2012

In the period under review there was a predominance of women over the number of men. In 2012, the overall population of 54 031 men account for approximately 49.4%.

Overall in 2012 in the Gorlice County on the 100 men there are about 102 women. For comparison, in the Małopolska feminisation index reached 106,15.

The highest rate of feminization in the Gorlice County is in the city of Gorlice (108,25) and lowest in Uście Gorlickie. In the case of masculinisation indicators, the highest level was recorded in the municipality of Bobowa, where for 100 women there were about 103 men.

Graph 24: Breakdown of the population by the economic age groups in the Gorlice District 2005 - 2012



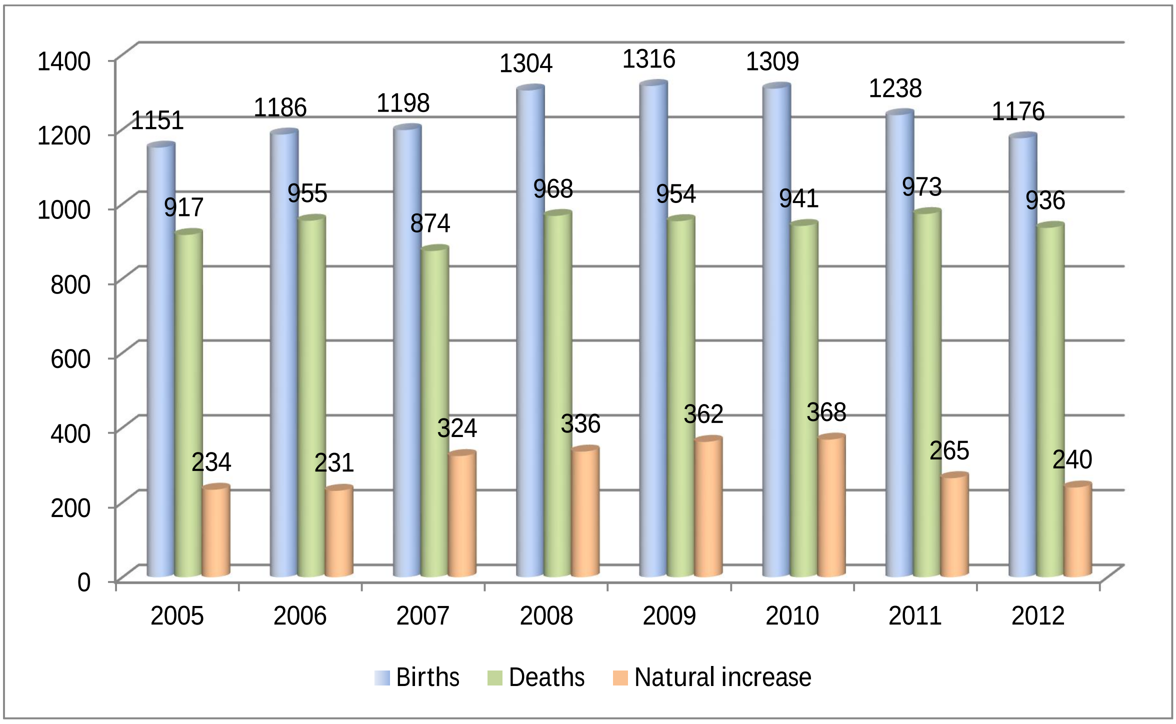
Source: CSO, 2005- 2012

Table 13: Breakdown of the population by the economic age groups in the communities of the Gorlice County in 2012

Community	Pre-working age	Working age	Post-working age
Gorlice (city)	4826	18405	5324
Biecz	3424	10678	2950
Bobowa	2452	5821	1291
Gorlice	3520	10686	2839
Lipinki	1365	4255	1182
Łużna	1872	5219	1296
Moszczenica	1110	2988	787
Ropa	1323	3248	764
Sękowa	1016	3087	818
Uście Gorlickie	1610	4212	897
County total	22518	68599	18148

Source: CSO, 2012

Graph 25: Population growth in the Gorlice County 2005- 2012



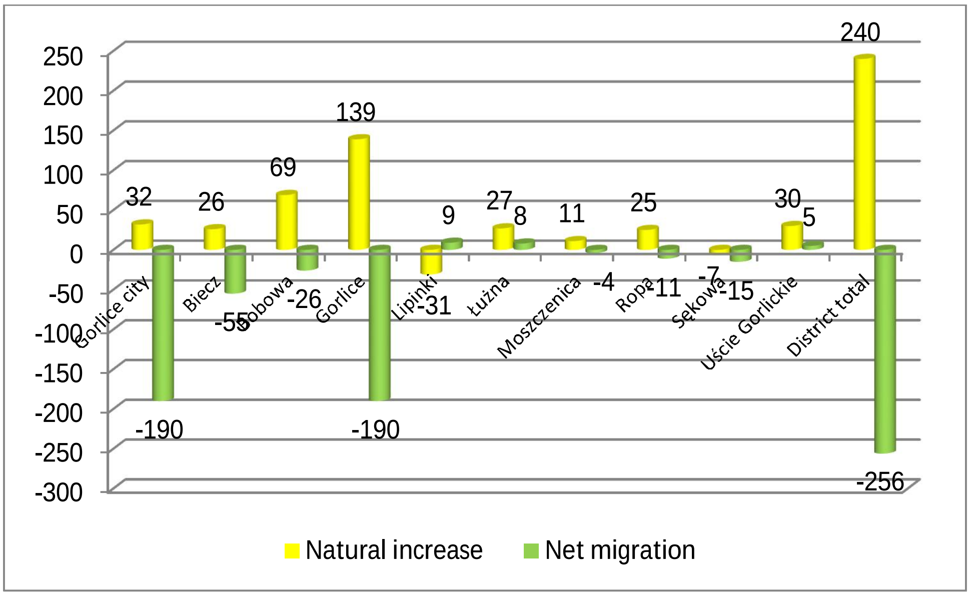
Source: CSO, 2005- 2012

Table 14: Population growth in the Gorlice County in 2012 by communities

Community	no. of births	no. of deaths	Natural increase
Gorlice (city)	269	237	32
Biecz	183	157	26
Bobowa	133	64	69
Gorlice	269	130	139
Lipinki	55	86	-31
Łużna	93	66	27
Moszczenica	56	45	11
Ropa	71	46	25
Sękowa	42	49	-7
Uście Gorlickie	86	56	30
County total	1176	936	240

Source: CSO, 2012

Graph 26: Indicators of natural increase and the balance of migration in the individual communities of the Gorlice County



Source: CSO, 2012

The forecast of the population in the Gorlice County

To estimate the population in the district of Gorlice, data published in 2009 by the Central Statistical Office (CSO) in the paper "The population forecasts for the period 2008-2035." were used.

Table 15: The forecast of the population in Małopolska

Małopolska:	up to:				
	2015	2020	2025	2030	2035
Overall	3 338 000	3 364 700	3 373 300	3 359 500	3 328 700
Men	1 614 900	1 628 100	1 632 900	1 616 000	1 611 100
Women	1 723 100	1 736 500	1 740 400	1 733 400	1 717 700

Source: „Prognoza ludności na lata 2008- 2035", CSO 2009

Referring to the above forecast, as well as demographic changes of the Gorlice County, the following forecast of the population was formulated:

Table 16: The forecast of the population in the Gorlice County up to 2035

Powiat gorlicki:	up to:				
	2015	2020	2025	2030	2035
Overall	109 172	108 684	107 582	105 882	103 887
Men	54 082	53 994	53 644	52 782	51 679
Women	55 090	54 690	53 938	53 100	52 208

Source: Authors' elaboration based on „Prognoza ludności na lata 2008- 2035", CSO 2009

8. The analysis of the development of housing in the Gorlice County.

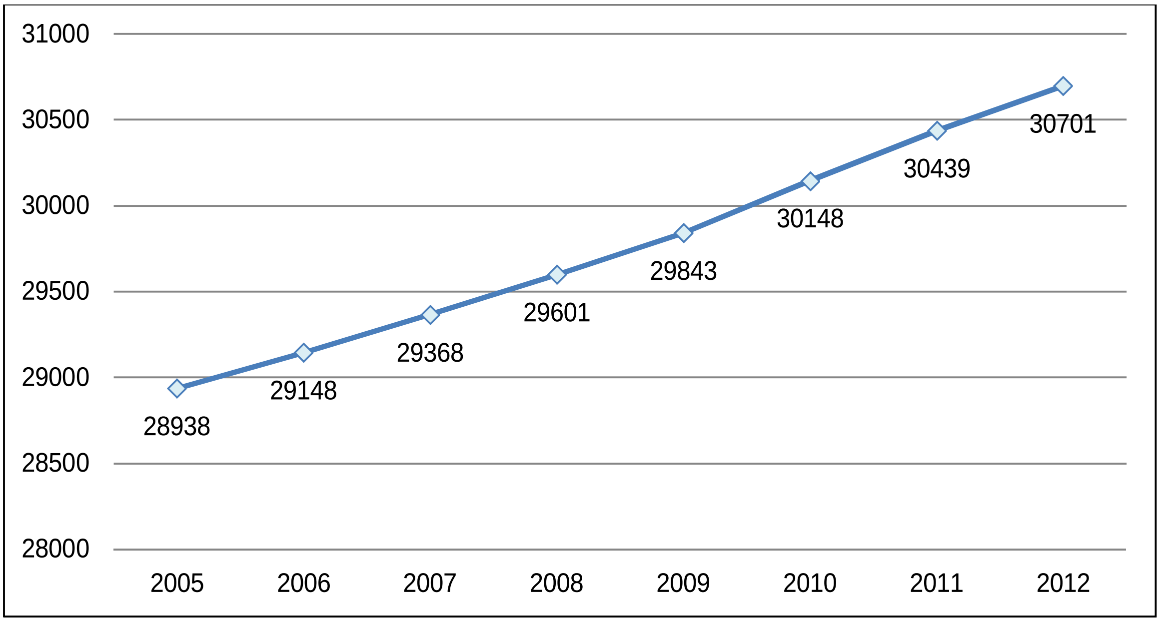
The analysis of the housing development was based on the CSO data for the years 2005-2012. This timeframe would allow the identification of trends in the county and use them in the forecast of energy demand.

Table 17: The housing resources in the Gorlice County 2005 – 2012.

Housing resources	unit	2005	2006	2007	2008	2009	2010	2011	2012
Dwellings	number	28 938	29 148	29 368	29 601	29 843	30 148	30 439	30 701
Rooms	number	116 085	117 158	118 423	119 758	121 116	122 730	124 438	125 953
Floor area	m^2	2 245 902	2 270 813	2 300 442	2 332 349	2 366 574	2 405 150	2 446 701	2 481 596

Source: CSO, 2005- 2012

Graph 27: Floor area in the Gorlice County 2005 -2012



Source: CSO, 2005- 2012

According to CSO (www.stat.gov.pl) at the end of 2012 the district has 30 701 dwellings with a total usable floor area of 2 481 596 m^2. An average size of a dwelling is 80,83 m^2 (Małopolska 76,35 m^2) and in one dwelling living an average of 3,56 persons (Małopolska – 3,00). The average dwelling consists of 4,10 chamber, which gives the value of 0,87 persons per one chamber. Statistical resident of Gorlice district has at its disposal housing floor surface of 22,71 m^2.

The housing situation of the county population is improving steadily, it is the result of new buildings of a higher standard.

Table 18: The housing standard in the Gorlice County vs Małopolska in 2012

	Details:	Gorlice County	Małopolska
Average	numbers of rooms in dwelling:	4,10	3,84
	inhabitants per 1 dwelling :	3,56	3,00
	inhabitants per 1 room:	0,87	0,78
	usable floor space of 1 dwelling (m^2):	80,83	76,35
	usable floor space per 1 inhabitant (m^2):	22,71	25,43

Source: CSO, 2012

The increase in the number of dwellings in the county is estimated on the current pace of growth in new housing.

Table 19: Forecast of number of dwellings and usable floor space in the Gorlice County.

Year	Number of dwellings	Usable floor space [m^2]
2015	31454	2579486
2020	32774	2757686
2025	33979	2916746
2030	35104	3070871
2035	36264	3227471

Source: Authors' elaboration based on CSO data

According to forecasts the number of dwellings will grow steadily. This may be related also to the trend prevailing in the present that the big city dwellers are moving to attractive countryside locations.

9. The assessment of the economic development of the county and the envisaged trends

The analysis of the economic activity performed on CSO data for the years 2005-2012. This timeframe would allow the identification of trends.

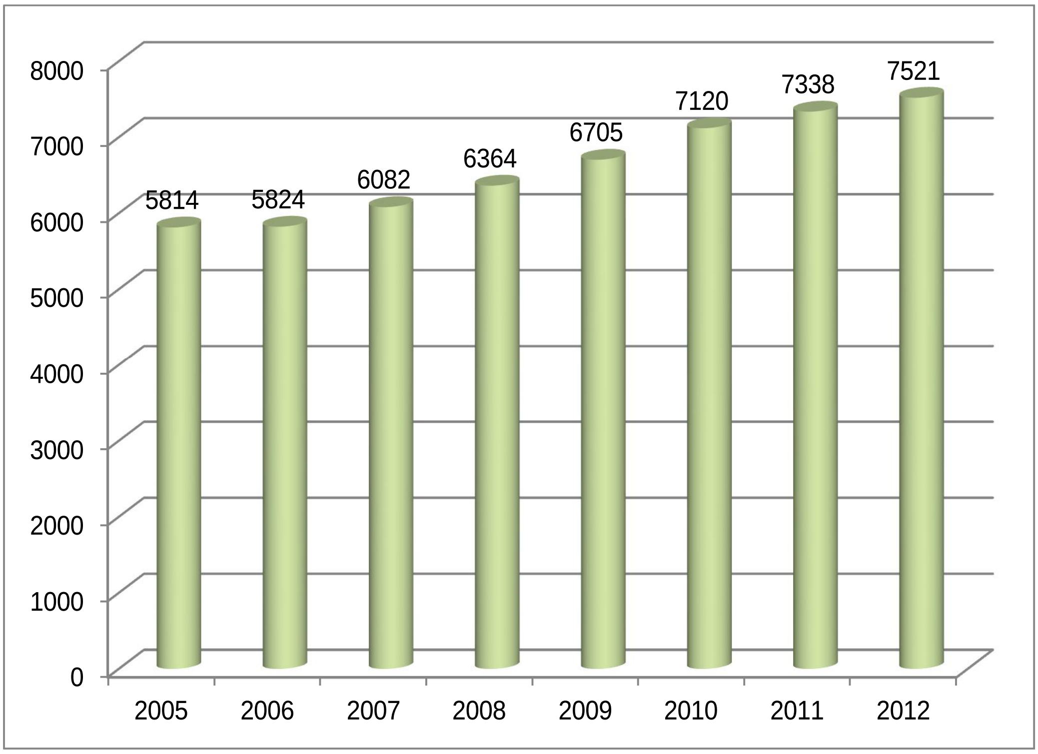
The business enterprises in the Gorlice County

Table 20: Number of business enterprises 2005 - 2012

Details:	2005	2006	2007	2008	2009	2010	2011	2012
Business enterprises overall:	5814	5824	6082	6364	6705	7120	7338	7521
Public sector:	347	353	353	345	343	367	363	362
of which:								
state and local government units of budgetary law	293	299	299	295	294	297	293	291
state enterprise	1	1	0	0	0	0	0	0
commercial companies	14	14	12	11	9	8	8	10
commercial companies with foreign capital	1	1	1	1	1	1	1	1
state and local units of budgetary law, auxiliary	4	5	5	4	3	0	-	-
Private sector:	5467	5471	5729	6019	6362	6753	6975	7159
of which:								
Natural person conducting economic activity	4458	4425	4667	4937	5270	5597	5795	5911
commercial companies	193	200	204	201	204	8	8	10
commercial companies with foreign capital	24	26	23	20	21	21	19	24
cooperatives	60	58	58	57	56	55	55	54
foundations, associations and community organization	230	240	255	272	291	310	323	337

Source: CSO, 2005- 2012

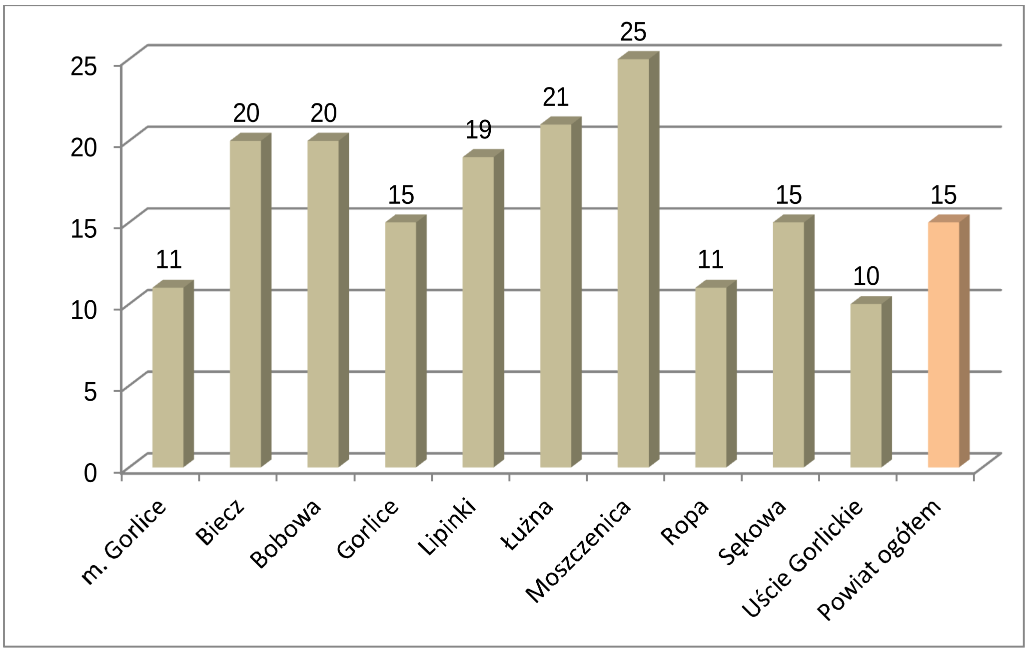
Graph 28: Number of registered business entities in the Gorlice County 2005- 2012



Source: CSO, 2005- 2012

In the years 2005 - 2012 systematic and clear upward trend in the number of enterprises is visible. Number of entities of the private sector demonstrate the economic activity of residents of the county. On the one registered enterprise in 2012, there were nearly 15 people, including about 9 people of working age (for comparison: Małopolska: 10 people of which 2 of working age)

Graph 29: Number of inhabitants per 1 registered business entity – by communities in 2012

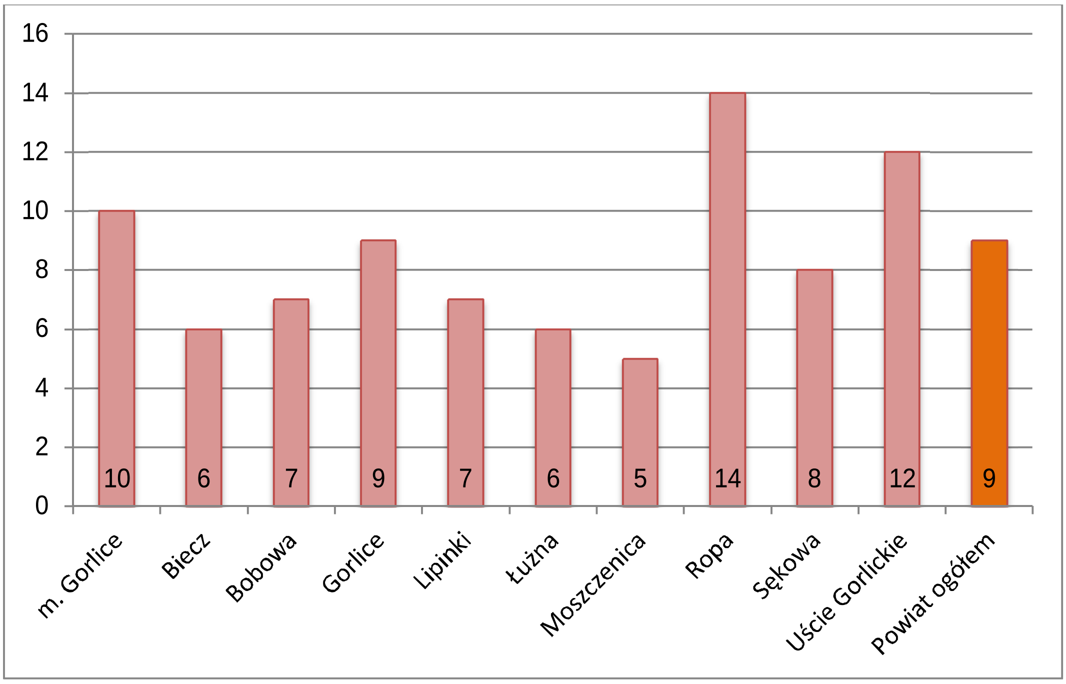


Source: CSO, 2005- 2012

The economic potential of Gorlice County district is diverse. The largest companies are

- Zakład Maszyn Górniczych „Glinik” sp. z o.o.,
- Kuźnia „Glinik” sp. z o.o.,
- Gorlickie Przedsiębiorstwo Przemysłu Drzewnego “Forest” sp. z o.o.,
- SEVERT Polska sp. z o.o.

Graph 30: Number of natural person conducting economic activity per 100 inhabitants in working age by community in 2012



Source: CSO, 2012

Table 21: Number of business entities by type of activity in 2009 – 2012 in the Gorlice County

Area of business activity	2009	2010	2011	2012
Agriculture, forestry and fishery	409	403	376	342
Industry and construction	2240	2393	2562	2666
Other business activity	4056	4324	4400	4513
Total	6705	7120	7338	7521

Source: CSO, 2009- 2012

Table 22: Gross Domestic Product (current prices) for Małopolska and subregion of Nowy Sącz 2008 - 2010

Wyszczególnienie	Małopolska			Nowy Sącz subregion		
	2008	2009	2010	2008	2009	2010
GPD overal [mln PLN]	95 020	99 610	104 089	15 259	16 076	16 547
GDP per 1 inhabitant [PLN]	28 948	30 251	31 501	19 987	20 949	21 467

Source: CSO, 2008- 2010

According to the GDP (at current prices) Małopolska is ranked 5th in the list of the largest economies in Poland and 8th in terms of GDP per capita 1 (data source: "The Małopolska Region in 2012". Małopolska Regional Studies).

Table 23:litreage fuel price [PLN/liter]

City of Gorlice	
Pb	5,56
ON	5,53
LPG	2,27
Małopolska	
Pb 98	5,70
Pb 95	5,43
ON	5,40
LPG	2,30
Poland	
Pb	5,66
ON	5,62
LPG	2,24

July 2013 r.

Table 24: Approximate price of energy carriers in Poland

Details	Price
Natural gas [PLN/m^3]*	1,43
Fuel oil [PL/l]	3,96
Black coal [PLN/t]	818,16
Wood [PLN/m^3]	300
Electricity [PLN/kWh]*	0,21

Prices at the end of 2012.
**price without distribution and servicing costs*

Agriculture

Table 25: Agricultural land in the Gorlice County in 2005

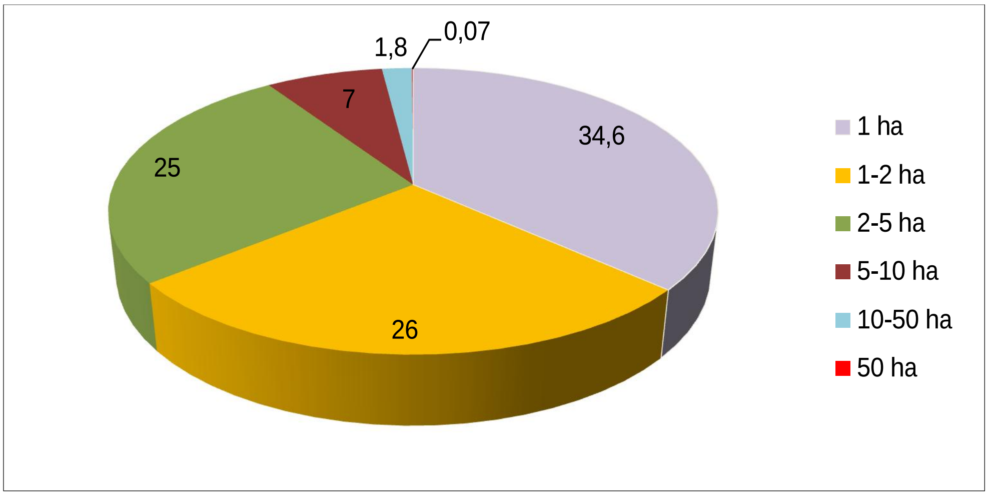
Community	Agricultural land [has]				
	Total	Arable	Orchards	Meadows	Pastures
Gorlice (city)	1 031	605	28	283	115
Biecz	6 666	4 601	83	1 105	877
Bobowa	3 610	2 709	42	513	346
Gorlice	5 736	3 173	81	1 721	761
Lipinki	3 481	1 854	30	1 042	555
Łużna	3 907	2 241	23	1 191	452

Moszczenica	2 690	1 735	15	590	350
Ropa	2 334	962	11	1 024	337
Sękowa	4 572	1 673	4	1 803	1 092
Uście Gorlickie	8 088	1 985	3	3 925	2 175
County total	42 115	21 538	320	13 197	7 060

Source: CSO, 2005

The total area of agricultural land in Gorlice County is 42 115 ha (app. 43.5% of the total area of the county).

Graph 31: Percentage share of the farms with regard to the area in the Gorlice County.



Source: CSO, 2005

In the Gorlice County the growing interest in organic farming in the largest farms in the area is observed. The largest number of organic farms is operating in the municipalities of Uście Gorlickie and Sękowa. There are about 200 organic farms in the county.

<u>Forestry</u>

Table 26: Forestry area in the Gorlice County in 2012

Community	Area of: lasów		Total [ha]
	state owned [ha]	private [ha]	
Gorlice (city)	90,4	116,0	206,4
Biecz	294,0	1 138,0	1 432,0
Bobowa	294,7	435,0	729,7
Gorlice	2 217,1	790,0	3 007,0
Lipinki	1 848,1	312,0	2 061,1
Łużna	363,6	765,0	1 128,6
Moszczenica	147,8	410,0	557,8
Ropa	1 304,7	557,0	1 861,7
Sękowa	12 180,8	1 172,0	13 352,8

Uście Gorlickie	16 197,8	1 403,0	17 600,8
County total	34 938,9	6 999,0	41 937,9

Source: CSO, 2012

Forests cover a large part of the county – 41 937,9 hectares, which is 43% of the total county area. The index is much higher than the Małopolska (28.6% of the area) and the national (29.3% of the area).

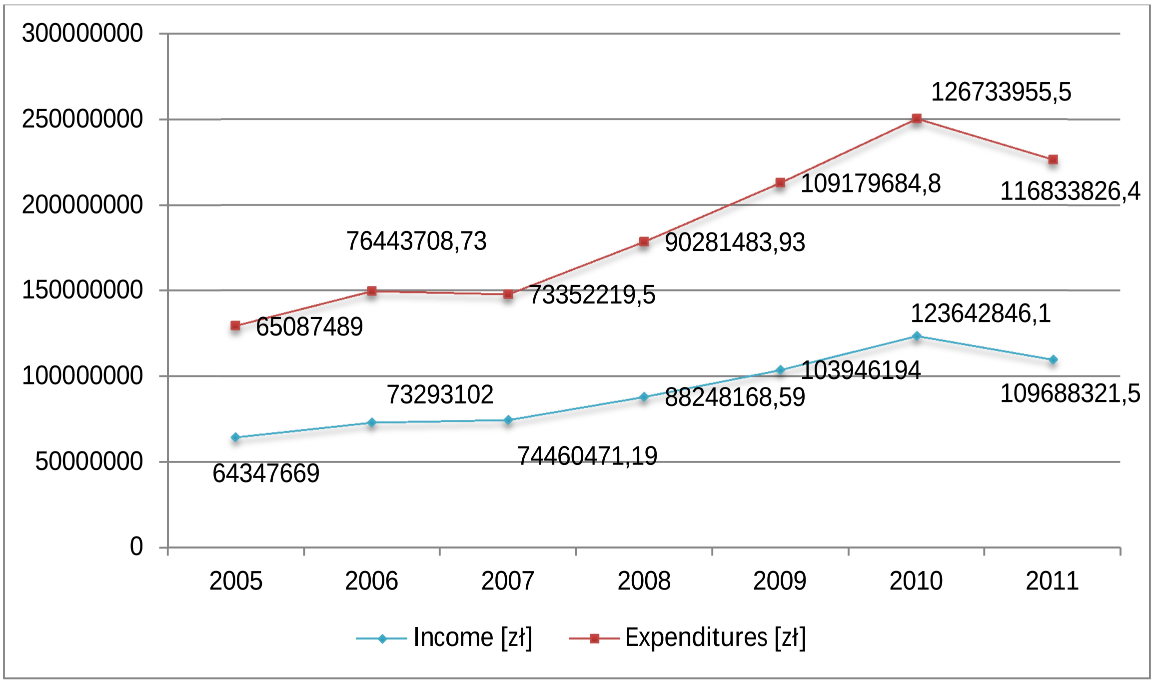
<u>The county budget</u>

Table 27: Income and expenditures of the Gorlice County 2005- 2012

Years	Total income [PLN]	Total expenditures [PLN]	Income per 1 inhabitant [PLN]	Expenditures per 1 inhabitant [PLN]
2005	64 347 669,00	65 087 489,00	603,47	610,41
2006	73 293 102,00	76 443 708,73	687,94	717,51
2007	74 460 471,19	73 352 219,50	697,92	687,53
2008	88 248 168,59	90 281 483,93	827,15	846,21
2009	103 946 193,99	109 179 684,81	972,26	1 021,21
2010	123 642 846,06	126 733 955,54	1 133,20	1 161,54
2011	109 688 321,53	116 833 826,42	1 004,79	1 070,25

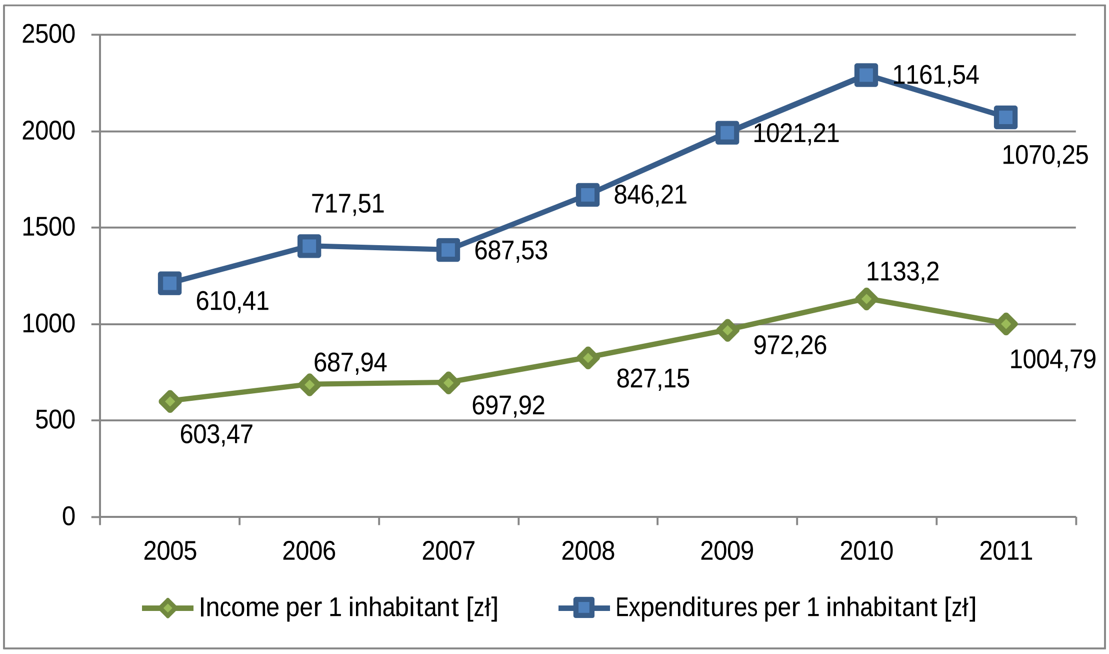
Source: CSO, 2005- 2012

Graph 32: Income and expenditures of the Gorlice County 2005- 2012



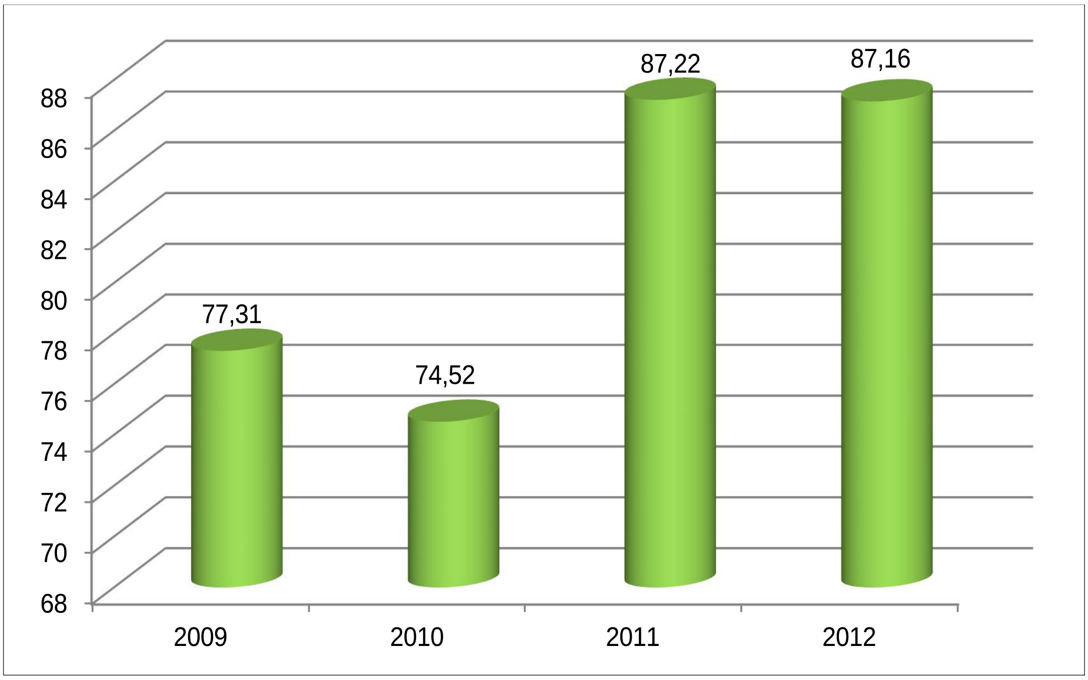
Source: CSO, 2005- 2012

Graph 33: Income and expenditures per 1 inhabitant in the Gorlice County 2005- 2012



Source: CSO, 2005- 2012

Graph 34: Index of basic tax income per 1 inhabitant in 2009- 2012 (calculation for compensation subvention)



Source: CSO for 2009- 2011, Ministry of Finanse http://www.mf.gov.pl- for 2012

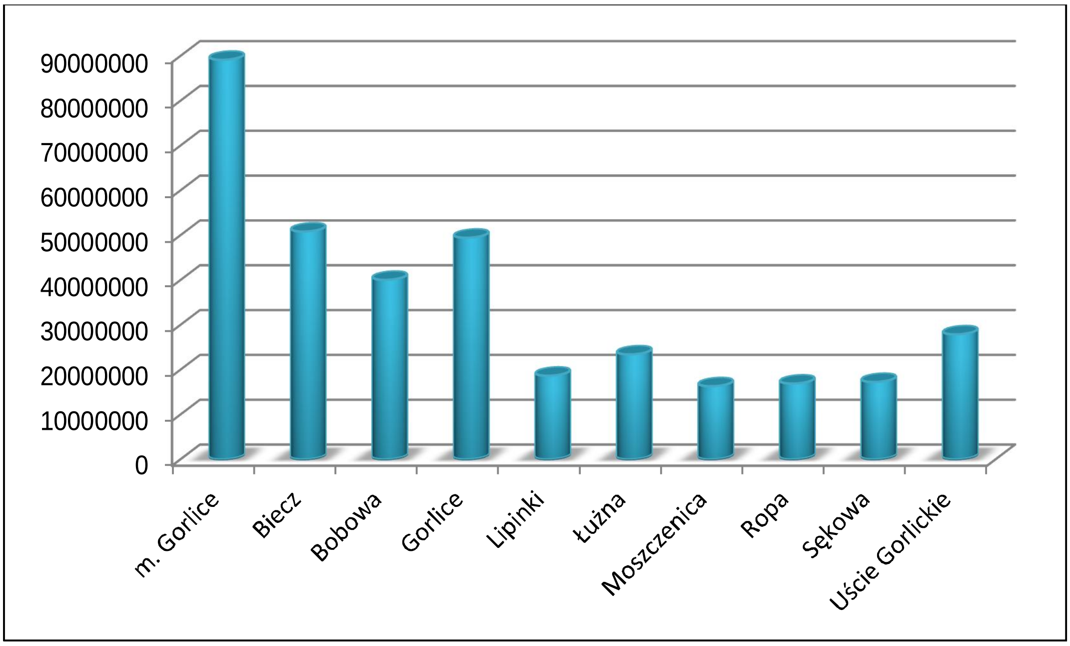
In terms of the amount of tax revenue per one inhabitant, the Gorlice County is on the 12th place among 22 counties in Małopolska. The highest income tax on the one inhabitant are in districts of Kraków, Nowy Sacz and Chrzanów, while the lowest in districts Proszowice, Tarnów and Dąbrowa Tarnowska.

Table 28: *Income and expenditures by communities in 2009- 2011*

Community	Total income ogółem [PLN]			Total expenditures [PLN]		
	2009	2010	2011	2009	2010	2011
Gorlice (city)	66 993 627	73 158 169	89 124 672	70 838 916	79 697 610	105 044 553
Biecz	36 869 177	51 568 795	50 806 933	37 854 995	61 227 423	62 636 634
Bobowa	30 144 542	31 292 548	40 033 493	28 362 680	41 396 954	37 244 083
Gorlice	40 740 476	44 435 393	49 430 875	45 538 920	45 633 448	51 463 594
Lipinki	17 294 918	20 263 300	18 647 061	18 703 968	23 090 005	18 637 817
Łużna	21 221 313	22 243 306	23 399 401	21 664 163	24 743 999	25 961 547
Moszczenica	14 193 436	15 153 554	16 298 522	16 703 631	18 140 716	19 428 879
Ropa	14 731 680	18 833 747	16 896 056	13 984 585	19 365 324	17 729 029
Sękowa	15 689 943	15 539 148	17 252 270	15 286 700	16 423 809	23 246 611
Uście Gorlickie	25 447 733	27 470 244	27 873 273	26 103 006	30 405 780	32 708 059

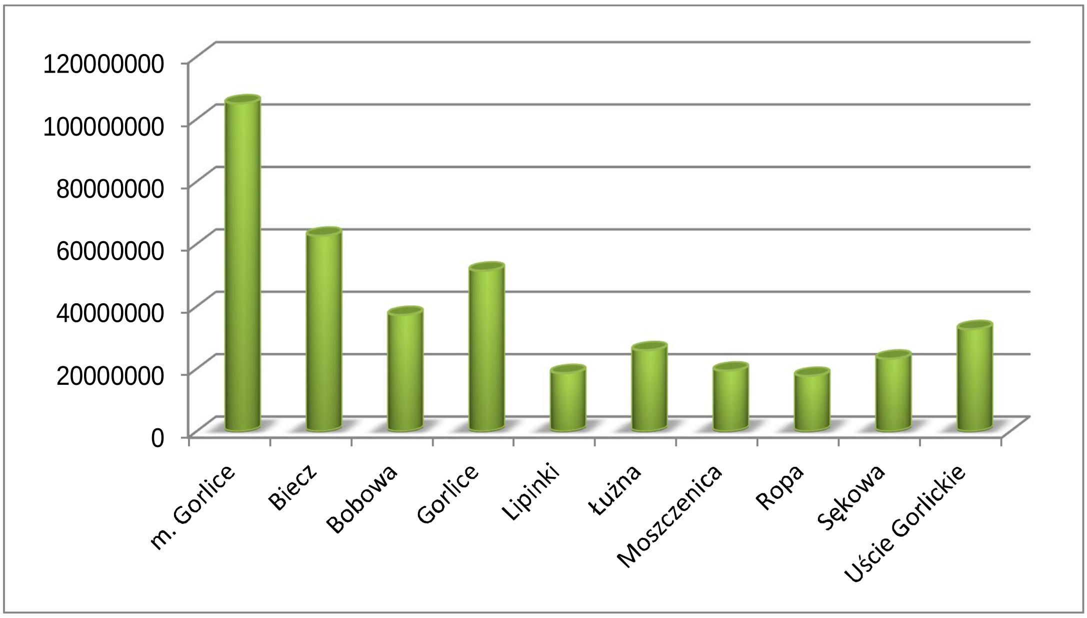
Source: CSO, 2009- 2011

Graph 35: Income by community in 2011.



Source: CSO, 2011

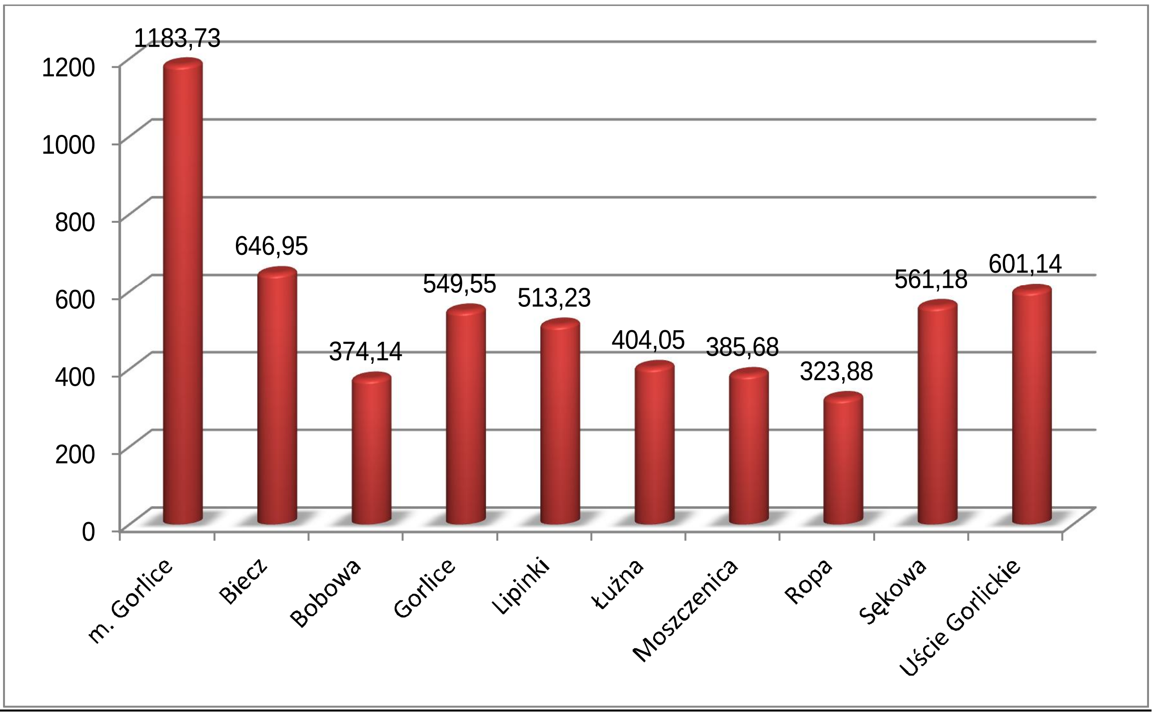
Graph 36: Expenditures by community in 2011.



Source: CSO, 2011

The largest both revenues and expenditures in 2011 was recorded in city of Gorlitz and in the municipality of Biecz.

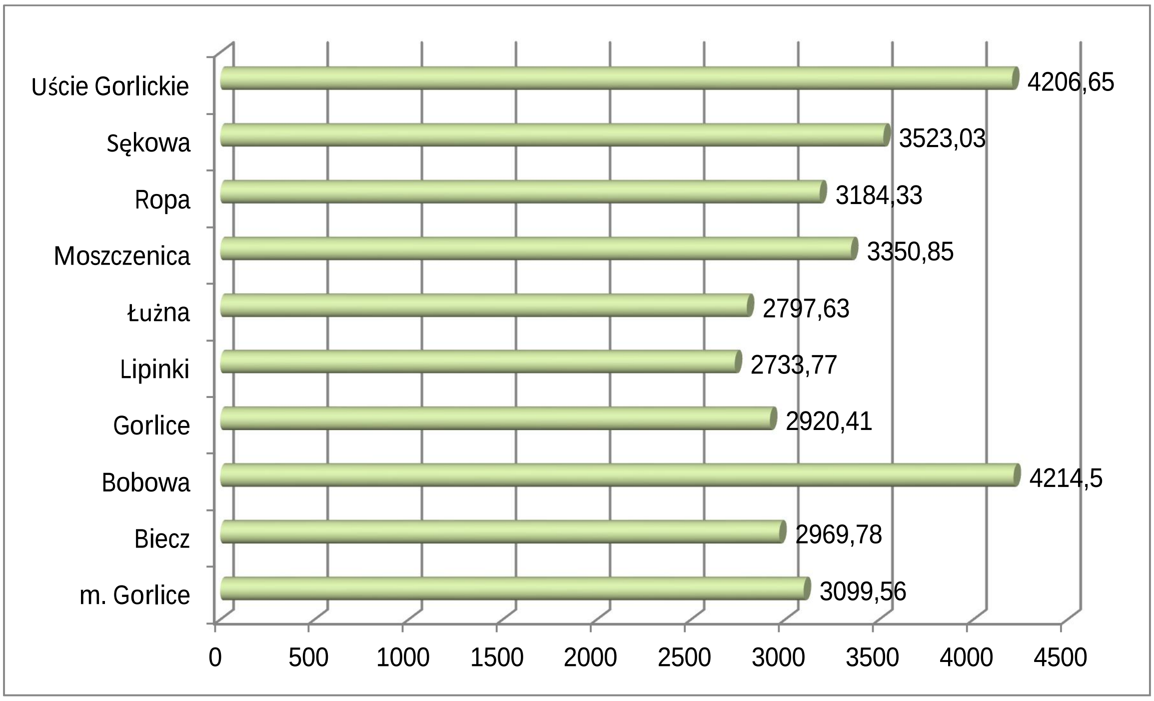
Graph 37: Index of basic tax income per 1 inhabitant by community in 2012 (calculation for compensation subvention)



Source: Ministry of Finance http://www.mf.gov.pl

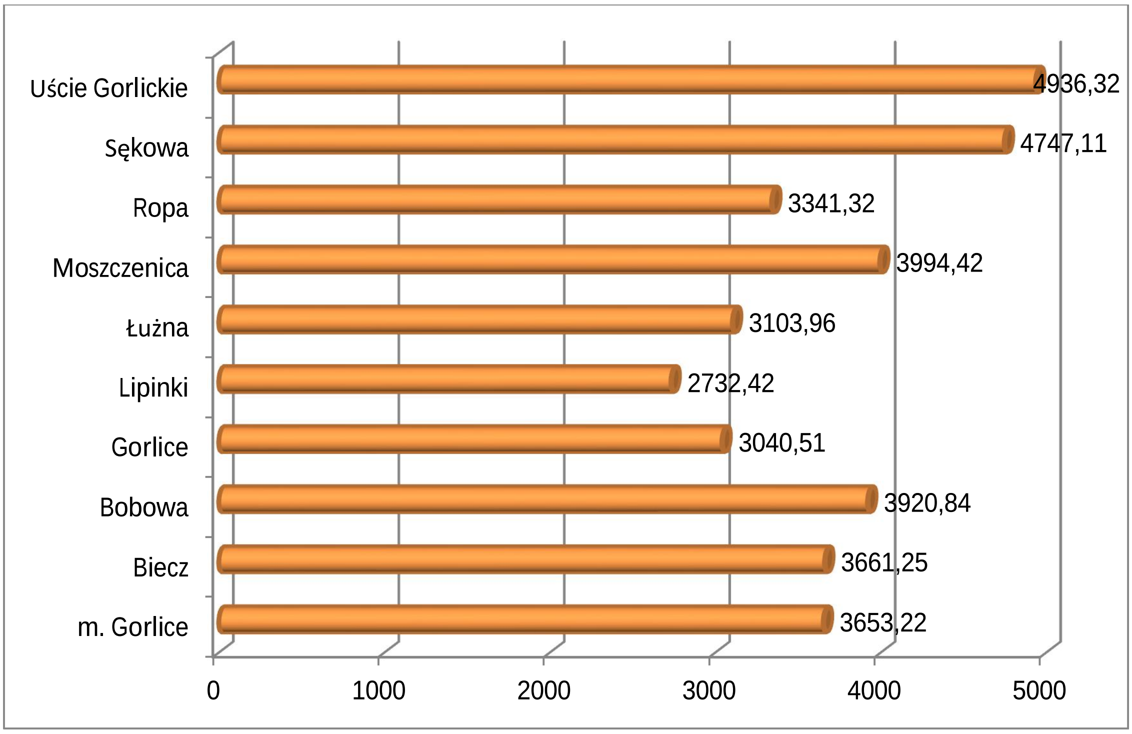
Competitive development of municipalities and the Gorlice County is visible in the size of the total budget income per one inhabitant. In 2011, the highest value was recorded in the municipality of Bobowa (4 214,65 zł), while the average for the county Gorlicki is 1 004,79 zł.

Graph 38: Total income per 1 inhabitant by community in 2011 [PLN]



Source: CSO, 2011

Graph 39: Total expenditures per 1 inhabitant by community in 2011 [PLN]



Source: CSO, 2011

Economic development of the Gorlice County is also stimulated by external funding from European funds.

Table 29: EU funding acquired by the Gorlice County 2006 – 2009.

Year	Total funding	For investments
2006	729 515,12	683 039,69
2007	1 091 966,49	1 091 966,49
2008	561 193,97	59 917,00
2009	4 483 570,89	3 903 083,54

Source: CSO, 2006- 2009

ASSUMPTIONS OF FUTURE ENERGY DEMAND 3.3.3

10. The estimation of energy demand (by type) in different sectors of the county economy.

The energy demand

There are no data on energy consumption by sector at the level of the municipality or the county. There is therefore no basis for establishing accurate forecasts. For the purpose of this study simulations were based on the information received from distributors of electricity and natural gas and the calculation of the heat demand for the Gorlice County and the CSO report "Fuel and Energy Economy in the years 2010, 2011".

On the basis of these materials annual energy demand for primary energy carriers has been estimated:

- Households
  - Coal – 1480 TJ (space heating)
  - Wood – 70 TJ (space heating)
  - Natural gas – 135 TJ (space heating and living)
  - Electricity – 245 TJ (lighting, home appliances, heating)
- Industry (business activity)
  - Coal – 317 TJ (space heating)
  - Natural gas – 600 TJ (space heating and production processes)
  - Electricity – 480 TJ (lighting, machinery and equipment, production processes)
- Transport – no data available

The energy generation

The limited amount of electricity is generated in the county:

- small hydro power generation (Klimkówka – average annual production is 5,1 mln kWh (18,36 TJ) and one small hydro in the municipality of Biecz – no data available)
- co-generation by Elektrociepłownia Gorlice during heating season (8 616 MWh in 2010)).

The heat production is based on solid and liquid fuels, which are produced outside the county.

Resources

The following energy resources are exploited in the county:

Natural gas and crude oil

Mines of crude oil and natural gas are located in the municipalities of Lipinka, Biecz and Gorlice.

Table 30: Natural gas deposits in mln m³

Name of deposit	Status	Resource		Production
		recoverable	industrial	
Bednarka	E	unprofitable.	0	0,51
Biecz	P	unprofitable.	0	0
Dominik.- Kob. – Kryg	Z	0	0	0
Gorlice	E	31,15	0	0,02
Gorlice –Glinik	E	8,25	2,35	0,74
Strzeszyn	T	2,69	2,32	0
Szalowa	E	73,01	61,89	0,67

Source: http://geoportal.pgi.gov.pl/surowce - Bilans zasobów złóż kopalin w Polsce wg stanu na 31 XII 2012 r. Państwowy Instytut Geologiczny, Państwowy Instytut Badawczy, Warszawa 2013

Table 31: Crude oil deposits in th. Mg

Name of deposit	Status	Resource		Production
		recoverable	industrial	
Biecz	E	unprofitable.	-	0,25
Dominik.- Kob. – Kryg	E	2,23	2,23	0,56-
Fellerówka-Hanka	E	17,28	-	0,31
Gorlice	E	29,84	0,41	-
Kryg-Libusza-Lipinki	E	16,94	4,78	1,62
Magdalena	E	unprofitable.	-	0,11

Source: http://geoportal.pgi.gov.pl/surowce - Bilans zasobów złóż kopalin w Polsce wg stanu na 31 XII 2012 r. Państwowy Instytut Geologiczny, Państwowy Instytut Badawczy, Warszawa 2013

Explanation for tables 30 and 31:
E – exploited deposit
P – deposit preliminary recognized
T – periodically exploited deposit
Z – abandoned deposit

Hydro energy

Small hydro power generation facilities in Klimkówka and Biecz of total capacity of 1,11 MW

Biomass

Mainly wood for heating, no data available on production and consumption

Solar Energy

Solar energy - a single installations, no data concerning the number of installations and the amount of energy produced

The renewable resources available for use in the future:

- energy of water - 3 small hydro installations located in the city of Gorlice - capacity of 300 kW
- wind energy – wind farm of a capacity of 4,5 MW in municipality of Lipinki
- solar energy (solar thermo a PV systems)
- wind energy (big and small „windmills")
- geothermal energy (heat pumps)
- biomass (wood, straw)

11. The analysis of predicted changes.

The analysis of the expected direction of changes in energy demand was carried out independently in three areas:

- housing / households;
- public building;
- business activity and industry.

Possible scenarios were defined from the point of view of local governments, their capabilities and potential impact of this development.

Housing / households

The present energy consumption in housing / households results from the following parameters:

- the size of the dwellings and the quality and efficiency of the heating system;
- number and quality of household appliance used;
- the type, amount and pattern of lighting use.

The above parameters are affected by:

- external / national factors:
  - national prosperity, that determines the wealth of society and the ability to take actions that affect energy consumption
  - administrative and legal - rules for thermal insulation of buildings, or the requirement to have an energy certificate, for example
- knowledge and awareness of the society
- local conditions - the support of local authorities:
  - organizational
  - financial.

Based on these parameters and factors one can adopt the following scenarios of changes related to housing and households:

I. Baseline scenario – determined by the economic situation of the country.

The continuing trend of energy consumption, resulting mainly from increasing the housing resources as well as a small increase in the number and usage of household appliances slightly mitigated by a conscious action of the inhabitants (e.g. thermo retrofitting) and use of more energy-efficient appliances and lighting. Energy sources are not affected - negligible share of RES.

II. Scenario of increased energy efficiency - determined primarily by the actions of local governments.

Through information and promotional activities the rate of growth in energy consumption is lower than in the baseline scenario. Energy sources are not affected - negligible share of RES.

III. Scenario of increased use of renewable energy generated by micro installations - mainly determined by changes in legislation and government policy and with the very active involvement of local authorities.

The introduction of the favourable changes in the rules of the financing of renewable energy micro-installations combined with less administrative and organizational barriers allows for a gradual increase of the RES share in the energy mix.

IV. Scenario of increased energy efficiency in conjunction with the change of energy sources - combines scenarios II and III

Public buildings

The energy consumption in public buildings results from the following parameters

- the size of the premises and their thermal quality as well as an efficiency of heating system
- the usage pattern of the premises
- the type, amount and pattern of lighting use.

Those parameters are affected mainly by knowledge and awareness of the managing staff and the local authorities.

Like the housing / household area one can adopt the following scenarios of changes to the public buildings:

I. baseline scenario - almost unchanged
II. scenario of increased energy efficiency - determined primarily by the actions of local governments
III. scenario of increased use of renewable energy generated by micro installations - mainly determined by changes in legislation and government policy and with the very active involvement of local authorities.
IV. scenario of increased energy efficiency in conjunction with the change of energy sources - combines scenarios II and III

Industry / Business activity

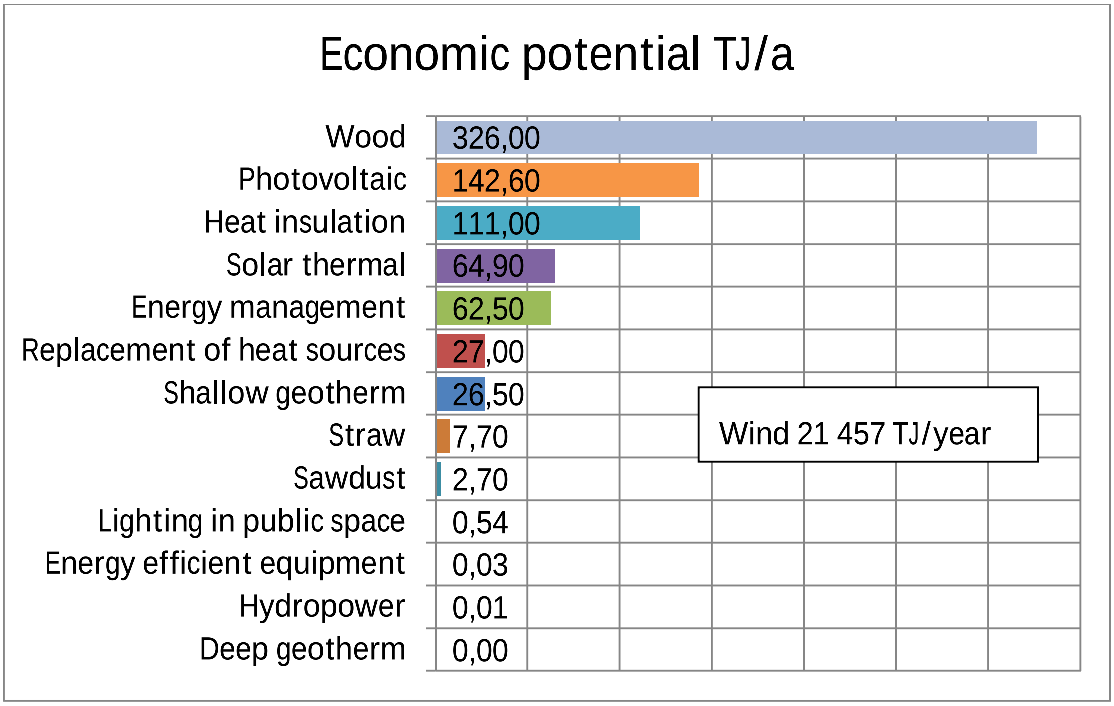
According to the available data there is no reason to consider that the trend of industrial development and economic activity in the Gorlice County will differ from the national trends.

Additionally, given the small (except for information and promotion) possibilities of local authorities to influence the activity of local industries / businesses on energy use we assume the only one scenario – baseline scenario I.

12. The analysis of potential energy resources, their accessibility and economic efficiency of generation.

Analysis of potential energy resources of the county and their availability and economic efficiency of generation is based on data from the study "A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice" prepared in 2012 and on "National Plan for the Development of micro-installations renewable Energy by 2020" published by the the Renewable Energy Institute in April 2013.

Graph 40: Economic potential of RES and EE in the Gorlice County.



Source: „Analiza SWOT Powiatu Gorlickiego w dziedzinie energii odnawialnej i wydajności energetycznej", PPUH BaSz, 2012

The authors of a SWOT analysis have proposed the adoption as the leading all strategies aimed at improving energy efficiency, complemented by compatible strategies involving the production of renewable energy generated at the point of use (i.e. solar panels, photovoltaic, small wind turbines and heat pumps).

The cost-effectiveness analysis will focus on RES micro-installations:

- solar panels
- photovoltaic
- small wind turbines
- heat pump

The data presented in the following table are published by the Renewable Energy Institute in the report "National Development Plan for Renewable Energy Sources micro installations by 2020".

Table 32: Simple payback periods for investments in micro-installations and small installation of RES

Installation RES / power	below 10 kW	10 – 40 kW	above 40 kW
Electricity generation			
Photovoltaic	18,3	14,9	14,2
Small wind turbines	>20	19,0	13,5
Micro biogass	n.a.	>20	13,9
Co-generation – liquid biofuel	>20	14,5	11,8
Heat production			
Heat pump	>20	17,9	16,8
Solar panel	17,2	15,2	13,2
Automatic biomass boilers	11,2	11,1	10,2

Source: Krajowy Plan Rozwoju Mikroinstalacji Odnawialnych Źródeł Energii do 2020 roku, IEO, 2013

The above table shows that the payback occurs at or near the lifetime of the installation. In practice, this means that without support schemes the investment in renewable energy micro-installations are devoid of any economic rationality.

The proposed changes to the law governing the support of micro installations and small renewable energy systems through a system of fixed prices per kWh take into account the specific needs of support for the "home" installation of less than 10 kW capacity.

Additionally, the rapid development of technology, especially in photovoltaics, and thus lower prices for the devices suggests that the energy model based on the micro-installations will develop well in Poland. Such conclusion is based also on the results of public opinion polls indicating the willingness of the public to invest in small renewable energy sources.

13. Conclusions and recommendations

CONCLUSIONS

- An aging and a shrinking population. By 2012, the population of the Gorlice County increased steadily, mainly working-age population and the retirement age population while at the same time a decreasing population of pre-working age which means slow aging population. It is expected that the population of the Gorlice County from 2015 will steadily decline, mainly due to decreasing birth rate.

- The Increase the housing resources. The number of new homes with a higher standard is increasing. It can be assumed that this trend will continue due to migration of the larger cities dwellers into the attractive area.

- Increasing economic activity of inhabitants. From year to year, the number of registered business entities is increasing. It is estimated that this trend will continue.

- One can not expect a significant development of energy-intensive industries in the county, despite the existence of the Special Economic Zone "Europark" Mielec - Industrial Area Gorlice.

- Development of the Gorlice County is stimulated by external EU funding - a number of investments could and still can be realized.

RECOMMENDATIONS

- The Local governments should support, mainly through the acquisition of external financing and organizational activities, the development of energy generation (heat and electricity) from renewable sources by individual households for their own use. In the case of electricity, also with the possibility of reselling the surplus to the grid.

- As a part of the support "The local programs supporting the development of small renewable energy" should be developed in conjunction with acquisition of external funds for the implementation of these programs and the development of rules. The subsidies should be limited to that households that install renewable energy sources that meet the conditions for participation in the program.

- The local authorities should initiate and / or support all efforts to increase awareness of society in the area of and energy efficiency. A high impact activities shall be implemented – e.g. RES and EE investments in public buildings.

- The local authorities should be prepared to avoid / resolve conflicts related to investments in renewable energy sources which can emerge also over micro-scale investments. Preparation and implementation of effective public consultation procedures in this area will help to avoid any conflicts.

- Depending on macroeconomic developments and legislative changes the local governments should take into account in its activities scenarios described in Chapter 11. The most desirable scenario is a scenario IV - improving energy efficiency in conjunction with the development of renewable energy generation by micro-scale installations.

AREA	BASELINE	ENERGY EFFICIENCY	RES MICRO-SCALE INSTALLATIONS	ENERGY EFFICIENCY + RES MICRO SCALE INSTALLATIONS
scenario	I	II	III	IV
HAUSING / HAUSEHOLDS	√	√	√	√
PUBLIC BUILDINGS	√	√	√	√
BUSINESS ACTIVITY / INDUSTRY	√			

14. Literature

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