The Energy Efficiency Plan for the Gorlice County

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1. Purpose and scope of the study and its legal considerations

The Energy Efficiency Plan for the Gorlice County is another document of a strategic nature, for the Gorlice Region, developed under the project VIS NOVA (sustainable and efficient energy for rural areas). Preceding documents are:

- "A SWOT Analysis for Renewable Energy Sources and Energy Efficiency in the Administrative District of Gorlice",
- "The development scenarios for renewable energy in the Gorlice County".

The plan sets targets for energy efficiency and defines specific actions required for efficient use of fuel and energy in key sectors, ie:

- households (housing sector)
- municipal buildings and public institutions,
- business enterprises,
- transport,
- lighting of public spaces.

Strategic action plan to improve energy efficiency is in line with the objectives of the project VIS NOVA:

- an increase of energy efficiency in the region,
- an increase in regional production of energy from renewable sources.

Energy efficiency is at the core of European energy policy and is one of the main objectives of the "Europe 2020" strategy for smart, sustainable and inclusive growth.

The EU energy and climate package (3x20)

This package was adopted by the European Parliament in December 2008 and assumes:

- reduce greenhouse gas emissions by 2020 by at least 20% compared to 1990,
- rationalization of energy use and consequently reduce consumption by 20% (compared with forecasts for the EU for 2020) - increasing energy efficiency,
- Increasing the share of energy produced from RES to 20% of total energy consumption in the EU average in 2020 (for Poland this goal was set at 15%).

Directive on energy end-use efficiency and energy services

Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.

European Initiatives on Energy Efficiency

Initiative	Objective
EU Energy Star Programme	Promotion of energy efficient office equipment
Green Light Programme	Reduction of the energy consumption of indoor and outdoor lighting throughout Europe, thus reducing polluting emissions

	and limiting the global warming
EU Stand-by Initiative	Improve the Energy Efficiency of Electrical Equipment while either OFF or in Stand-by
„Energy+" Programme	Promotion of the energy efficiency in refrigeration equipment

Europe 2020 strategy for smart, sustainable and inclusive growth adopted by EEC on 17 June 2010

Priority 2**: Sustainable growth thanks to a decisive move towards a low-carbon economy**
Target: **Climate change and energy sustainability:**

- greenhouse gas emissions 20% (or even 30%, if the conditions are right)lower than 1990
- 20% of energy from renewables
- 20% increase in energy efficiency

Recommendation 5 – efficient use of resources and reduce greenhouse gas emissions

Flagship initiatives: support the shift towards a low-carbon and resource-efficient environment and strive to eliminate the dependence of economic growth from environmental degradation.

Polish Energy Policy until 2030

The main objectives of the document, adopted by the Council of Ministers on 10 November 2009, in the area of energy efficiency are:

- Striving to maintain a "zero-energy growth", i.e. economic growth with no primary energy demand.
- Consistent reduction of the energy intensity of the Polish economy to the level of EU-15.

Trends in energy policy:

- improving energy efficiency,
- increasing the security of the supply of fuel and energy,
- diversification of electricity generation by introducing nuclear power plant,
- the development of renewable energy sources, including biofuels,
- development of competitive fuel and energy markets,
- reduce the impact of energy generation on the environment.

Renewable Energy Sources National Action Plan

The main objective of the plan, adopted by the Council of Ministers of 7 December 2010, is to achieve levels of 15% share of energy from renewable sources in gross final energy consumption in 2020., (including the share of renewable sources in the transport sector - 10%, in heating and cooling - 17%, power generation - 19%).

The second National Action Plan for Energy Efficiency 2011

This document, adopted by the Council of Ministers on 17 April 2012, defines as a national target for efficient energy management by 2016 the final energy savings in the amount at least 9% compared to the average final energy consumption in the years 2001-2005 (ie 53,452 GWh of energy savings by 2016).

Areas for action

- improving energy efficiency in the residential sector,
- improving energy efficiency in the services sector,
- improving energy efficiency in the industrial sector,
- improving energy efficiency in the transport sector (excluding aviation and shipping), including the introduction of traffic management and transport infrastructure and the promotion of sustainable transport systems and the efficient use of fuels in transport.

The national target for efficient energy management is enshrined also in the **Energy Efficiency Law** of 15 April 2011. (Journal of Laws of 2011. No. 94, pos. 55, with amendments). The Law sets out, inter alia,:

- issues related to the principles of drawing up national action plans on energy efficiency,
- duties of the public sector in terms of energy efficiency and energy efficiency improvement measures.

Regional Energy Plan (REP) for the Malopolska Region for 2013-2020 (draft)

Main objective: To achieve the European standards in the energy system of Malopolska, and ensure energy security by covering the energy needs of the Region on the basis of diverse resources.

Priorities:

1 Create the conditions and mechanisms aimed at increasing the share of renewable energy in the energy balance of the Region,

2 Support for activities aimed at cost-effective and efficient use of energy,

3 Malopolska aware of energy - improving organizational, educational and financial system in the field of energy policy.

Strategic Environment Protection Programme (draft)

Main objective: To improve environmental safety and protection of environmental resources for the development of Malopolska, implemented by priorities including:

Priority 5: Regional Energy Policy

Measure 5.1: Creation of conditions and mechanisms aimed at increasing the share of renewable energy in the energy balance of the region,

Measure 5.2: Support for activities aimed at cost-effective and efficient use of energy.

Air Pollution Protection Programme of the Malopolska Region

The main objective of the Programme, adopted by the Assembly of the Malopolska Region on 30 September 2013, is to achieve by 2023 permissible levels of air pollutants: PM10, PM2.5, benzo(a)pyrene, nitrogen dioxide and sulphur dioxide.

The main directions of activities include:

- implementation of municipal programs for the reduction of low emission - the elimination of low-efficient appliances for solid fuel

- expansion and modernization of district heating and natural gas networks providing connection of new end-users,
- thermal improvements of buildings and the promotion of energy-efficient construction in residential and public buildings,
- reduce transport related emissions,
- reduction of industrial emissions,
- environmental education.

The Regional Operational Programme of the Malopolska Region for the years 2014 - 2020 (draft)

The project, approved by the Board of Malopolska Region on 1 April 2014, defines, among others:

Priority Axis 4 - Regional Energy Policy

Purpose Theme 4 - Supporting the transition to a low carbon economy in all sectors

Investment Priority 4.1 - Support for the production and distribution of energy from renewable sources,

Investment Priority 4.2 - Promote energy efficiency and renewable energy in the enterprise sector,

Investment Priority 4.3 - Support for energy efficiency, intelligent power management and use of renewable energy sources in public infrastructure, including public buildings and the residential sector,

Investment Priority 4.5 - Promote low-carbon strategies for all types of territories, particularly in urban areas, including the promotion of sustainable multi-modal urban mobility and adaptation actions aimed at mitigating the impact on climate changes.

2. Methodology

Energy Efficiency Plan consists of two parts:

• diagnostic part - assessment of the current situation

• programming part – programming of actions

The assessment of the current situation

The assessment of the current situation has been prepared on the basis of a variety of data such as:

- questionnaires submitted to the Local Government Units;
- data obtained from the institutions and enterprises;
- local, regional and national strategies, programmes and analysis;
- oral information from experts;
- statistical data;
- a variety of literature data.

The following list shows the main sources of information used in the diagnostic part

Local Authority Units		**Enterprises and institutions**	
District Authority Office	√	TAURON Dystrybucja S.A. *(electricity)*	√
Biecz	√	PGE Dystrybucja S.A. O/Rzeszów *(electricity)*	√
Bobowa	√	Elektrociepłownia Gorlice Spółka z o.o. *(combined heat & power plant)*	√
City of Gorlice	√	PGNiG S.A. Karpacki Oddział Obrotu Gazem Tarnów *(gas)*	
Commune of Gorlice	√	Polska Spółka Gazownictwa sp. z o.o. O/ Tarnów *(gas)*	
Lipinki	√	Polskie Sieci Elektroenergetyczne – Południe S.A. *(electricity)*	√
Łużna	√	Polskie Sieci Elektroenergetyczne – Wschód S.A. *(electricity)*	√
Moszczenica	√	PGL Lasy Państwowe Nadleśnictwo Łosie *(State Forests)*	√
Ropa	√	PGL Lasy Państwowe Nadleśnictwo Gorlice (State Forests)	√
Sękowa	√		
Uście Gorlickie			

Surveys addressed to local government units concerned:

buildings:

- heating system of municipal buildings (current status)
- demand for fuels (current state)
- demand for electricity (current states)
- demand for fuels (base year 1999)
- demand for electricity (base year 1999)

street lighting:

- current state
- state in the base year 1999

Unfortunately, we failed to obtain any data on the base year, 1999.

The programming part

The programming is based on:

- conculsions from diagnostic part
- analysis of good practices
- discussions with experts
- meetings and discussions with the Local Support Group of the VIS NOVA project

When creating the Energy Efficiency Plan, the authors tried to use the best practices in the preparation of this type of studies. One of the methodology used in this study was the " How to develop a sustainable energy action plan (SEAP) – guidebook "developed for the Covenant of Mayors for sustainable energy at the local level.

Comparison of the scope and methodology of this study with the principles / methodology SEAP is presented in the following statement.

Ten key elements of SEAP	Energy Efficiency Plan (EEP)
Formal adoption of the SEAP by the city council or town	Document of VIS NOVA project for free use by the local governments of Gorlice Region
Commitment to reduce CO_2 emissions by at least 20% by 2020	The level of reduction of CO_2 emissions will result from the implementation of the measures established in the EEP
The preparation of a base inventory of CO2 emissions (BEI)	Yes, but in less detail
Comprehensive measures / actions involving key sectors	Yes
Strategies and actions until 2020	The plan has a horizon of the year 2022 and comprises 2 terms of local authorities
Adaptation of urban structures	The creation of a new structure (Centre for Energy Education)
The mobilization of civil society	Yes
Financing	Yes, but only for certain actions
Monitoring and Reporting	Yes
The submission of the SEAP and filling a template	Energy Efficiency Plan is a document of VIS NOVA project developed in accordance with the tender specifications

3. Description of the county and its socioeconomic characteristic and technical infrastructure

Location

The Gorlice County is located in the southeastern part of the Malopolska province in the Lower Beskids. It is located peripherally in relation to the capital of the province and most important cities of the region. It is a border area of Polish and Slovak. The County is bordered in the west district by the Nowy Sącz county, in the north by Tarnów district, east by the Jasło county, and from the south by the Republic of Slovakia. The County seat is the city of Gorlice.

The Gorlice County area is 966.46 km^2, ie 6.4% of the Maloposlka province. The County includes 91 villages and towns.

The administrative units consist of the Gorlice County are: City of Gorlice, 2 urban and rural communities Biecz and Bobowa, 8 rural communities: Gorlice, Lipinki, Łużna, Moszczenica, Ropa, Sękowa, Uście Gorlickie.

Graph 1 Location of the Gorlice County

Network of roads and railways lines in the County:

- national road (DK No. 28 Zator - Medyka)
- rovincial roads (No. 977 Tarnów - Konieczna, No. 979 Moszczenica - Zagórzany, No. 980 Biecz - Jurków, No. 981 Zborowice - Krynica, No. 993 Gorlice - Dukla)
- county and communal roads
- three railway lines - (line No. 96 so-called. "Kryniczanka" leading to the Polish-Slovak border, line No. 108 Stróże - Krościenko, line No. 110 Gorlice Zagórzany - Gorlice)

The total length of the road network is about 1600km. County road infrastructure is well developed, but the road surface is in poor condition. Roads have a lot of steep ups and downs. A barrier to the availability of Gorlice County remains primarily a distance - journey to the capital of the province takes about two hours. Peripheral position relative to Krakow, as well as poor transport connections

with the most important cities in the region (Tarnow, Nowy Sacz), hinders residents commuting to work, causes little interest in investments in the region, which in turn leads to the economic isolation of the county.

The County has a low level of urbanisation and is dominated by agriculture and forests – agricultural land cover 37% and forests more than 43%. Such land use favours the development of tourism and spa industry. There are natural resources: oil and gas (exploited industrially for more than a 150 years) as well as sand, gravel and other construction ceramics raw materials. There are deposits of mineral waters in Wysowa (Spa Wysowa SA) and Wapienne (Wapienne Spa). Communes of Uście Gorlickie and Sękowa one can define as tourists with the spa industry.

The Gorlice County is attractive for tourists due to his natural and cultural heritage:

- the world's first street kerosene lamp
- the Castle in Szymbark
- the Centre of Folk Architecture (open-air ethnographic museum) in Szymbark
- a rich history and numerous monuments of Biecz, one of the oldest towns in the southeastern Polish. Biecz is often called the "pearl of the Subcarpathian region" or "little Krakow"
- numerous palaces, mansions, parks and wooden sacral architecture (centuries-old churches in Sękowa and Binarowa - UNESCO World Heritage Sites)

Other tourist attractions are the Stud of Hucul Horses"Gładyszów - Regetów", Klimkowka Lake, ski lifts and downhill skiing on the slopes of Magura Małastowska.

The Gorlice County is characterized by rugged terrain and diversity of the natural environment. The most of the land is wooded hills, winding river valleys and valleys forming a transition zone between the Lower Beskids and the Carpathian Foothills. Due to high natural value some areas and objects are protected with different legal status and different functions.

More than 60% of the County area is protected by law. The protected areas and objects are:

- The Magura National Park,
- South Małopolska Terrain of Protected Landscape,
- Nature Reserves: Kornuty and Jelenia Góra,
- Nature 2000 sites: Low Beskid, Magura Sanctuary, Springs of Wisłoka River, Wisłoka River and their tributaries, Biała Tarnowska River, Bat Sanctuaries of the Gorlice District, Bat Sanctuary near Bukowiec,
- Natural Monuments.

Table 1. Protection of the nature

Forms of legal protection	Acreage (has)
Area in total:	**59 603,8**
of whic:	
National Parks	1 898,9
Nature Reserves	24,8
Area of Protected Landscape	57 703,6
Ecological grounds	1,1
Documentation stations	0,2

Source: Central Statistics Office GUS, 2012r.

There are 42,392.2 hectares of forest, the largest forest complexes are in the communies of Uście Gorlickie and Sękowa - forest cover in these areas is over 60%.

Table 2. Forests in the Gorlice County - 2012

Commune	Forest area (ha)	Woodiness (%)
City of Gorlice	206,4	8,8
Biecz	1 432,0	14,6
Bobowa	729,7	14,7
Gorlice	3 007,1	29,2
Lipinki	2 061,1	31,0
Łużna	1 128,6	20,1
Moszczenica	557,8	14,8
Ropa	1 861,7	37,9
Sękowa	13 352,8	68,5
Uście Gorlickie	17 600,8	61,2
County total	**42 392,2**	**43,4**

Source: Central Statistics Office GUS, 2012r.

Forests are mostly public domain. Private forests represent 16.5% of the forests in the County. The dominant habitat type is a mountain forest. Supervision of forests is performed by superintendences in Gorlice, Kołaczyce and Łosie.

Logging in 2002 -2012 (m^3)

	2002	2004	2006	2008	2010	2012
Total	9 215	13 526	9 441	10 765	12 429	11 834
of which						
Private forests	8 274	11 079	8 041	9 089	10 246	10 435
Communal forests	941	2 447	1 400	1 676	2 183	1 399

Source: Central Statistics Office GUS, 2012r.

Population

In 2012 the population of the Gorlice County was at the level of 109 265 people (about 3.6% of the region's population), of which:

- 73 010 in rural areas,
- 36 255 in urban areas (Gorlice, Bobowa and Biecz).

The urbanization rate here is low at 33.2%. The population density shows a significant spatial differentiation, with a clear concentration of the population in Gorlice (1214 people per square km). The least populated is the southern, border part of the district, i.e. the Communes of Uście Gorlickie (23 per square km) and Sękowa (25 persons per square km). The scattering of settlements increases, among others, the cost of construction of network infrastructure systems. Dispersed settlement structure is accompanied by scattered farms.

Table 3. Population in the Gorlice County in 2012.

Commune	Acreage (ha)	Population	Population density (person/km^2)
City of Gorlice	2 353	28 555	1214
Biecz	9 825	17 052	174
Bobowa	4 977	9 564	192
Gorlice	10 285	17 045	166
Lipinki	6 646	6 802	102
Łużna	5 627	8 387	149
Moszczenica	3 762	4 885	130
Ropa	4 911	5 335	109
Sękowa	19 480	4 921	25
Uście Gorlickie	28 780	4 921	23
County total	**96 646**	**109 265**	**113**

Source: Central Statistics Office GUS, 2012r.

The population of the Gorlicki County increases slightly - in the period of 2002-2012 population growth rate was at the level 1.5% and was lower than the provincial rate, which in this period reached 4.1%. Changes in population are related to:

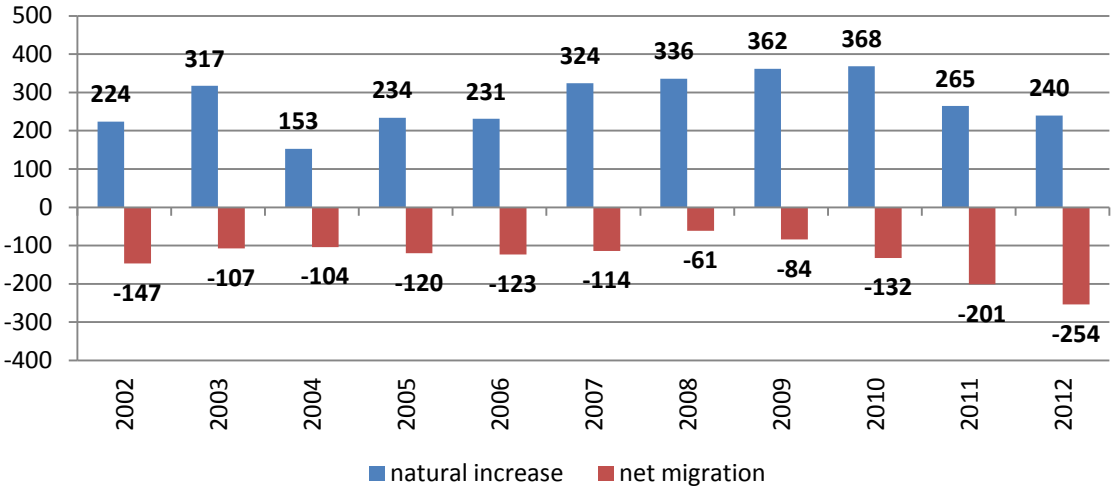
- positive rates of natural increase
- negative net migration

Table 4. Population changes in the years 2002-2012

	2002	2004	2006	2008	2010	2012	Dynamics 2002-2012
County – overall	107 694	107 808	107 813	108 081	109 175	109 265	101,5
of which:							
men	52 933	53 058	53 073	53 295	53 968	54 031	102,1
women	54 761	54 749	54 740	54 786	55 207	55 234	100,9

Source: own elaboration based on Central Statistics Office data.

Graph 2. Natural increase and net migration in 2002 - 2012



Source: Central Statistics Office GUS.

The Gorlice County has the lowest net migration rate in the Małopolska province (which is typical for mountainous areas of the province), with considerable high natural increase.

Table 5. Population structure in the years 2002-2012

	2002	2004	2006	2008	2010	2012
Population by economic age groups:						
pre working	28 229	26 447	24 811	23 464	23 301	22 518
working	62 145	63 940	65 464	66 564	68 526	68 599
post working	15 931	16 216	16 401	16 771	17 348	18 148

Source: Central Statistics Office GUS.

The current age structure of the population is favourable and conducive to economic development. But the changes point the aging of the population: steadily decreasing of the population at productive age (from 26.6% in 2002 to 20.6% in 2012), increasing the number of people of working age (from 58.5% in 2002 to 62.8% in 2012) and post-working age (from 15% in 2002 to 16.6% in 2012).

Demographic indicators for the Gorlice County for the year 2012:

- females per 100 males – 102 people,
- marriages per 1000 population – 6,5
- live births per 1000 population – 10,8
- deaths per 1000 population – 8,6
- natural increase per 1000 population – 2,2

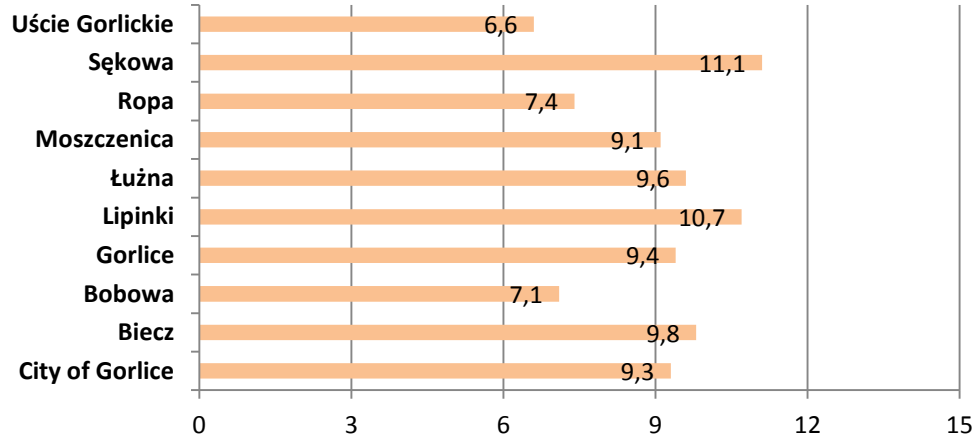
Demographic projections Central Statistical Office of Poland for 2035 indicate that the changes in the resource population in the Gorlice County will be of a negative nature:

- The number of county residents will be lower by 6.6%, i.e. around 7,000 people (compared to 2010)
- the aging of the population - the number of people in the pre and production age will be reduced relative to the constantly growing number of people of post production age.

Economic activity

There were 6 263 registered unemployed in Gorlice County at the end of 2012, which in relation to the total number of people of working age accounted for 9.1%. Unemployment is varied geographically within the County - the lowest rate in the commune of Uście Gorlickie (6.6%) and the highest in the community of Sękowa (11.1%).

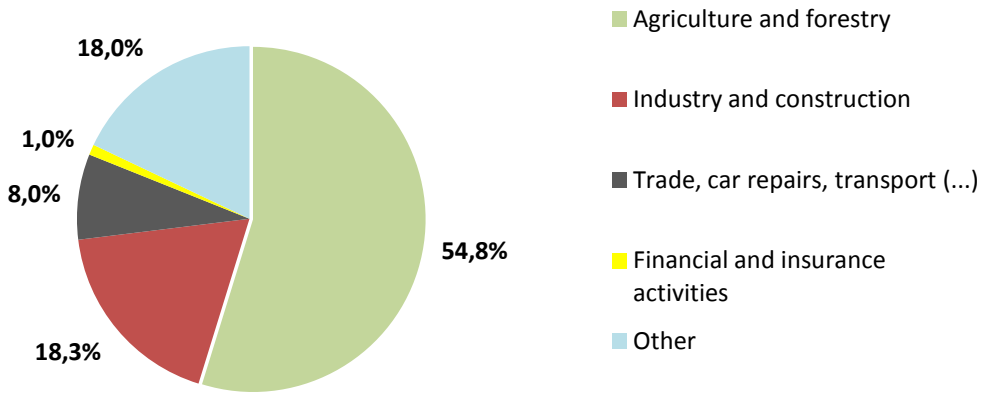
Graph 3. Unemployment ratio in commune at the end of 2012 (%)



Source: Central Statistics Office GUS.

In 2012, the number of people working in Gorlice County amounted to more than 34 3 thousand people (without those working in companies employing up to 9 people). According to the structure of employment by PKD 2007 (i.e. NACE) there is a very high share of employment in agriculture. Large resources of people formally employed in agriculture testify to the untapped potential of the workforce in the County. Agriculture is characterized by relatively low productivity in comparison with the other sectors of the economy.

Graph 4. Structure of employment at the end of 2012.



Source: Central Statistics Office GUS.

The economical development of the Gorlice County is based on industry, tourism and modern agriculture. However, rates of entrepreneurship are at a low level. Number of registered enterprises (end of 2012) amounted to 7521 companies, of which:

- public sector – 362 enterprises (4,8%)
- private sector – 7159 enterprises (95,2%)

In the private sector, in term of employment, there are:

- 7143 micro-enterprises (up to 9 employees), of which 5911 are natural persons conducting economic activity
- 312 small enterprises (10-49 employees)
- 60 medium-sized companies (50-249 employees)
- 6 entities employing more than 250 people

The number of the entities of the national economy in the Gorlice County is growing systematically, but the rate of entrepreneurship measured by the number of companies per 1 thousand residents remained at the lowest levels among counties in the Małopolska Province. This may be a result of the low investment attractiveness of the County, as well as natural and environmental constraints.

Table 6. Number of enterprises in the years 2002-2012.

Powiat ogółem	2002	2004	2006	2008	2010	2012	Dynamic 2002-2012
Number of entities	5 910	5 762	5 824	6 364	7 120	7 521	127,3
Number of companies per 1 th. of residents	54,9	53,4	54,0	58,9	65,2	68,8	125,3
Number of micro-enterprises	5 530	5 346	5 383	5 918	6 644	7 143	129,2

Source: own elaboration based on Central Statistics Office data.

Most entities are involved in construction, wholesale and retail trade, repair of motor vehicles as well as in industrial processing.

The most important employers in the County are:

- Machinery Factory „Glinik" in Gorlice,
- „Forest" Wood Processing Factory
- Mine of crude oil and natural gas – the Polish Mining Oil and Gas in Warsaw – Sanok County Plant Oil and Gas in Sanok,
- Severt Polska Ltd

The special economic zones play an important role in shaping the investment attractiveness of the County. Thera are two Subzones of Special Economic Zones: Krakow Technology Park and the Euro-Park Mielec.

Of the total land area of the Gorlice County farming lands occupy an area of 44 287,29 hectares (46%), of which arable land – 35 813,98 ha (37%). Arable land consists mainly of permanent meadows (16 716 ha) and sown land (10 780 ha).

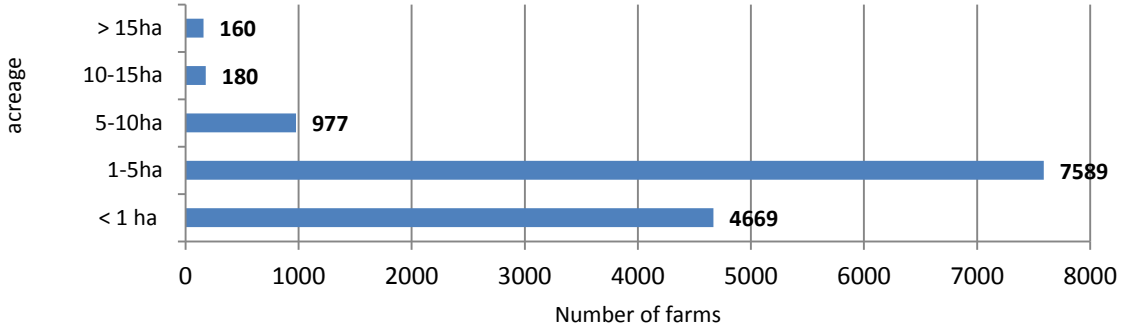
Due to the natural conditions of agriculture the County can be splited into:

- southern region - mountain area (communes of: Uście Gorlickie, Sękowa, Ropa and part of the commune Gorlice). The main activities are related to forest and agriculture. The

forests cover 65% of the acreage. The structure of farmland use is dominated by permanent grassland. The main livestock production is dairy cattle.

- northern region - foothill areas (communes of: Bobowa, Biecz, Moszczenica, Łużna, Lipinka and the rest of the commune Gorlice). The main activities are related to agriculture, especially to arable land: cereals and root crops. Livestock production is varied.

Graph 5. Size of farms



Source: National Agriculture Census 2010, Central Statistics Office GUS.

There are 13 575 farms and average farm size is 3,2 hectares. The farm structure, i.e. small and dispersed fields, limits the ability to produce energy crops for other than their own needs.

Most of the land has been allocated for cereals and potato production. The predominant profile of animal production on farms is milk production and livestock (beef and lamb). For years, one can observe a growing interest in organic farming and agro-tourism. The largest farms are mostly organic farms - now in the County is 460 organic farms, mostly in the communes Uście Gorlickie and Sękowa (source: Malopolska Agricultural Advisory Centre).

There are more than 200 households in the Gorlice County providing services related to countryside tourism (source: Malopolska Agricultural Advisory Centre):

- agrotourism farms - 90
- ecological agrotourism farms - 20
- farms with horse studs - 25
- farms cooperating with spas - 20
- farms of rural tourism - 40

Standard of dwellings

The level of the average gross remuneration in the Gorlice County, which is lower than the provincial and country level, affects the quality of life, promotes the outflow of residents and adversely affects the development of local entrepreneurship.

Table 7. Gross salary in the years 2002-2012

County overall	2002	2004	2006	2008	2010	2012	Dynamics 2002-2012
Average gross salary (PLN)	1 770,23	1 929,02	2 124,38	2 492,53	2 632,27	2 847,79	160,9
in relation to:							
national average (Poland =100) %	79,0	80,1	80,6	78,9	76,6	76,1	#
province average % (province =100)	86,2	87,0	86,9	85,8	83,0	82,4	#

Source: own elaboration based on Central Statistics Office data.

In 2012, in the Gorlice County there were 23 225 residential buildings with a 30 709 dwellings, of which:

- 11 795 dwellings in urban areas
- 18 914 dwellings in rural areas

Table 8. Housing stock in the Gorlice County in 2012

Housing stock	Total	Urban areas	Rural areas
Dwellings	30 709	11 795	18 914
Rooms	127 019	45 533	81 486
Floor area (m^2) overall:	2 487 005	816 586	1 670 419
of which:			
average of dwelling (m^2)	81,0	69,2	88,3
floor area per 1 person (m^2)	22,8	22,5	22,9

Source: Central Statistics Office GUS.

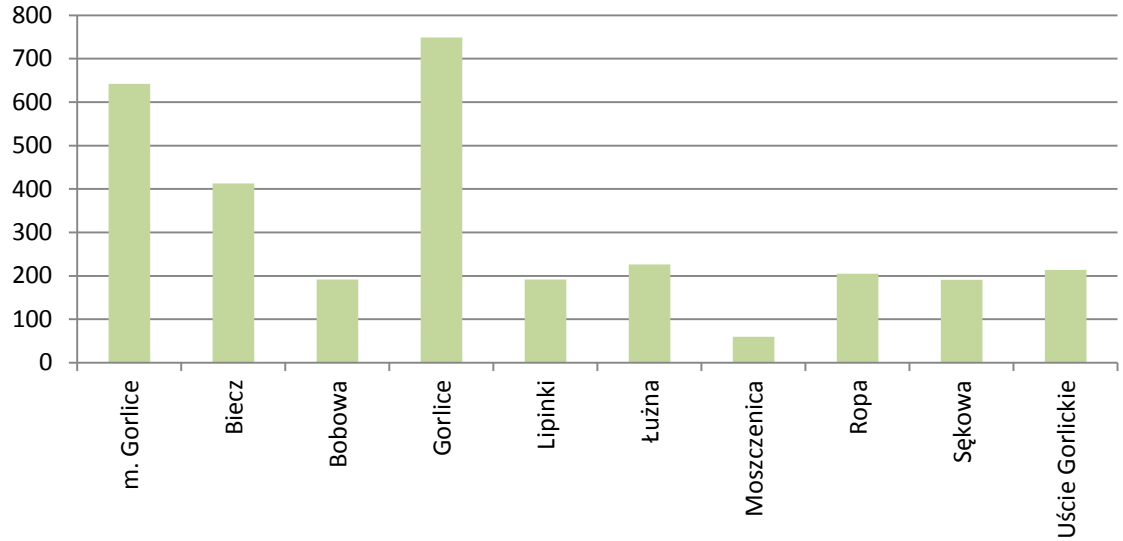
The Gorlice County is a place with an average attractiveness for settlement. The increase in the number of dwellings in the period of 2002-2012 was less than 10%. The main construction activities are located in the city of Gorlice and its surroundings as well as in commune of Biecz.

Table 9. Housing stock in the years 2002-2012

County - overall	2002	2004	2006	2008	2010	2012	Dynamic 2002-2012
Dwellings	27 946	28 756	29 148	29 601	30 172	30 709	109,9
of which							
in the cities	10 401	10 581	10 708	10 802	11 698	11 795	113,4
in the countryside	17 545	18 175	18 440	18 799	18 474	18 914	107,8

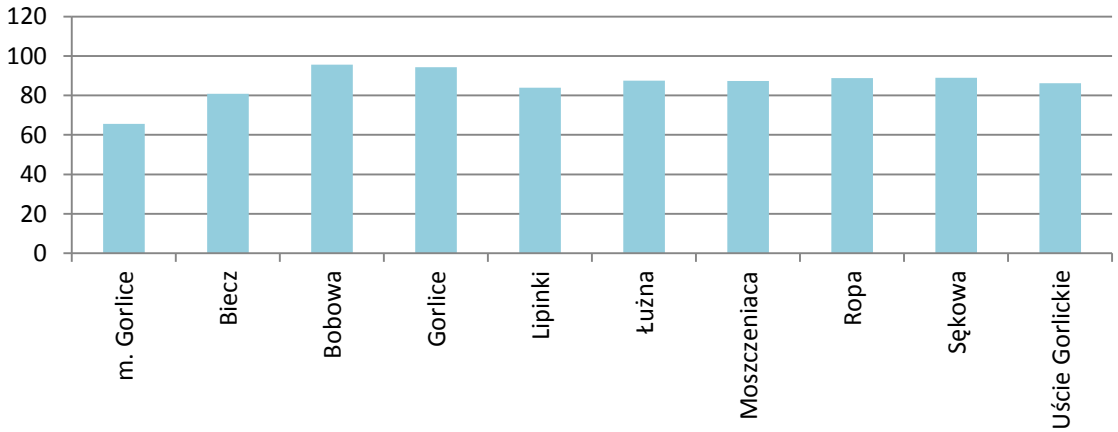
Source: own elaboration based on Central Statistics Office data.

Graph 6. Number of dwellings constructed in the period 2002-2012.



Source: own elaboration based on Central Statistics Office data.

Graph 7. Average usable floor space (sq.m.)



Source: own elaboration based on Central Statistics Office data.

The average floor space of one dwelling in the private buildings is 86,0 m^2, while the average for a co-operative housing and communal apartments are much lower: 46 m^2 and 45 m^2 respectively.

Table 10. Fittings in the dwellings in the Gorlice County (%)

Installation	Cities	Countryside
Water supply	97,4	88,7
Bathroom	95,4	81,9
Central heating	82,4	64,1
Gas from the gas network	91,5	58,8

Source: Central Statistical Office, 2012

There are differences in the housing equipment / fittings between the cities and countryside. The dwellings in the cities are better equipped with in the basic installations, in particular with regard to central heating and access to the gas network.

Public facilities

Water supply and sewage disposal system are in place in all communes of the Gorlice County but on a limited scale. There is the disproportion between the lengths of the water supply and sewage networks and significant gaps in the development of infrastructure. In many locations of the County residents use individual dug wells. Most communes have their own sewage treatment plants, but their wastewater load is small and inadequate to existing capacity.

Indicators of water supply and sewage disposal system:

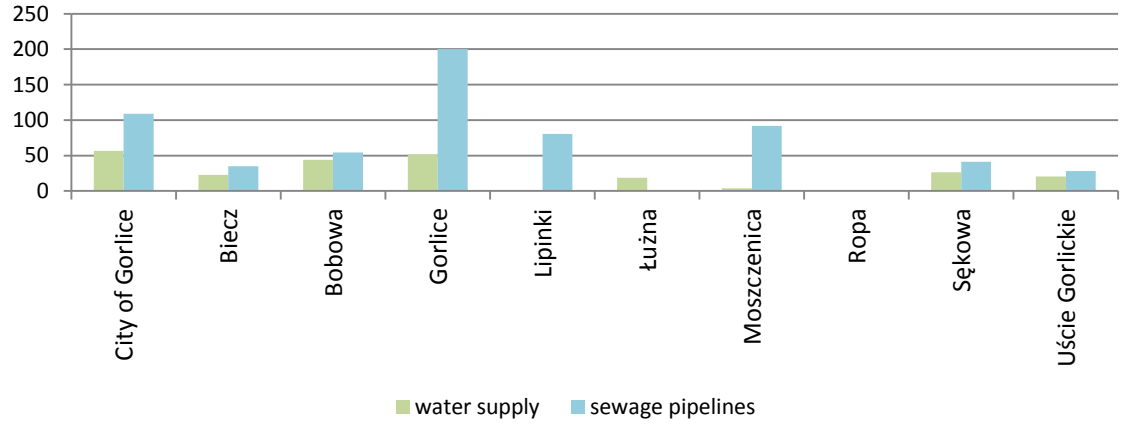
- residents with access to water supply system - 36,6%
- residents with access to sewage disposal network – 44,8%
- sewage treatment plants (industrial and communal)) – 16

Table 11. Length of water supply system and sewage network in the Gorlice County in 2012

Commune	Length of water supply network (km)	Percentage of residents with access to network	Length of sewage disposal network (km)	Percentage of residents with access to network
City of Gorlice	56,5	84,8	108,9	90,0
Biecz	22,8	23,2	34,8	18,7
Bobowa	43,8	32,8	54,5	21,3
Gorlice	51,6	11,4	200,4	45,6
Lipinki	0	0	80,7	43,1
Łużna	18,6	9,6	0	0
Moszczenica	3,9	7,1	92,0	55,0
Ropa	1,3	5,3	0,7	1,1
Sękowa	26,4	61,3	41,2	41,5
Uście Gorlickie	20,5	34,0	28,0	36,9
County total	**245,4**	**36,6**	**641,2**	**44,8**

Source: Central Statistics Office GUS.

Graph 8. Length of water and sewage pipelines



Source: Central Statistics Office GUS.

The electricity, gas and heating networks make up the energy infrastructure in the Gorlice County.

Table 12. Energy market players active in the Gorlice County

	Operators, utilities and producers	Coverage
Electricity	*Transmission:* Polskie Sieci Elektroenergetyczne S.A. Wschód Polskie Sieci Elektroenergetyczne S.A. Południe *Distribution:* TAURON Dystrybucja S.A. Oddział w Krakowie PGE Dystrybucja S.A. Oddział Rzeszów Fabryka Maszyn GLINIK S.A. – Oddział Obsługi Energetycznej F.M. „GLINIK"S.A. *Generation*: Heat and power generation plant Gorlice Sp. z o.o. Hydropower plant – 2 in communes of Ropa and Biecz	The entire County – electrification rate 100%
Natural gas	*Transmission:* Operator Gazociągów Przesyłowych GAZ-SYSTEM S.A. Oddział w Tarnowie *Distribution:* Polska Spółka Gazownictwa sp. z o.o. Oddział w Tarnowie Zakład w Jaśle	All communes in the country, but at different levels – gasification rate is around 70%
Heat network	*Generation:* Elektrociepłownia Gorlice Sp. z o.o. *Transmission and trade:* Miejskie Przedsiębiorstwo Gospodarki Komunalnej Sp. z o.o. Fabryka Maszyn GLINIK S.A.	City of Gorlice – indicator of heat network coverage is around 35%

Sources: Energy Regulatory Office, Central Statistical Office, „The draft guidelines to plan of the supply of heat, electricity and fuel gas for the City of Gorlice - developed for the years 2012-2027"

The electricity supply system, as a part of national power grid, supplies electricity to all recipients in the County. There are two power generators:

- CHP Gorlice Ltd – licenced for the electricity generation (power 5MW). Heat and electricity is generated by boilers fuelled by conventional fuels (coal, heating oil)
- Two small hydro power plants of total power capacity of 1,11 MW

The production capacity of power generators in the County is small in relation to the electricity demand of the area.

Network infrastructure in Malopolska is significantly depreciated, which affects the quality of electricity supply. The problem in the power system network is the age of low and medium voltage lines and transformer failures, especially in rural areas. It is the result of neglect of investment in recent years, with a steadily increasing number of electricity consumers across different sectors. Households are the largest consumer of electricity.

Table 13. Consumers of electricity – households in the year 2002-2012

The County - overall	2002	2004	2006	2008	2010	2012	Dynamics 2002-2012
Consumers of electricity in households	19 743	28 752	32 314	32 592	32 834	33 318	168,7
of which:							
urban	10 484	10 995	11 448	11 544	12 737	12 349	117,8
countryside	9 259	17 757	20 866	21 048	20 097	20 969	226,5

There is well developed gas infrastructure in the County. All communes of the County have access to natural gas, but the network coverage in individual areas is varied. There is no natural gas network in the southern part of the County - in some places located in communes of Sękowa and Uście Gorlickie. The gasification rate of individual communes varies from 97% in the City of Gorlice to 12% in the commune of Uście Gorlickie.

Table 14. Gas infrastructure in the years 2002-2012

The County - overall	2002	2004	2006	2008	2010	2012	Dynamics 2002-2012
The length of gas network (km)	1 060,7	1 080,3	1 086,4	1 099,5	1 101,6	1 106,5	104,3
No. of connections to buildings	16 739	16 799	16 439	16 752	17 006	17 297	103,3

Source: own elaboration based on Central Statistics Office data.

The technical condition of the gas network is fairly diverse, due to the different periods of construction and operating conditions. In recent years, operators are gradually modernizing the oldest and most exploited sections of the network in accordance with its investment plans.

The households are the largest group of consumers of natural gas, while the overall gas consumption by the industrial sector is the highest.

Table 15. Consumer of natural gas – households in the year 2002-2012

The County - overall	2002	2004	2006	2008	2010	2012	Dynamics 2002-2012
Consumers of natural gas	20 751	21 300	21 323	21 511	21 531	21 686	104,5
of which:							
urban	9 973	10 200	10 165	10 246	10 701	10 719	107,5
countryside	10 778	11 100	11 158	11 265	10 830	10 967	101,7

Source: own elaboration based on Central Statistics Office data.

According to the Energy Regulatory Office in the Gorlice County there is one company licensed to generation of heat (CHP Gorlice Sp. z o.o.) and two companies with a license to transmit or distribute the heat (Municipal Municipal Services Sp. z o.o. and Machine Factory "GLINIK" SA). Infrastructure related to the generation and distribution of heat is made up of 50 local boiler houses (owned by different entities and institutions, including industrial plants, businesses, housing associations and municipalities), 22,4 km of heat transmission pipelines, 11,8 km of connections to buildings and individual heating systems of different entities.

Table 16. Heat sales in the Gorlice County in the years 2002-2012

Powiat ogółem	2002	2004	2006	2008	2010	2012
The sale of heat (GJ)	391 049,0	370 262,1	342 189,1	348 232,1	340 971,0	370 787,0
of which:						
residential buildings	352 320,0	316 284,4	320 308,9	310 570,6	311 789,0	296 926,0
public buildings	38 729,0	53 977,7	39 880,2	37 661,5	29 182,0	73 861,0

Source: own elaboration based on Central Statistics Office data.

One can observe the trend of reducing the demand for heat supplied to residential buildings. Theses results came from: the implementation of measures for the effective use of heat (thermal improvements), increased public awareness of energy efficiency and changes in the weather (higher external temperatures during the heating season).

The largest share of the total heat demand is housing, followed by industry, trade and services, and public buildings.

The standalone, individual heating systems (central heating systems and furnaces) are the main sources of heat in residential buildings. These systems are of small heating power and are based mainly on coal.

Public utilities (municipal and county buildings) are equipped usually with their own, independent heat sources which are based predominantly on natural gas. Some of the buildings in the City of Gorlice are supplied with heat from the district heating network.

The coal remains the primary fuel used for heating purposes in the County - estimated share of the total balance of energy produced is about 77%.

4. The methodology of the energy demand evaluation in the County

In this study the demand for energy was determined based on:

- • **actual energy consumption** in recent years (for groups of objects for which such data are available);
- **indicator methods** based on estimates, indicators of the energy intensity, fuel consumption rates, etc. (for groups of objects for which detailed data are not available).

The methodology for calculating the energy demand for particular groups of objects is presented below.

Public buildings

- Heat demand - based on actual energy consumption and fuel – according to the data provided by managers and users of buildings.
- Electricity demand – according to the data provided by electricity providers and managers / users of buildings

Production and commercial buildings

- Heat demand – calculations based on average rates per m^2 of usable space.
- Electricity demand – based on data from electricity providers.
- Demand for energy in industrial processes – calculation based on the estimated indicators.

Residential buildings

- Heat demand –calculation based on the average rates of the heat demand per m^2 of usable space, the age and technologies of the buildings as well as on the estimated rate of buildings retrofitted.
- Electricity demand – based on data from electricity providers.

Street lighting

- Electricity demand - based on actual energy consumption and fuel – according to the data provided by the local authorities.

Transport

- Fuel demand - estimates based on data on the number of registered vehicles and the average annual fuel consumption by different types of vehicles.

In determining the energy demand a variety of sources were used:

Statistical data:

1. The National Census 2011 – Central Statistical Office (Narodowy Spis Powszechny Ludności I Mieszkań 2011 (GUS, 2012 r.))
2. New dwellings - Central Statistical Office (Dane statystyczne dotyczące mieszkań oddawanych do użytku (GUS))
3. Usable floor size of production and commercial buildings – local governments (Dane o powierzchni budynków, w których prowadzona jest działalność gospodarcza (Dane z Urzędów Gmin))

Data provided by local authorities:

4. Number of vehicles – the County Office (Dane o liczbie pojazdów zarejestrowanych na terenie powiatu gorlickiego (dane Starostwa Powiatowego w Gorlicach))
5. Usable floor area of public buildings – local governments (Dane o powierzchni budynków użyteczności publicznej (dane z Urzędów Gmin I Starostwa Powiatowego))
6. Energy consumption for street lighting – local governments (Dane o zużyciu energii do celów oświetlenia przestrzeni publicznej (dane z Urzędów Gmin))

Data provided by electricity, natural gas and heat supplying companies:

7. Sales of electricity (Dane o sprzedaży energii elektrycznej na terenie powiatu (dane PGE Dystrybucja S.A. Oddział Rzeszów, TAURON Dystrybucja S.A. Oddział w Krakowie))
8. Sales of natural gas (Dane o sprzedaży gazu na terenie powiatu (dane PGNiG S.A. Karpacki Oddział Obrotu Gazem w Tarnowie))
9. Sales of heat and electricity by CHP Gorlice (Dane o sprzedaży ciepła oraz produkcji i sprzedaży energii elektrycznej produkowanej w skojarzeniu z ciepłem (dane Elektrociepłowni Gorlice Spółka z o.o.))

Data of Malopolskie Region Office:

10. Województwo Małopolskie 2013 - Urząd Marszałkowski Województwa Małopolskiego, Kraków 2013

Sources of indicators / rates were various standards and regulations, indicators of energy intensity of buildings as well as experts' forecasts:

1. Normy i rozporządzenia dotyczące wymaganej izolacyjności przegród zewnętrznych, obowiązujące w okresie budowy mieszkań (PN-64/B-03404; PN-74/B-03404; PN-82/B-02020; PN-91/B-02020; Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz. U. z 2002r. Nr 75, poz. 690); Rozporządzenie Ministra Infrastruktury z dnia 6 listopada 2008r. zmieniające rozporządzenie w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz. U. z 2008r. Nr 201, poz. 1238)
2. Wskaźniki energochłonności budynków w zależności od okresu budowy (dr inż. M. Robakiewicz, Termomodernizacja budynków i systemów grzewczych – poradnik, Fundacja Poszanowania Energii, 2002)

3. dr inż. J. Waśkiewicz, dr hab. Inż. prof.. nadzw. ITS Z. Chłopek, mgr P. Pawlak „Prognozy eksperckie zmian aktywności sektora transportu drogowego (w kontekście ustawy o systemie zarządzania emisjami gazów cieplarnianych i innych substancji)", Instytut Transportu Samochodowego, 2012.

5. Energy demand in the County in the base year

As the base year for the analysis of energy demand in the Gorlice County the 1999 has been adopted (the year the local government reform in Poland).

Due to the inability to gather all historical data, the base year inventory was estimated.

Basic statistical data describing the Gorlice County in 1999 (according to Central Statistics Office data and survey data):

- Population – 107 376
- Usable floor area of dwellings – 1 892,0 th. m^2
- Usable floor area of public buildings – 210 th. m^2
- Number of enterprises – 5 101 in total, of which 4 870 private

Demand for electricity

Demand for electricity was determined using:

- statistics of the average annual electricity consumption of household in the Gorlice County in the base year
- statistical data for energy efficiency in the years 1999 - 2009 according to the information and statistical studies of the Central Statistical Office
- data of representative / model public buildings - on the basis of the survey

Public buildings

Demand for electricity was determined on the basis of available data on the actual consumption of electricity in the building in the year 1999 as well as by using the indicators of average electricity consumption per 1 m^2 of usable space, depending on the function of the building. The following groups of buildings and the average ratios of unit consumption of electricity in the Gorlice County were defined - the rate for county and municipal buildings was based on the electricity consumption in buildings representative in 1999:

- educational buildings (schools, kindergartens) - 25,0kWh/m^2
- health care buildings – 30,0kWh/m^2
- culture related buildings – 12,0kWh/m^2
- administrative and office buildings – 38kWh/m^2
- other buildings – 10kWh/m^2

Discrepancies between the value of indicators are primarily the result of:

- different demand for light intensity and the amount of installed electrical equipment in areas with different purposes: teaching, communication, office, etc.
- different energy efficiency standards of equipment installed.

The demand for electricity for public buildings was estimated at **6 930 MWh in the base year**.

Production and commercial buildings

The electricity consumption in the base year was determined by the amount of energy delivered to these buildings in the Gorlice County in 2013 and adjusted by the following factors:

- in the years 1994 - 2009 there has been a systematic decline in energy intensity at 10,34%/year (national rate of decline in of energy intensity by "Energy efficiency in the years 1999-2009" Statistical information and reports GUS)
- in the period 2008-2013 there has been a systematic decline in the demand for electricity supplied by a high - voltage network (an average of 2.8% per year) and a systematic increase in electricity supplied by the medium-voltage network (about 4.5% per year) (the actual data).

The demand for electricity of production and commercial buildings was estimated at **109 316,5 MWh in the base year**.

Residential buildings (households)

The electricity consumption in households was based on the amount of energy supplied in 1999 for consumers in urban and rural areas of the Gorlice County (Central Statistical Office). Total demand was estimated at the level **32 835 MWh in 1999**.

Table 17. Electricity consumption by households in 1999

	Households			
	Number of households supplied	Overall electricity consumption (MWh)	Average yearly consumption by 1 household (kWh)	Average yearly consumption by 1 inhabitant (kWh)
County - overall	**18 939**	**32 835**	**1 733,7**	**305,8**
cities	10 223	16 748	1 638,3	482,3
countryside	8 716	16 087	1 845,7	221,4

Source: own elaboration based on Central Statistics Office data.

Street lighting

The street lighting in 1999 was primarily based on mercury lamps – approximately 80% of total lamps. The mercury lamps are lamps of high power in comparison to sodium lamps used in later years.
As the complete data on the characteristics of street lighting (number, type and power of lamps) was unavailable for each commune of the GorliceCounty, the electricity consumption of street lighting in 1999 was adopted at the level higher by 6% than in 2013 (analysis for the City of Gorlice).
Under such assumption the electricity consumption for street lighting amounted to **3 597,1 MWh in 1999.**

Summary

The total demand for electricity in the Gorlice County in the base year (1999) was estimated at a level of **152 678,6 MWh,** of which:

- public buildings – 6 930,0 MWh
- production and commercial buildings -109 316,5 MWh
- residential buildings – 32 835 MWh
- street lighting – 3 597,1 MWh

Demand for heat and fuels

Due to a lack of inventory of all buildings approximate seasonal heat demand for the Gorlice County was calculated by the indicator method taking into account the following:

- usable floor space of buildings
- medium heat demand (kWh/m2/year) taking into account the age of the buildings and building standards more demanding over the years
- marginal level of thermal improvements made.

The heat demand for the following sectors: public buildings, residential buildings and production / commercial buildings was calculated separately. Usable floor area of buildings in 1999 was based on the CSO data (housing), data from surveys of individual communes and the County Office (area of public buildings) as well as estimates based on statistical data and *The Regional Energy Plan (RPE) for the Province of Malopolska for the years 2013-2020*.

Public buildings

The demand for heat energy in public buildings for 1999 was determined bearing in mind following assumptions:

- usable floor space - around 210 th. m^2
- thermal improvements started after 1999
- medium heat demand indicator for all buildings – 250 kWh/m2/year
- heat for hot water production was set as 5% of the heat demand for heating buildings
- the average efficiency of heating systems is around 0,65

The amount of energy to meet the demand for heating, hot water production and ventilation for public buildings was estimated at **298 329 GJ in 1999**.

Production and commercial buildings

The demand for heat energy in production and commercial buildings for 1999 was determined bearing in mind following assumptions:

- usable floor space – around 425 000 m^2
- medium heat demand indicator for all buildings – 280 kWh/m2/year
- heat for hot water production was set as 5% of the heat demand for heating buildings
- the average efficiency of heating systems is around 0,6

The amount of energy to meet the demand for heating, hot water production and ventilation for production and commercial buildings was estimated at **785 400 GJ in 1999**.

Residential buildings (households)

The demand for heat energy in housing for 1999 was determined bearing in mind following assumptions:

- total usable floor space - around 1,9 mln m^2
- medium heat demand indicator for all buildings – 270 kWh/m2/year
- heat for hot water production – 3 500MJ/inhabitant/year
- the average efficiency of heating systems is around 0,65

The demand for heat in residential buildings was estimated at **3 205,1TJ in 1999** of which 2 829,3TJ for heating and 375,8 TJ for hot water production.

Summary

The total demand for heat in the Gorlice County in the base year (1999) was estimated at a level of 4 288,8 TJ, of which:

- public buildings – 298,3 TJ
- production and commercial buildings – 785,4 TJ
- residential buildings – 3 205,1 TJ

Fuels for heating purposes in the base year in the Gorlice County

The high share of energy consumption for heating in the base year was associated with low thermal insulation of buildings and low-efficiency coal stoves. Index of gasification of the County was high, nearly 60%. Natural gas consumption by households stood at 10.5 million m^3 (CSO data), of which: about 7 million m^3 to heat dwellings (GUS), and about 2.0 million m^3 for hot water production (according to the normative rate of consumption of natural gas at 130 m^3/person/year). It was assumed that in the base year about 20% of households were using natural gas for heating. Gas consumption by the production, services, trade and other recipients was assumed at the level of 2.5 million m^3 per year. An analysis of the demand of a representative group of public sector buildings shows that the demand for natural gas during 1999-2013 increased by about 25%. Due to the lack of historical data on the volume of the heat supply from the heat network, the demand for district heating is included in the group of coal fuels.

Table 18. Estimated demand for fuels for heating and hot water production in the base year

	Natural gas (th. m^3)	Coal fuels (Mg)	Biomass (Mg)
			wood
Residential buildings	9 000	103 720	18 588
Public buildings	2 000	8 600	754
Production / commercial buildings	2 500	25 035	4 640
Total:	**13 500**	**137 355**	**23 982**

Source: own elaboration.

Transport

The consumption of fuels in the transport sector in the base year 1999 was calculated on the basis of:

- the number of vehicles registered in the Gorlicki County in 1999 (according to the records of the Department of Transport and Roads - County Office in Gorlice);
- the indicators of unit fuel consumption by vehicles (dm^3/100 km)and the publication of the Motor Transport Institute: "The methodology of of forecasting changes in the road transport sector of activity (in the context of the Law on the management of emissions of greenhouse gases and other substances);
- the indicators of fuel consumption in road transport according to the information and statistical studies of CSO *"Energy efficiency in the years 1999 - 2009"* CSO;
- the indicators of diesel consumption in Polish agriculture.

Table 19. Number of vehicles in base year 1999

Type of vehicle	Number
Bus	28
Farm tractor	2 937
Road tractor	23
Motocycle	5 028
Moped	1 119
Universal truck	735
Specialized truck	435
Cargo-passenger and passenger car	9 400
Car - other	79
Total	**19 784**

Source: Department of Transport and Roads - County Office in Gorlice, 1999.

Table 20. Amount of fuel used by vehicles in the Gorlice County in the base year

Fuel	unit	Amount
Petrol	dm^3	3 960 340
Diesel	dm^3	8 094 604
LPG	dm^3	488 089

Source: own elaboration based on indicators.

Summary:

In the base year energy demand for all groups of customers in Gorlice County was approximately 5 273,97 TJ.

6. Demand for energy in the County – current state

The demand for energy in the district is presented by type of energy, ie electricity and heat, and by groups of objects: public buildings, commercial facilities, residential buildings (households), street lighting and transport.

Demand for electricity

The demand for electricity in the Gorlice County stands at about 176.7 GWh / year and is fulfilled by following energy companies:

- TAURON Dystrybucja S.A. – 146,7 GWh
- PGE Dystrybucja S.A. Oddział Rzeszów – 23,9 GWh
- CHP Gorlice Sp. z o.o. (sales in the County and own consumption) – 6,1 GWh

The supply of electricity is carried out by a network of high voltage (HV) to one recipient, ie Machinery Factory GLINIK SA and to other customers through a network of medium (MV) and low voltage (LV).

Table 21. Number of recipients of electricity and electricity consumption in the Gorlice County

Supplier	Number of recipients			Sales of electricity (MWh)		
	by type of network / voltage					
	HV	**MV**	**LV**	**HV**	**MV**	**LV**
TAURON Dystrybucja S.A.	1	28	30 193	30 564,90	25 496,63	90 688,44
PGE Dystrybucja S.A.	-	7 800		-	23 900	
CHP Gorlice Sp. z o.o.	-			-	6 090,4	
Total:	**30 222**			**176 740,37**		

Source: Energy suppliers

Public buildings

The availability of comprehensive operational data on the electricity consumption in "communal" and "county" buildings is limited. It may be explained by a large number of buildings and a short time to collect the necessary information.

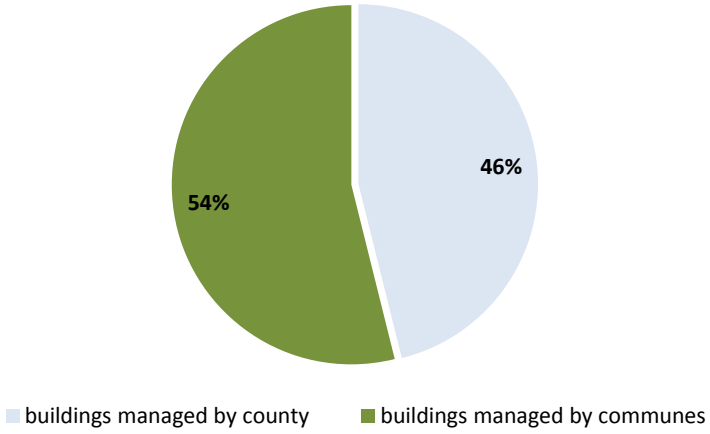
The current demand for electricity for public buildings is determined on the basis of available data on the actual consumption of electricity in the building over the year, as well as using indicators of the average electricity consumption per 1 m^2 of usable floor space. The public buildings serve a number of roles, which are different in terms of condition and duration of operations. The public buildings were divided into groups, to which the average indicators of electricity unit consumption are assigned:

- educational building (schools, kindergarten) – 35,0 kWh/m^2
- health care buildings – 40,0 kWh/m^2
- culture related buildings – 15,0 kWh/m^2
- administration and office buildings – 40 kWh/m^2
- other buildings (community centres, fire stations etc.) – 15 kWh/m^2

The current demand for electricity by public buildings is about 9 229,5 MWh, of which:

- 4 256,3 MWh for buildings managed by the County (actual data)
- 4 973,2 MWh for buildings managed by communes (actual and indicator data)

Graph 9. Demand for electricity in public



Production and commercial buildings

There are no energy-intensive industries in the Gorlice County. The largest purchaser of electricity in the enterprise sector is Machinery Factory "GLINIK" SA. In 2013, the factory purchased 34 224 MWh of electricity, of which: 30 564,90 MWh from Distribution Network TAURON SA (supply of the high - voltage network) and 3 659,1 MWh from network CHP Gorlice Sp. z o.o. (medium voltage power network). Machinery Factory "GLINIK" SA is also an electricity provider supplying 48 customers of which the major customers are companies of the "GLINIK" Group. Based on the amount of electricity supplied according tariff groups A and B and partially group C (other business activities), it is estimated that business sector consumes about **95 856,4 MWh** of electricity annually.

Residential buildings (households)

Households are the largest user of energy. This sector consumes about 39% of total electricity in the Gorlice County and more than 75% of the energy transmitted over a of low voltage network.

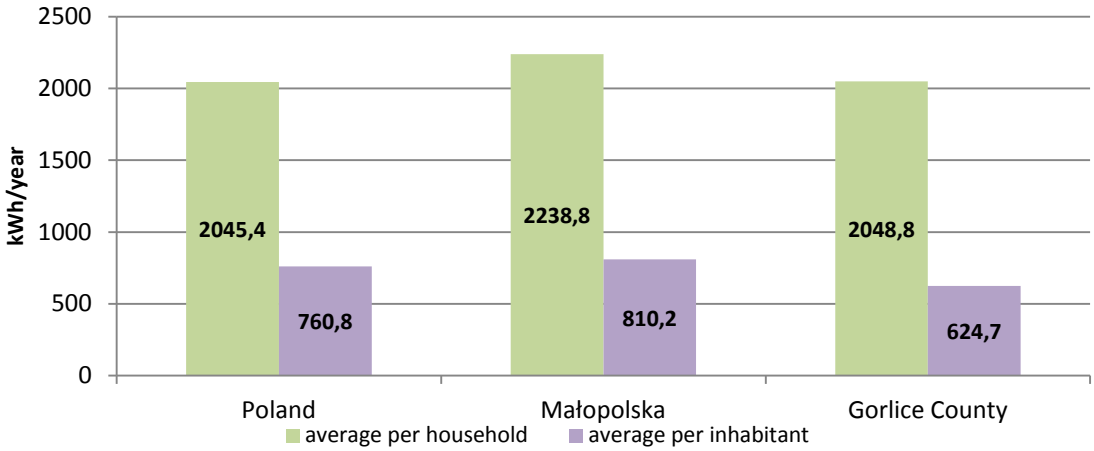
Table 22. Consumption of electricity in households per year

	Households			
	Number of recipients	Total yearly electricity consumption (MWh)	Yearly average consumption per 1 household (kWh	Yearly average consumption per 1 inhabitant (kWh)
County - overall	**33 318**	**68 261**	**2 048,8**	**624,7**
cities	12 349	22 441	1 817,3	619,0
countryside	20 969	45 820	2 185,1	627,6

Source: own elaboration based on Central Statistics Office data

The electricity consumption per capita in the Gorlice County is one of the lowest in the country and the region.

Graph 10. Average electricity consumption per household and inhabitant



Street lighting

There is an extensive system of street lighting in the communes of the Gorlice County. It includes both upgraded lighting points, based on sodium lamps and fixtures that use older mercury sources. In individual cases, there are incandescent or halogen lighting points. The total demand of electricity for lighting public spaces was estimated at 3 393.5 MWh. Differences in consumption in individual communes are due to territorial extent, the type of light source used, varying density of location of lighting poles as well as austerity measures (turn off lights at certain hours of the night).

Table 23. Consumption of electricity – street lighting

Commune	**Street lighting**
	electricity consumption (MWh)/year
Biecz	598,0**
Bobowa	135,5*
City of Gorlice	1 826,9**
Gorlice	228,0**
Lipinki	250,3*
Łużna	80,0**
Moszczenica	54,8**
Ropa	84,5**
Sękowa	85,3**
Uście Gorlickie	data not available

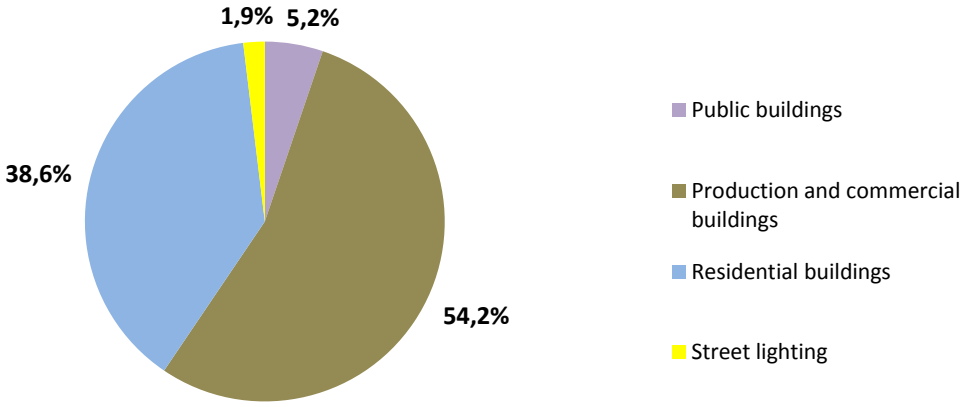
Source: Surveys in 2012 and 2014***

Summary

Current balance of electricity consumption in the Gorlice County is as follows:

- Public buildings – 9 229,5 MWh
- Production and commercial buildings – 95 856,4 MWh
- Residential buildings – 68 261,0 MWh
- Street lighting – 3 393,5 MWh

Graph 11. Structure of electricity consumption by users



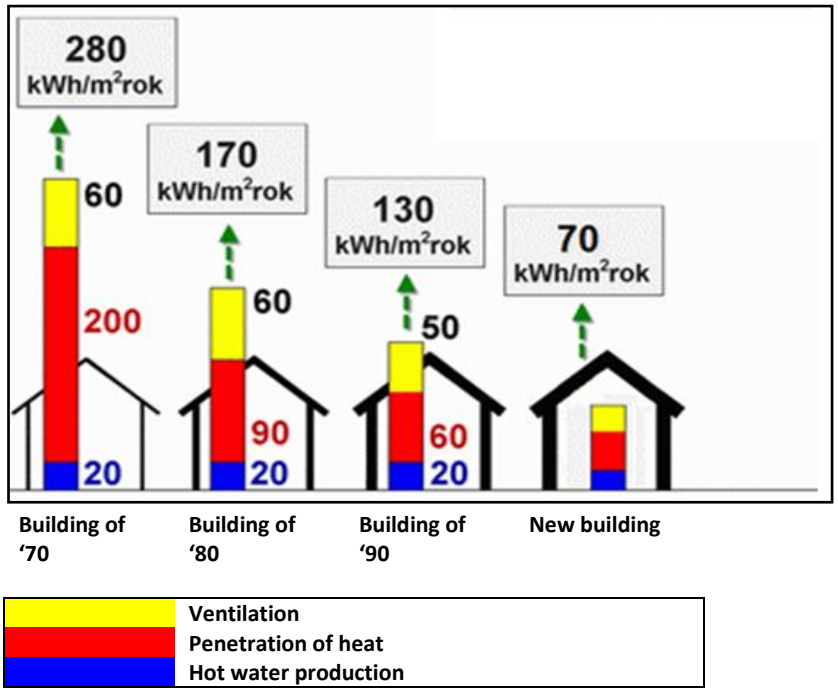
Demand for heat and fuels

The demand for heat in the Gorlice County stands at about 3,334.1 TJ / year and is fulfilled by:

- a central heating network (CHP Gorlice Sp. z o.o., only in the city of Gorlice) - 186.8 TJ (data for 2013)
- a local boiler houses - 210.8 TJ (CSO data)
- individual heat sources of low power capacity - 2 936.5 TJ (estimated)

The heat demand is the total needs of different types of buildings: residential, public as well as production and commercial ones. The energy standard of buildings - the period of construction and progress in implementation of thermal improvement measures – was taken into account in the calculations of the thermal energy consumption.

Graph 12. Heat demand indicators (kWh/m^2/year)



Public buildings

The current heat demand for public buildings was determined according to the actual consumption of heat and fuel in these objects in 2013 (according to the commune offices and the County Office) and by indicator method. The usable floor space of the public buildings total in the Gorlice County is about 219 641 m^2.

The current heat demand in public buildings is about 125 069 GJ, of which:

- 46 411.1 GJ for buildings managed by the County (according to actual data: purchase of heat from the supplier and the amount of natural gas consumed),
- 78 657.9 GJ for buildings managed by communes (based on the actual data for part of buildings and indicator method).

The demand for thermal energy in public buildings managed by communes was determined using the following assumptions:

- total usable floor space – 128 149 m^2
- it was assumed that 90% of buildings were retrofitted so for these buildings the indicator of yearly heat demand is 110 kWh/m^2/year
- for other buildings this indicator is 250 kWh/m^2/year
- heat for hot water production was set at 10% of the heat demand for heating buildings
- average index of efficiency of heating systems is 0,8

Production and commercial buildings

For production and commercial buildings, the demand for heat was determined by indicator method assuming that:

- total usable floor space is around 642 000 m^2
- it was assumed that 50% of these buildings are of high thermal standard (new or retrofitted buildings) so for these buildings the indicator of yearly heat demand is 100 kWh/m^2/year
- for other buildings this indicator is 220kWh/m^2/year
- heat for hot water production was set at 10% of the heat demand for heating buildings
- average index of efficiency of heating systems is 0,7

The total energy demand for space heating, hot water production and ventilation in production and commercial buildings was estimated at about 528 275 GJ per year.

Residential buildings (households)

The total usable floor space of the residential buildings (multifamily buildings and detached houses) in the Gorlice Country is around 2,5 million m^2 (CSO data). The energy standard of building depends mainly on the construction period and the degree of thermal improvements. The heat demand for space heating were calculated taking into account the age of the buildings and unit indicators of energy demand per square meter of floor space.

The assumptions:

- the values of the unit indicator for heat demand for each construction period are shown in the following table:

Table 24. Estimated indicator of energy consumption in housing in the Gorlice County

Construction year	Percentage of dwellings in the County*	Average heat demand (kWh/m^2/year)	Average indicator of heat demand (kWh/m^2/year)
till 1966	32,0%	295	229
1967 – 1985	32,8%	260	
1985 – 1992	13,9%	180	
1993 – 1997	6,8%	140	
after 1998	14,5%	105	

** indicative value based on data from the National Dwellings Census in 2011*

- buildings built after 2002 have a relatively high energy standards and do not require of thermal improvements
- 10% of the usable space in buildings constructed in the years 1918-2001 was thermally retrofitted in the years 2002 – 2012 - so for these buildings the indicator of yearly heat demand is assumed at 100 kWh/m^2/year.
- The indicator for energy for hot water production at the level 3500 MJ/inhabitant/year was used for calculations
- average efficiency index of heating systems is 0,75 and for hot water production is 0,8

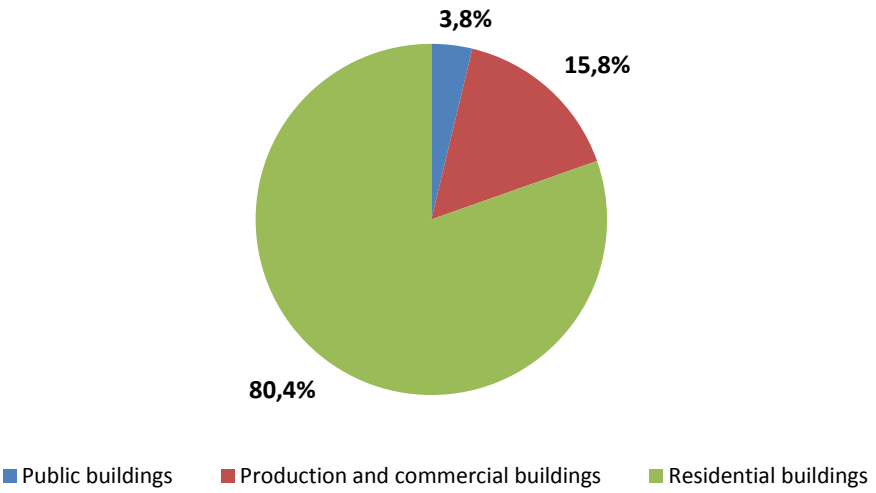
Taking into account the above assumptions the heat demand in the housing sector is set at 2 680.7 TJ, of which: space heating 2 202.7 TJ, hot water production 478.0 TJ.

Summary

The current demand for heat in the Gorlice County was estimated at 3 334.1 TJ, of which:

- public buildings – 125,1 TJ
- production and commercial buildings – 528,3 TJ
- residential buildings – 2 680,7 TJ

Graph 13. Structure of heat demand by user groups



Source: own elaboration

Demand for fuels for space heating and hot water production

The main fuel used for heat production the Gorlice County is coal - approximately 77% of heat is generated from the coal. The remaining heat is produced from natural gas (15%) and biomass (8%).

The structure of the fuel and energy consumption for space heating was estimated on the basis of the data collected. The analysis took into account the following data and assumptions:

- the natural gas consumption in households stands at 10.7 million m^3 (CSO, 2012.), of which 6.8 million m^3 for heating (CSO, 2012.) and 2.7 million m^3 for the hot water production (according to the normative rate of consumption of natural gas at 130 m3/person/year)
- services, trade and other annually consume about 4.2 million m^3 of natural gas (gas supplier, data for 2010) - it is assumed that the gas is primarily used for space heating and hot water production
- consumption of natural gas by "industry and construction sector of economy" is at a level of about 14.5 million m3 (gas supplier, data from 2010). As this gas is used for the technological needs mainly, so this amount was omitted in the analysis
- calorific values of fuels:

Fuel	Calorific value
Natural gas	36 MJ/m^3
Coal and derivatives	25 MJ/kg
Wood (dry)	15,5 MJ/kg
Wood chips	13 MJ/kg

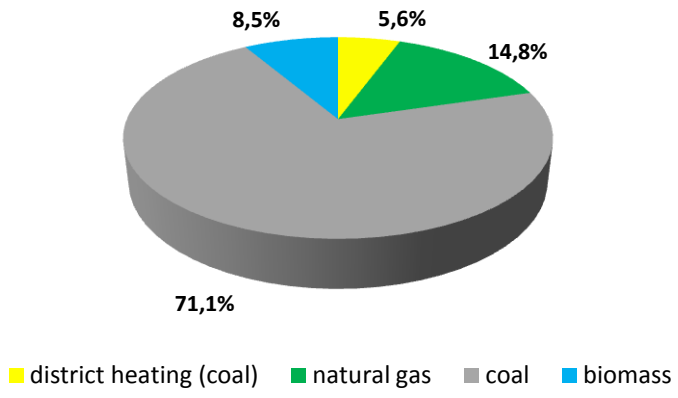
- due to the wide coverage of natural gas in the Gorlice County and high prices of furnace oil and liquefied petroleum gas, such fuels are of marginal importance in the production of heat in the county, and so were omitted in the analysis.

Table 25. Demand for fuels and energy for space heating and hot water production

	District heating (GJ) *	Natural gas (th. m^3)	Coal and derivatives (Mg)	Biomass (Mg)	
				wood	wood chips
Residential buildings	154 085	9 500	79 714	14 095	
Public buildings	19 440	1 594	12	15	2000
Production / commercial buildings	13 242	2 600	15 174	2 810	
Total:	**186 767**	**13 694**	**94 900**	**18 920**	

Source: own elaboration
** heat supplied by CHP Gorlice – coal fuelled (13 743 Mg of coal in 2012)*

Graph 14. Structure of fuel for heating buildings



Source: own elaboration

Transport

The consumption of fuel in transport was calculated on the basis of:

- the number of vehicles registered in the Gorlicki County in 1999 (according to the records of the Department of Transport and Roads of the County Office in Gorlice);
- the indicators of unit fuel consumption by vehicles (dm^3/100 km)and the publication of the Motor Transport Institute: "The methodology of of forecasting changes in the road transport sector of activity (in the context of the Law on the management of emissions of greenhouse gases and other substances)";
- the indicators of fuel consumption in road transport according to the information and statistical studies of CSO *"Energy efficiency in the years 1999 - 2009"* CSO;
- the indicators of diesel consumption in Polish agriculture

Table 26. Number of vehicles in the Gorlice County

Type of vehicle	Number
Bus	240
Farm tractor	6 107
Road tractor	284
Motocycle	6 586
Moped	4 547
Universal truck	4 566
Specialized truck	373
Cargo-passenger and passenger car	48 264
Car - other	510
Total	**71 477**

Source: Department of Transport and Roads - County Office in Gorlice, 2013.

Table 27. Amount of fuels used by vehicles in the Gorlice County

Fuel	Unit	Amount
Petrol	dm^3	13 044 647
Diesel	dm^3	48 423 805
LPG	dm^3	7 783 545
CNG	m^3	9 966
Electricity	kwh	0

Source: own elaboration based on indicators

Summary

It is estimated that in 2013 the demand for energy for all groups of customers in Gorlice County was approximately 6 336.56 TJ

7. Energy Efficiency of in the County - present

Measures to improve energy efficiency can be divided into 2 groups:

- Investment activities - measures related to the thermal improvements of buildings, modernization of heating systems, replacement of receivers etc.
- Organisational activities - reducing energy demand by improving the organization of work, lighting management etc.

As part of the investment activities are possible:

- Measures to minimize the losses of heat - thermal improvements, energy recovery from ventilation air
- Measures to improve efficiency of systems - modernization of heat sources and networks, systems of RES utilisation
- Assembly of equipment for managing energy

Energy management in the County and initiatives to reduce energy

The energy management in most communes of the Gorlice County is done without links to energy planning in the form specified by the Energy Law Act of 10 April 1997. (Journal of Laws of 2012, Pos. 1059, amended.) imposing an obligation on communes to draw up "Guidelines for plans for heat, electricity and natural gas". Such plans have two county communes, ie the City of Gorlice and Commune of Gorlice.

Analysis of the current system of energy management in the county was based on the assessment of the extent of the implementation of the following measures:

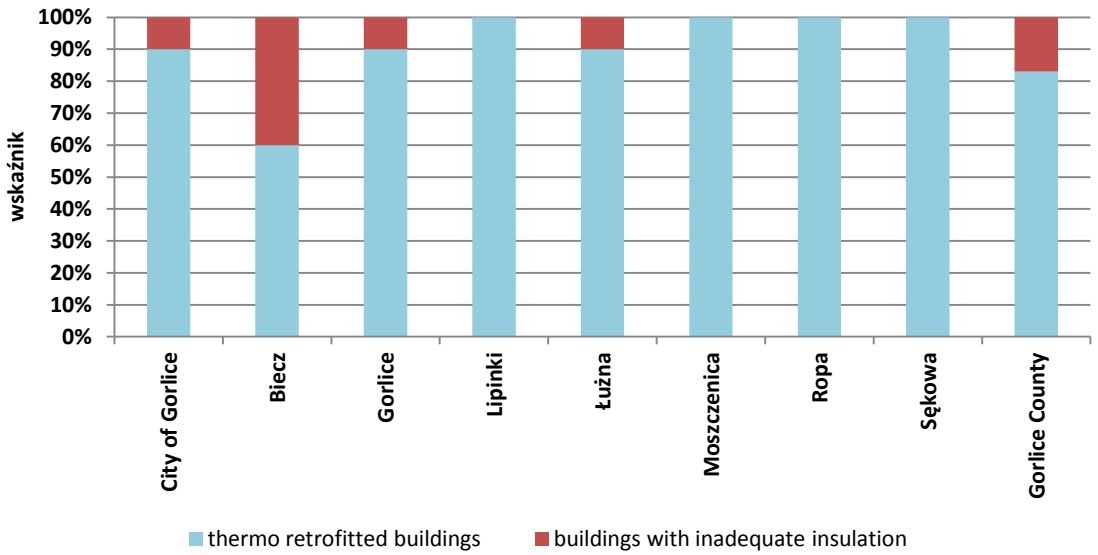
- Thermal retrofitting (building insulation, replacement of windows and external doors)
- Energy management in buildings
- Modernization of heat sources
- Energy efficient equipment and technology
- Lighting of public spaces

Thermal retrofitting

The progress of thermo retrofitting is as follows:

- public buildings – thermo retrofitting is done in about 90% of the buildings
- private buildings – thermo retrofitting (full or partial) is done in about 60% of the buildings

Graph 15. Retrofitted public buildings



Source: own elaboration based on surveys

Standards for thermal protection of buildings are gradually tightened, hence it must be assumed that even the retrofitted buildings will be not thermo-insulated properly, especially in the view of the new standards, which took effect on 1 January 2014. However, insulation of buildings is improving steadily, which helps to improve the energy efficiency.

Table 28. Standards of insulation of buildings.

Heat transfer coefficient U (max) [W/(m^{2}xK)]	Type of envelope partition:			
	outer wall	flat roof	window	doors
PN-64/B-03404	1,16	0,87	3,5	3,5
PN-74/B-03404	1,16	0,7	2,9	2,9
PN-82/B-02020	0,75	0,45	2,6	2,5
PN-91/B-02020	0,55	0,3	2,6	3,0
Regulation of 2002 [1)]	0,3 – 0,45	0,3	2,0 – 2,6	2,6
Regulation of 2008 [2)]	0,3	0,25	1,7-1,8* 1,8-2,6**	2,6
Regulation of 2013 [3)] in force since 1 January 2014	0,25	0,20	1,3	1,7
Regulation of z 2013 [3)] in force since 1 January 2017	0,23	0,18	1,1	1,5
Regulation of 2013 [3)] in force since 1 January 2021 ***	0,20	0,15	0,9	1,3

* for residential buildings
** for collective residential buildings
*** from 1 January 2019 – for public buildings
[1)] Regulation of the Minister of Infrastructure dated 12 April 2002 on the technical conditions to be met by buildings and their location (Journal of Laws of 2002. No. 75, item. 690 with amendments)
[2)] Regulation of the Minister of Infrastructure dated 6 November 2008 amending the regulation on the technical conditions to be met by buildings and their location (Journal of Laws of 2008. No. 201, pos. 1238)
[3)] Regulation of the Minister of Transport, Construction and Maritime Economy on 5 July 2013. amending the regulation on the technical conditions to be met by buildings and their location (Journal of Laws of 2013. pos. 926)

Table 29. Planned investment activities related to thermal improvements in public buildings

Commune	Building	Zakres
City of Gorlice	at Jagiełły street 10	insulation of walls and ceilings and exterior doors repacement
	City Schools Nr 5	full thermo retrofitting of building for special classes insulation of ceilings
	at swimming pool	windows replacement
	at skating rink	insulation of walls and ceilings and window replacement
	at stadium	full thermo retrofitting
Biecz	Fire Station OSP Biecz	insulation of walls and window and interior doors replacement
	Fire Station OSP Binarowa	full thermo retrofitting
	Fire Station OSP Racławice	full thermo retrofitting
	Fire Station OSP Rożnowice	full thermo retrofitting
	Fire Station OSP Sitnica	full thermo retrofitting
	Fire Station OSP Strzeszyn	full thermo retrofitting
	Fire Station OSP Korczyna	insulation of walls and ceilings and windows and doors replacement
	Village Cultural Centre Głęboka	insulation of walls and ceilings and windows and doors replacement
	Health Care Centre Biecz	insulation of walls
	Health Care Centre Binarowa	insulation of walls and ceilings and windows and doors replacement
	Health Care Centre Rożnowice	insulation of walls
	at Tysiąclecia street 5	insulation of walls and ceilings and windows and doors replacement
	„Wantuchówka	windows and doors replacement
	School and Kinderarten Korczyna	insulation of walls and windows and doors replacement
	School Grudna Kępska	full thermo retrofitting
	School Racławice	full thermo retrofitting
	School Sitnica	insulation of walls and ceilings and windows and doors replacement
Bobowa	data not available	data not available
Gorlice	Village Cultural Centre Kobylanka	insulation of walls
	Village Cultural Centre Kwiatonowice	insulation of walls
	Village Cultural Centre Zagórzany	windows replacement
	Village Cultural Centre Dominikowice	full thermo retrofitting
	Fire Station OSP Bielanka	full thermo retrofitting
Lipinki	action plans not submitted	
Łużna	Village Cultural Centre and Health Care Centre Wola Łużańska	insulation of walls and ceilings
	Fire Station OSP Łużna	insulation of walls and ceilings
	Fire Station OSP Biesna	insulation of walls and ceilings and windows and doors replacement
	Kindergarten Szalowa	insulation of walls and ceilings and windows and doors replacement
Moszczenica	action plans not submitted	
Ropa	action plans not submitted	
Sękowa	action plans not submitted	
Uście Gorlickie	data not available	data not available
Gorlice County	at Biecka street 9b	full thermo retrofitting
	Dormitory of ZSZ Bobowa	full thermo retrofitting
	School at Parkowa 1, Biecz	insulation of walls and ceilings
	DPS Klimkówka Pavilion A i C	full thermo retrofitting
	DPS at Michalusa 14, Gorlice	insulation of walls
	Hospital Gorlice	various measures
	DPS Gorlice	full thermo retrofitting
	Special School Szymbark ”Dworek”	full thermo retrofitting
	School no. 1 main building	door replacement, insulation of ceilings
	School no. 2 dormitory	insulation of walls and ceilings
	Vocational school Gorlice PCE, library	full thermo retrofitting

	Vocational school Gorlice workshops building	door and windows replacement, insulation of ceilings

Source: own elaboration based on surveys

Energy management in buildings

Energy management in buildings - residential buildings, public buildings and facilities associated with economic activity - is not widely used.

There are two systems of energy management in buildings:

- standard systems based on organizational and investment activities
- intelligent systems related with the concept of intelligent building.

On the market there are many technologies and equipments of energy management, but the barrier to their use are the high cost of implementation and the lack of knowledge about possible savings resulting from energy management.

Activities in the field of energy planning and energy management in the communes of the Gorlice County are performed without a dedicated organizational unit or person responsible for energy management. Although energy is a key factor in the daily activities and is an important component of expenditure on maintenance of buildings, the energy management problem is ignored.

Initiatives:

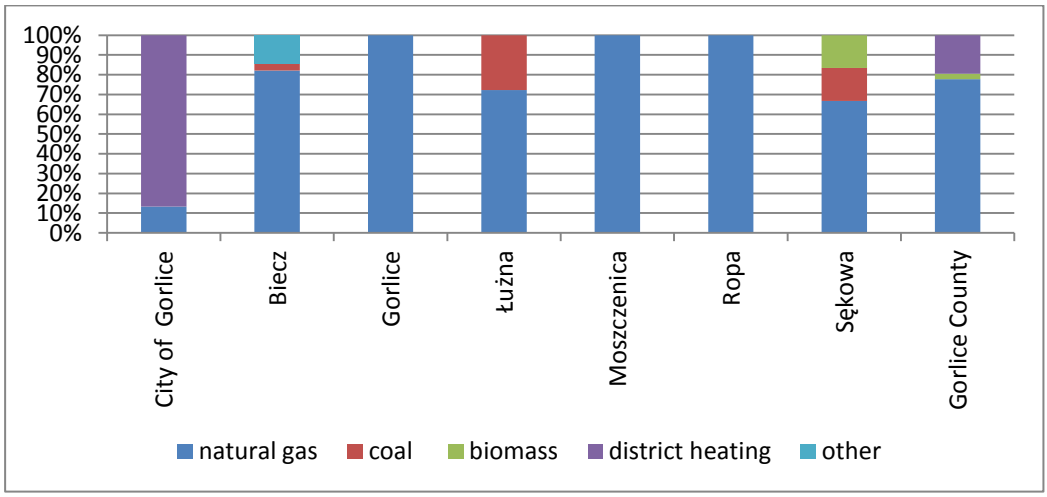
A good example of the benefits of energy management system in the building is only, so far, the pilot project developed under the VIS NOVA project, - a modern energy management system in a public building the Secondary School No. 1 in Gorlice.

Modernization of the heat source

Modernization of heat sources for heating and hot water production refers to a replacement of the source for new, of greater efficiency and productivity, while maintaining the same type of fuel or changing fuels (for more ecological or renewable).

At present the most of heat sources in public buildings are highly efficient and fueled by natural gas.

Graph 16. Public buildings by type of fuel



Source: own elaboration based on surveys

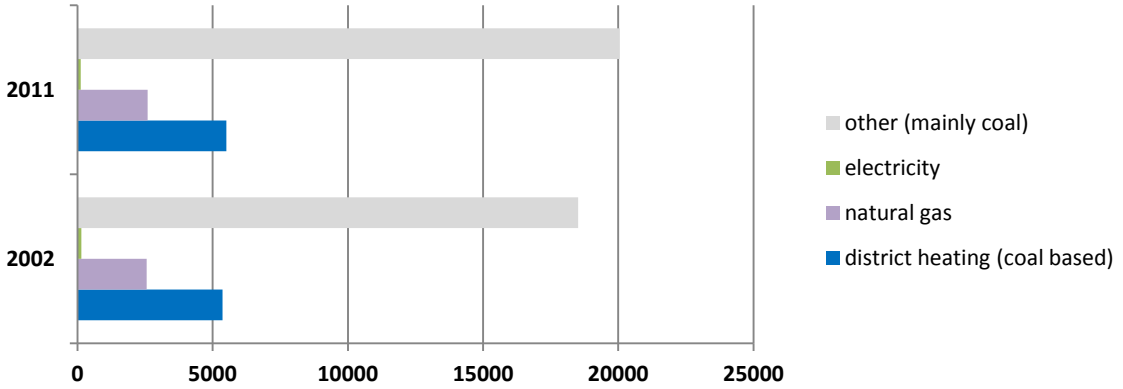
Table 30. Planned investment activities related to modernization of heat sources in public buildings

Commune	Building	Scope of work
City of Gorlice	at Jagiełły 10	modernization of central heating installation
	Complex of Schools No. 5	replacement of heat source, modernization of central heating installation
	at Słoneczna 11	modernization of central heating installation
	building at the stadium	modernization of central heating installation
	Complex of Schools No. 4	modernization of central heating installation
Biecz	Fire Station Binarowa	modernization of central heating installation
	Elementary school Grudna Kępska	replacement of heat source, modernization of central heating installation
	Elementary school Racławice	modernization of central heating installation
Bobowa	data not available	data not available
Gorlice	Village Cultural Centre Kwiatonowice	replacement of heat source
	Village Cultural Centre Zagórzany	replacement of heat source
	Village Cultural Centre Dominikowice	replacement of heat source, modernization of central heating installation
	Fire Station Bielanka	replacement of heat source, modernization of central heating installation
Lipinki	data not available	data not available
Łużna	Fire Station Łużna	replacement of heat source, modernization of central heating installation
	Fire Station Biesna	
Moszczenica	action plans not submitted	
Ropa	action plans not submitted	
Sękowa	action plans not submitted	
Uście Gorlickie	data not available	data not available
Gorlice County	at Bieckaj 3	modernization of central heating installation
	at 11 Listopada 6	modernization of central heating installation
	at Słoneczna 7	modernization of central heating installation
	at Biecka 9b	modernization of central heating instalation
	Dormitory of ZSZ Bobowa	modernization of central heating instalation
	Parkowa 1, Biecz	modernization of central heating installation
	DPS Klimkówka - Pavillion A and C	modernization of central heating installation
	DPS Gorlice at Michalusa 14	modernization of central heating installation
	Hospital	modernization of central heating installation
	Special School at Kobylanka	modernization of central heating installation
	Complex of Schools at Bobowa	modernization of central heating installation
	High School Gorlice	modernization of central heating installation
	DPS Gorlice	modernization of central heating installation
	Special School Szymbark”	modernization of central heating installation
	Dormitory of Complex of Schools no. 1 Gorlice	modernization of central heating installation
	Complex of Schools Gorlice	modernization of central heating installation
	Complex of Schools – workshop building	modernization of central heating installation

Source: own elaboration based on surveys

In the private buildings the primary source of heat is solid fuel, mainly coal and wood. Modernization of individual heat sources (fuel change for natural gas or electricity) is conducted occasionally, hence the situation in 2002 and 2011 are not significantly different.

Graph 17. Number of buildings and fuels for space heating in 2002 and 2011.



Source: own elaboration based on National Census 2002 and 2011

Initiatives:

The Gorlice County there are activities aimed at the modernization of heat sources:

Replacement of coal to gas boilers in buildings and dwellings in the City of Gorlice – „KAWKA" programme (2014). Main activities:

a) connection to district heating network buildings located at Biecka st. 6 and Copina st. 13 – elimination of 60 coal furnaces;
b) modernization of heating systems in 29 buildings and dwellings in the City of Gorlice – replacement of solid fuel furnaces for gas units;
c) development of database of low emission sources.

Grants (from city budget) for modernization of heating systems in buildings and dwellings – under the reduction of the low emission programme started in 2013.

Energy efficient technologies and equipments

The use of energy-efficient equipment and technologies, both in public and in private buildings refers primarily to the use of energy-efficient electric motors, modern appliances, electronic equipment and lighting systems. Replacement of old equipment for new will result in savings, similar as the implementation of the principles of energy conservation. The most common way of saving electricity is shut down the unnecessary lighting, quite popular is also the use of energy efficient "light bulbs" (compact fluorescent lamps), as well as the mainstreaming of energy intensity of devices when buying new equipment.

Based on the results of survey one can say that the most common method used to improve energy efficiency in the public sector is non-investment activity such as an information campaigns and training of employees. The next action should be the replacement of light sources for energy efficient ones (eg. LEDs); this action despite the relatively small financial outlay is not common.

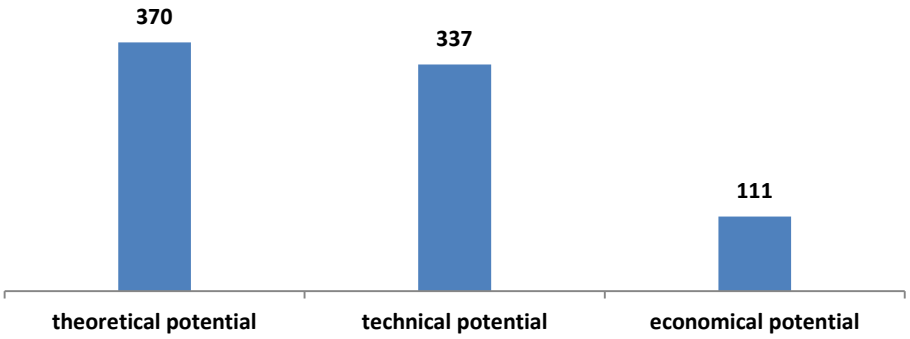
Public space lighting

Lighting of public spaces in the district is mainly done by high pressure sodium lamps, and to a limited extent obsolete mercury lamps.

Analysis the opportunities and abilities of energy saving

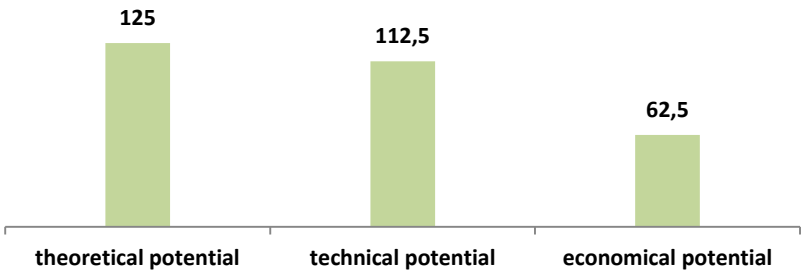
The biggest energy consumers are buildings (residential, public and production / commercial). The most of the energy is used for space heating. The thermal insulation of walls and ceilings and improvement of inefficient heating systems are the greatest sources of potential energy savings. Another activity with high potential for savings is energy management in buildings. The relatively small energy savings are possible by changing the equipment and technology used as well as modernization of lighting of public space.

Graph 18. Potential of energy savings in the county – thermal retrofitting (TJ)



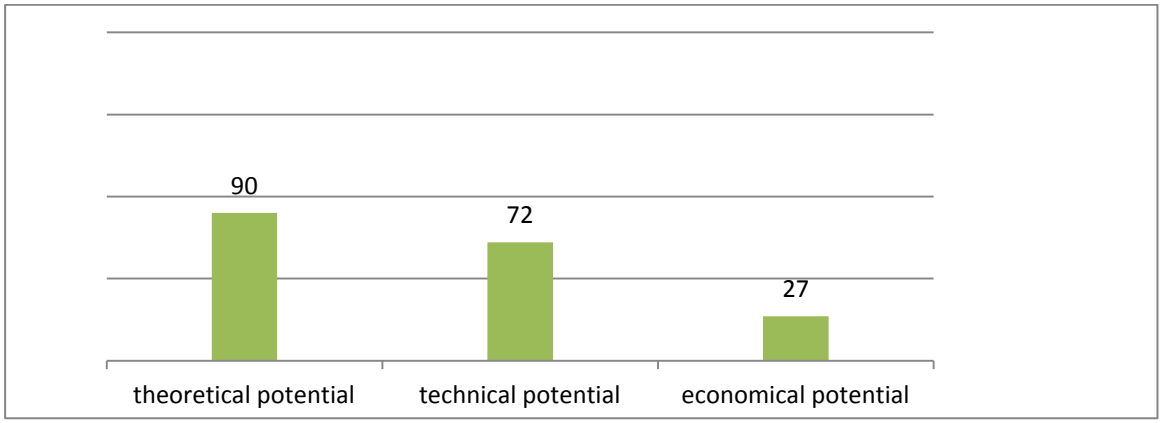
Source: A SWOT Analysis for RES and EEE in the Gorlice County

Graph 19. Potential of energy savings in the county – energy management (TJ)



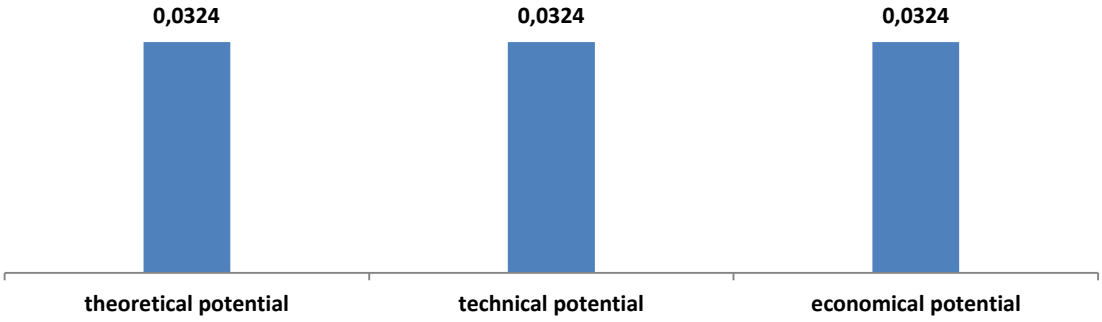
Source: A SWOT Analysis for RES and EEE in the Gorlice County

Graph 20. Potential of energy savings in the county – modernization of heat sources (TJ)



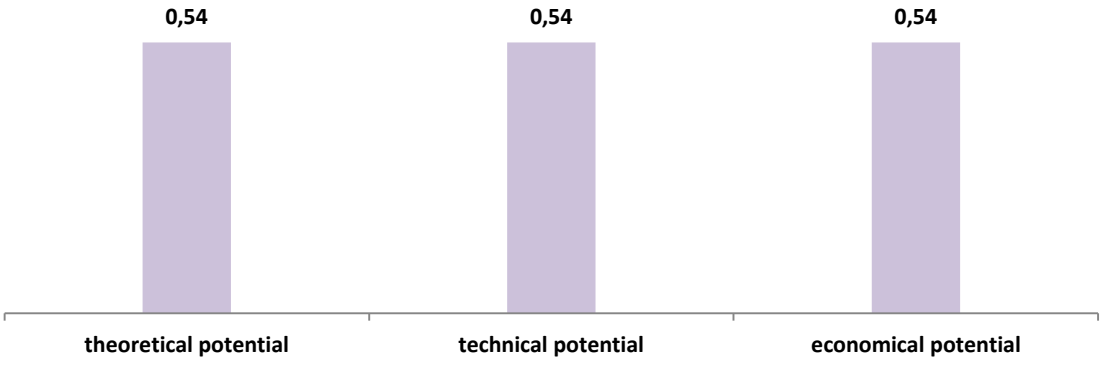
Source: A SWOT Analysis for RES and EEE in the Gorlice County

Graph 21. Potential of energy savings in the county – energy efficient equipment and technologies (TJ)



Source: A SWOT Analysis for RES and EEE in the Gorlice County

Graph 22. Potential of energy savings in the county – modernization of street lighting (TJ)



Source: A SWOT Analysis for RES and EEE in the Gorlice County

8. Characteristics of the current state of renewable energy

RES potential in the Gorlice County

In the study "SWOT Analysis of the Gorlice District in the field of renewable energy and energy efficiency" (2012) RES has been divided into the following groups / types:

- Biomass
- Wind energy
- Solar energy
- Hydro energy
- Geothermal energy

The methodologies specific for each area were applied and following potential were estimated:

- theoretical potential - the amount of energy available under natural conditions of the Gorlice County.
- technical potential – part of theoretical potential - reduced due to technical, legal, spatial planning and other restrictions.
- economic potential – part of technical potential which is feasible to utilize (economic and organizational criteria).

Estimated in this study potentials for RES analysed are presented below.

Renewable Energy Source / acquiring method	Potential (TJ/a)		
	theoretical	technical	economical
Biomass / wood	x	x	326,0
Biomass / sawdust	39,0	27,3	2,7
Biomass / straw	192,8	154,2	7,7
Wind energy	238 981,0	41 105,0	21 457,0
Solar energy / solar panels	3 827 182,0	216,2	64,9
Solar energy /photovoltaic	3 827 182,0	1 425,6	142,6
Hydro energy	0,34	0,17	0,02
Geothermal energy deep	x	x	0
Geothermal energy shallow	x	x	26,5

Current status of renewable energy sources in the Gorlice County

Current status of renewable energy sources has been estimated based on data received from some local government units and some energy companies as well as estimates of their own and consulted experts.

Biomass

The analysis conducted in the study "SWOT Analysis ...." shows that biomass resources are limited and it is difficult to expect an increase in supply.

Significant and prominent user of of woody biomass is a Hospital in Gorlice, which uses since 2007 biomass as fuel in their boiler room. The power of installed boilers is 5.6 MW and these boilers produce annually 20 371 GJ of energy, which is used for central heating and hot water.

Forest biomass is also widely used in individual residential heating sources, but only a limited number of users are using specially designed furnaces for burning wood. Most of the wood is burning inefficiently in the furnaces of the old type ("all kinds of fuel furnaces").

Evaluation of and recommendations:

There are opportunities for a better utilization of the energy of the wood biomass through, inter alia, incineration in specialized furnaces. Information activities as well as the possibility of co-financing exchange for a more modern, efficient boilers can increase the effectiveness of the use of wood biomass for energy purposes.

Hydro energy

The region does not have significant potential for energy production based on watercourses. The small Hydropower plant is located at Binarowa (Commune of Biecz) with an installed capacity of 10 kW.

Evaluation of and recommendations:

Very limited economic potential (for practical, economically viable use) of hydro energy suggests only a limited promotional activity related to this RES.

Wind energy

Despite good wind conditions in the eastern part of the County and despite of many years of planning, there is no any wind farm so far.

The micro installations using wind energy on farms or residential buildings are not existent too.

Evaluation of and recommendations:

At the moment, wind energy is not utilized in the region. This situation can change if promotional and organizational action will be taken combined with financial support for the construction of micro-installations based on wind energy. Introduction of anticipated legislative changes facilitating the sale of surplus energy produced to the grid should give impetus to the development of micro wind farms.

Solar energy

The region has good conditions for the use of solar energy. At the moment, the energy of the sun is used only for the hot water production. It is estimated that in all the communes a few hundreds of solar panels on individual buildings are installed.

In 8 buildings owned by the County Office solar panels are installed and this is a good promotion of such systems:

lp	Building	Year	Power	Use	Yearly energy production	Remarks
1.	Budynek Internatu Zespół Szkół Nr 1 w Gorlicach	2012		hot water	32 GJ	Basicx2.0 ZC 30 pcs, area of 72 m ^{2}
2.	Internat ZSZ w Bobowej	2012	23 kW	hot water	15 899 kWh	18 pcs.
3.	DPS Klimkówka, Pawilon „A”	2012		hot water.	50 GJ	18 pcs., 35,28 m^2
4.	DPS w Gorlicach ul. Michalusa 14	2013	180 kW	hot water	32 GJ	72 m^2
5.	Dom Pomocy Społecznej	2012		space heating and hot water	10 GJ	2 bateries of 4 collectors CPC45. Total 36m2
6.	Specjalny Ośrodek Szkolno – Wychowawczy w Kobylance	2012	29.72 KW	hot water		
7.	Budynek „Ogrodniówka” ul. Skrzyńskich 21 Gorlice	2009		hot water	12 GJ	16 M2 POW.
8.	Budynek Powiatowego Zespołu Placówek Oświatowych ul. Parkowa 1, 38-340 Biecz	2012	0,27 MW	space heating and hot water.	55 713 kWh	Collector Besicx 2.0 2C – 40 pcs

Evaluation of and recommendations:

The use of solar energy by using solar panels is gaining momentum, but it requires further organizational and financial support for individual users to become a mass phenomenon. The photovoltaic installation, currently absent in the region, should occur if promotional and organizational activities will be coupled with financial support for the construction of micro-installations and in the event of favourable legislative changes.

Geothermal energy

At the moment in the region, there are no professional geothermal installations. Also the use of heat pumps, where the lower source is ground, is sporadic.

Evaluation of and recommendations:

Today, geothermal energy is not used virtually. A significant increase in the number of installations of ground source heat pumps is only possible through the introduction of systems of financial and organizational support. It should, however, take into account the technological competition of heat pump drawing energy from the surrounding air.

9. Characteristics of the main groups of energy consumers in the district with an analysis of opportunities to improve energy efficiency

The analysis of energy consumption in the district of Gorlice was carried out for the following consumer groups:

- Households
- Public sector publiczny
- Sector of economy
- Transport

For the public sector, both public buildings and the energy used in the other tasks of local governments (street lighting, water and sewage, etc.) were analysed.

Households

About 20% of the total number of dwellings (representing approximately 12% of the total usable floor space in the county) are connected to the district heating network. Other households (according to statistics nearly 25 000) are buildings supplied from individual heat sources. About 75% of the buildings were constructed before 1990 according to the insulation standards applicable at the time of construction. Some of these resources were subjected to comprehensive thermal retrofitting (according to estimates it is about 10%), and approximately 50% of the buildings were partially thermo retrofitted (eg. replacement of the windows). About 35% of households use natural gas for heating purposes - other buildings in the vast majority - use coal alone or coal and wood.

The expected potential for improving energy efficiency in the district of Gorlice is presented below:

Measures	Potential reduction of energy demand	Estimated number of buildings
Thermal retrofitting of one family house	20-60% (depends on scope of improvements)	about 12 000 *
Replacement of heat source in one family house	10-15%	about 11 000 **
Temperature control during the day	5%	about 12 500 ***
Recovery of heat from ventilation air	About 70% of heat losses used for heating of ventilation air	about 2 000 ****

** - 70% of buildings constructed before 1990., which are not thermally retrofitted*
***- 70% of buildings heated using coal*
****- 50% of buildings heated individually*
*****- 30% of new building or thermally retrofitted*

Prices of RES installations are still too high and the payback time for some households may be as much as several years. Installation of renewable energy in a single family buildings in most cases will depend on funding opportunities of such investment. The scale of social interest is assessed as significant, but the better assessment will be possible after education and information campaigns and surveys.

Measures	Energy potential per year	Estimated potential in the Gorlice County
Installation of solar panels	about 1300 kWh (4,7 GJ)/m^2 active panel area	to be evaluated (survey)
Installation of photovoltaic cells	100-150 kWh per 1 m^2 of photovoltaic cell	to be evaluated (survey)
Installation of heat pumps	200-300% of heat energy in relation to electricity used for driving the pump	to be evaluated (survey)

For an estimation of projected energy efficiency improvements a model building was created: with a usable floor space of 100 m^2, built in traditional technology, not insulated. The heat demand was calculated for various types of heating systems and fuels.

Table 31. Description of model single family building

Parameters	Values
A. All common data	
Heated floor space	100,0 m^2
Cubic capacity of rooms heated	280,0 m^3
Number of inhabitants	3
Hot water production	Heating season – boiler room other months - electric heaters with storage tank system
Type of heating system	medium: hot water; radiators: convection type without thermostatic valves
Unit rate of heat demand (excluding the efficiency of the heating system)	0,6 GJ/m^2
The demand for heat power	10 kW
B. Characteristics of heat sources - alternatively	
Variant B1. Universal coal boiler	
Calculated seasonal heat demand for heating the building, taking into account the efficiency of the heating system	120 GJ
Calculated seasonal heat demand for domestic hot water production, taking into account the efficiency of the heating system (only during the heating season)	8,0 GJ
Fuel	Coal (different assortment)
Calorific value	22 MJ/kg

Fuel consumption	5,5 Mg
Calculated seasonal heat demand for domestic hot water production, taking into account the efficiency of the heating system (outside the heating season)	6,0 GJ
Fuel	Wood
Calorific value	15 MJ/kg
Fuel consumption	0,4 Mg (ca 0,7m^3)
Variant B2. Gas boiler	
Demand for space heating taking into account the efficiency of the heating system	80,0 GJ
Demand for hot tap water production	13,8 GJ
Fuel	Methane natural gas
Calorific value	32MJ / m^3
Fuel consumption	2,9 th. m^3
Variant B3. Oil boiler	
Demand for space heating taking into account the efficiency of the heating system	92,0 GJ
Demand for hot tap water production	13,8 GJ
Fuel	Light fuel oil
Calorific value	42 MJ/kg
Fuel consumption	2,5 Mg (3m^3)

The following estimations are based on the following assumptions:

- energy to heat the ventilation air is 30% of the total heat requirement
- building was built before 1990 and has not been upgraded / retrofitted
- coal boiler, efficiency of heating system 50%
- estimated cost of 1 GJ from coal - 40 zł
- analysis of savings based on fuel consumption, does not include the cost of investment

Measures	Yearly savings in case of:	GJ	zł
Thermal retrofitting	Insulation of walls, ceilings and windows replacement	50	2000
	Insulation of walls	20	800
	Windows replacement	8	320
Replacement of heat source	Boiler replacement (80% efficiency), modernization of heating system.	18	720
	Boiler replacement (80% efficiency)	12	480
Temperature control during the day	Lowering the temperature by 2^{o}C in the absence of the inhabitants	6	240
Recovery of heat from ventilation air	Installation of recuperation system	25*	1000

** - in a building with good insulation envelope loss of heating ventilation air is assumed to be 50% of the total heat demand*

Public sector

In most of the public buildings in the Gorlice County after 2000 thermomodernisation and modernization of the heat source was carried out. According to incomplete information there are about a hundred buildings which require improvements, but range of improvements is very diverse. This is illustrated in the following tables. Most of the buildings that have not been upgraded yet are small objects, such as rural community centres and local fire stations. In some of these objects heating is switched on periodically, so there is no technical prerequisites for the exchange of heat source and temperature regulation. Due to the variety of objects a "model public building" was not defined. Communes managing these objects are planning to make the necessary thermal improvements works in the coming years. Retrofitting of public buildings, in addition to the savings achieved, is an important element in popularizing the concept of energy efficiency among the local community.

Measure	Potential decrease of energy demand	Potential in the Gorlice County
Thermal retrofitting	10-50% (depends on scope of improvements))	142 buildings*
Modernization of heating system	5-15%	35 buildings *
Regulation of daily and weekly temperature regimes	5-15%	about 200 buildings **

** - data from Local Goverments and County Office (no data from Bobowa and Uście Gorlickie)*
*** - building heated periodically (village culture centre, fire station etc.)*

	Measures	Number of buildings
Thermal retrofitting a	Insulation of ceilings	26
	Insulation of walls	26
	Replacement of windows and doors	37
Modernization of heating system	Replacement of boiler	6
	Modernization of central heating system	29
Regulation of daily and weekly temperature regimes	Decrease of temperature by 2^0C during the night and weekends	about 200

Sector of economy

Economic sector in the district of Gorlice is based on the vast majority on micro firms - about 95% of entities. Small businesses (10 to 49 employees) - about 4%. The large majority of micro-enterprises (about 83%) from a legal point of view are “natural persons conducting economic activity”. Only some of the companies operating in their own facilities, some small entities operating in the place of residence. The real potential for improving energy efficiency in this sector is very difficult to estimate, due to technical and financial capabilities. To identify the potential of energy efficiency improvements a database of business entities with their investment plans should be created. Such data to be obtained from questionnaires submitted by companies interested in participating in the Energy Efficiency Plan implementation.

Measures	Potential of reduction of energy demand	Potential of the County
Thermal retrofitting of office building	20-50%	to be evaluated (survey)
Thermal retrofitting of production building	10-40%	to be evaluated (survey)
Replacement of heat source in office building	10-15%	to be evaluated (survey)
Replacement of heat source in production building	5-15%	to be evaluated (survey)
Regulation of daily and weekly temperature regimes	5-15%	to be evaluated (survey)
Decreasing demand in technological processes	depends on technological process	to be evaluated (survey)
RES for space heating and hot water production	only replacement of energy source, no reduction of demand for energy	to be evaluated (survey)

Transport

The fuel consumption in the Gorlice County is growing steadily - is the effect of rapidly increasing number of vehicles. The measures feasible to implement under the Energy Efficiency Plan aiming to increase energy efficiency, relate primarily to the area of traffic organization and promoting proper user behaviour.

Area of energy efficiency improvements	Possible solutions
Better organization of local transport and transit	Construction of ring roads around towns and villages Implementing the "smart" traffic control systems Changing the traffic organization - optimizing the location of pedestrian crossings in terms of vehicle traffic flow Taking into account the communication needs in land use planning The designation / construction of bicycle paths
Improving the efficiency of existing forms of transport	Popularization group commuting Popularization of use of the services of public and regional transport Popularization of cycling
Improving the energy efficiency of vehicles	Modernization of city transport fleet The development of transportation with biofuels Development of transport with the use of electricity

10. Energy demands forecast in the Gorlice County

The forecast of energy demand is based on the current energy balance of Gorlice district and taking into account future trends. The forecast takes into account the types of energy (electricity and heat) and a group of objects (public buildings, production and commercial facilities, residential buildings, street lighting and transport).

The forecast does not take into account the positive changes resulting from the implementation of measures under the Energy Efficiency Plan. Positive changes caused by the implementation of this plan are described in Chapter 22

Electricity demand forecast

The future demand for electricity was determined using:

- statistical data on current yearly use of electricity per 1 inhabitant
- analysis and its own estimates, based on the forecast of the domestic demand for electricity in the period up to 2030 according to the study "Polish Energy Policy until 2030" and forecasted demand for electricity in the region evaluated in the "Regional Energy Plan (REP) for Małopolska 2013 - 2020 "

According to the "Polish Energy Policy until 2030" national demand for electricity in the period 2013-2022 will increase by about 26%.

The total increase in electricity consumption by 2020 in the Malopolska province estimated by "Regional Energy Plan (RPE) for the Malopolska province for 2013-2020 could amount to about 25% compared to current demand.

Public buildings

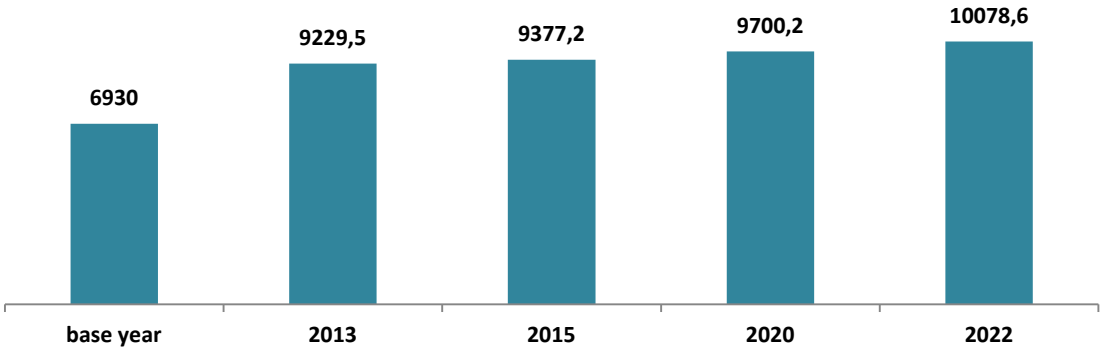
It was assumed that electricity consumption will grow by 1,6% by 2015, 5,1% in 2020, 92% by 2022 (indicators specified by “Polish Energy Policy until 2030”). The forecast of electricity consumption in public buildings by 2022 is shown below.

Table 32. Electricity demand forecast in public buildings up to 2022

	Base year	2013	2015	2020	2022
Electricity consumption (MWh)	6 930,0	9 229,5	9 377,2	9 700,2	10 078,6
Increase (%)		100	102	105	109

Source: own elaboration

Graph 23. Electricity demand forecast – public buildings

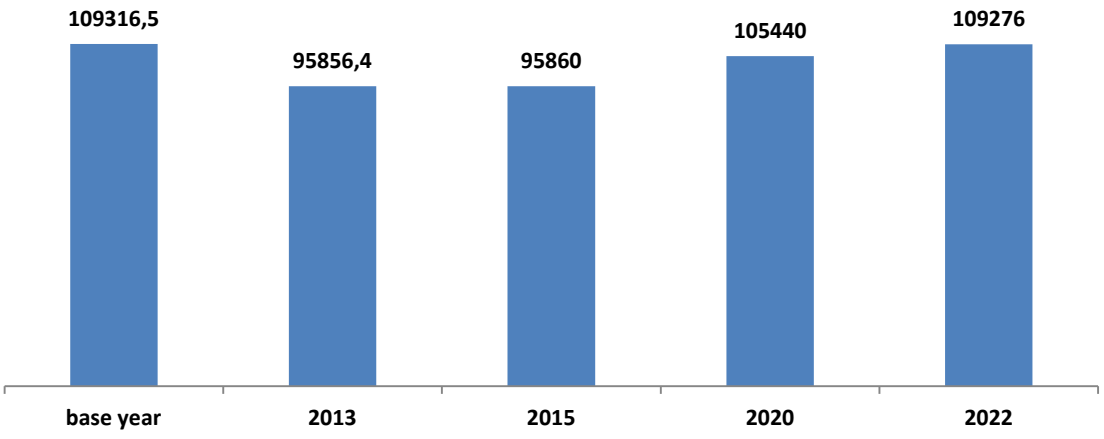


Source: own elaboration

Production and commercial buildings

Projected electricity consumption will depend on the pace of economic development of the district. The increase of electricity demand will relate to the development of existing and emerging economic facilities. Due to the lack of information on the development of existing and locating new manufacturing / industrial entities demand for electricity is difficult to determine. Increase of the number of firms in the county stands at around 3.4% per year (average of the years 2004-2013) and simply does not translate into an increase in electricity consumption. Data from energy suppliers show that in 2008-2013 the demand for electricity in the economic sector gradually fell - the annual rate of decline was estimated at 3%. For the purposes of the forecast a relatively constant demand by 2015, and the subsequent increase of about 2% per year (include indicators of macroeconomic development for the whole country) was assumed.

Graph 24 Electricity demand forecast – production anc commercial buildings



Source: own elaboration

Table 33. Electricity demand forecast in production and commercial building up to 2022

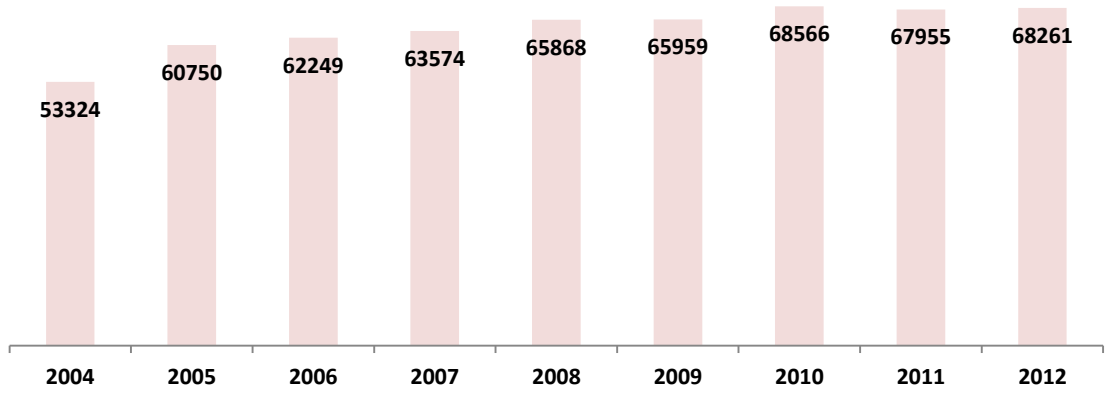
	Base year	2013	2015	2020	2022
Electricity consumption (MWh)	109 316,5	95 856,4	95 860,0	105 440,0	109 276,0
Increase (%)		100	100	110	114

Source: own elaboration

Residential buildings (households)

The electricity consumed by households is used mainly for social and cultural life and the consumption structure will be maintained over the forecast period on the same level, ie the use of electricity for heating buildings is negligible - omitted in the forecast period. The main indicators used in the analysis are the county trend of electricity consumed by the households observed in the period 2004-2012 and the national and provincial forecasts.

Graph 25. Electricity demand by households in years 2004-2012 (MWh)



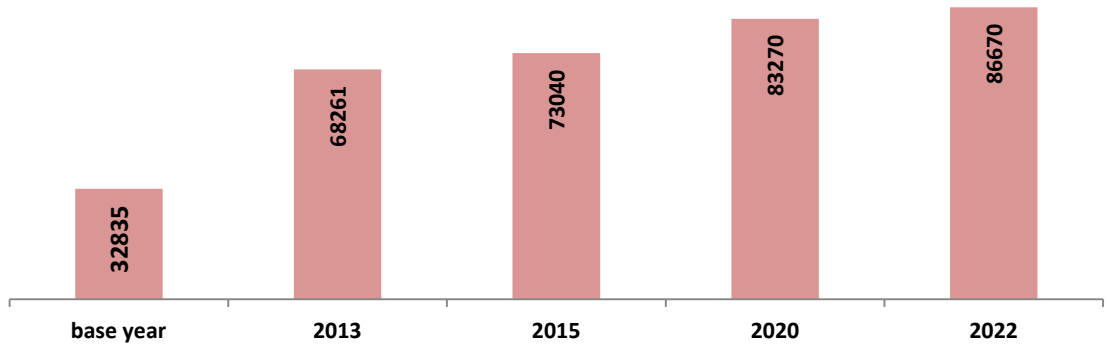
Source: Central Statistics Office GUS

Table 34. Electricity demand forecast by households up to 2022

	Base year	2013	2015	2020	2022
Electricity consumption (MWh)	32 835,0	68 261,0	73 040,0	83 270,0	86 670,0
Increase (%)		100	107	122	127

Source: own elaboration

Graph 26. Electricity demand forecast – residential buildings



Source: own elaboration

Street lighting

In most communes of the Gorlice County there has been a steady increase in electricity consumption for the street lighting - an average annual rate of growth of demand stands at 4,5% (analysis of the period 2010-2013).

The forecast of electricity consumption for street lighting by 2022 assumed that:

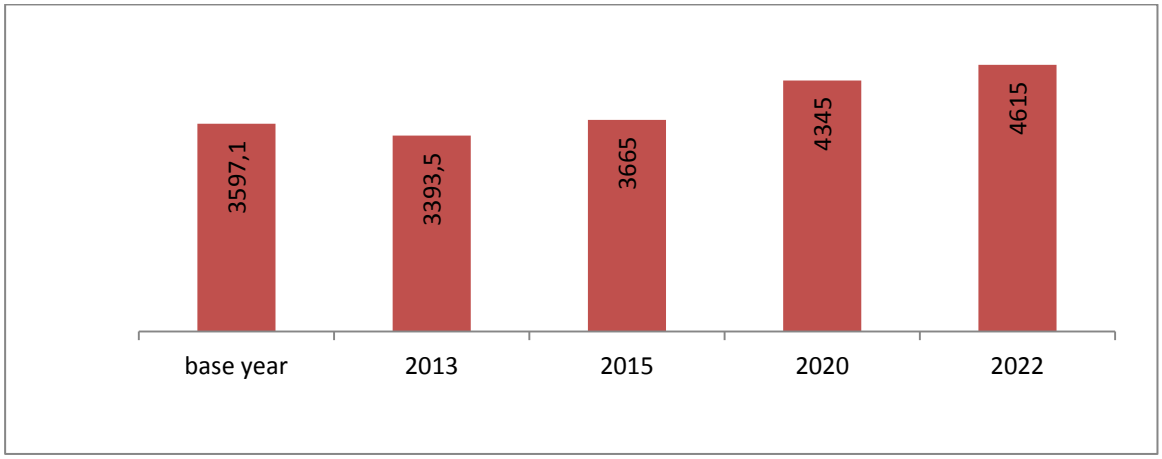
- changes caused by network expansion and an increase in the number of pressure sodium lamps (i.a. as a result of gradual replacement of obsolete mercury lamps and lighting new areas)
- lack of action on the lighting technology used (e.g. LED technology)

Table 35. Electricity demand forecast for street lighting up to 2022

	Base year	2013	2015	2020	2022
Electricity consumption (MWh)	3 597,1	3 393,5	3 665,0	4 345,0	4 615,0
Increase (%)		100	108	128	136

Source: own elaboration

Graph 27. Electricity demand forecast – street lighting



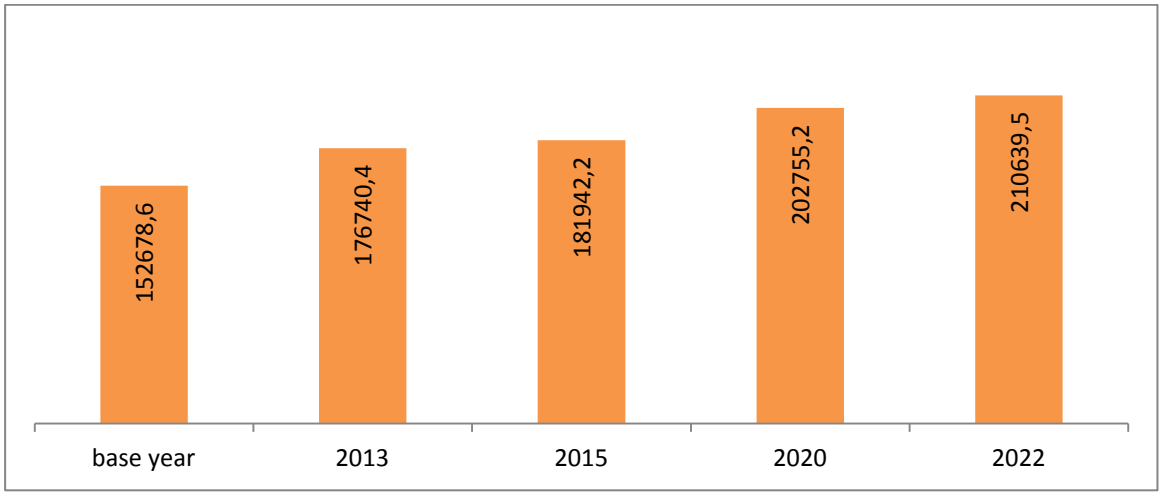
Source: own elaboration

Summary

Together with economic development there is an increase electricity consumption. The total increase in electricity consumption in the Gorlice County until 2022 was estimated at 19% compared to the status quo. Demand for electricity in the Gorlice County in 2022 was set at 210 639,6 MWh, of which:

- Public buildings – 10 078,6 MWh
- Production and commercial buildings – 109 276,0 MWh
- Residential buildings – 86 670,0 MWh
- Street lighting – 4 615,0 MWh

Graph 28. Electricity demand forecast – the Gorlice County overall



Source: own elaboration

Forecast demand for heat and fuels

The forecast of demand for thermal energy was developed taking into account:

- no significant actions towards improving the energy efficiency of buildings - only one pessimistic scenario
- an increase in the standard of of residence

Public buildings

In order to estimate the heat demand in the period to 2022 the following assumptions were made:

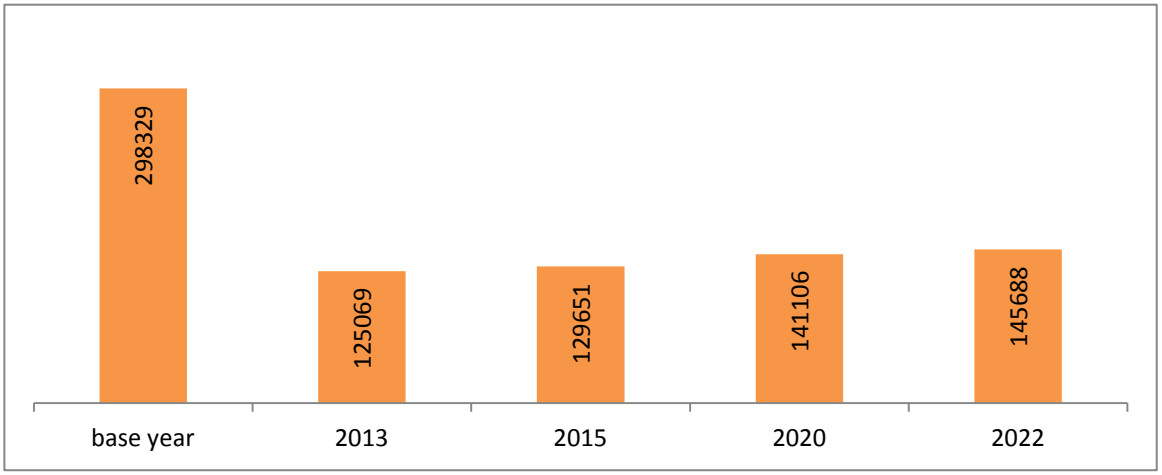
- a slight increase of usable floor space - the growth rate of approximately 5% (relative to the status quo)
- average rate of heat demand for new buildings at the 80kWh/m^2/year
- average rate of heat demand for the remaining buildings was set at 130 kWh/m^2/year
- heat for hot water production was set at 10% of the heat demand for heating buildings
- average efficiency of all heating systems was assumed at 0,8.

Table 36. Forecast of heat consumption for space heating and hot water production in public buildings.

	Base year	2013	2015	2020	2022
Heat consumption (GJ)	298 329	125 069	129 651	141 106	145 688
Increase (%)		100	104	113	116

Source: own elaboration

Graph 29. Heat demand forecast – public buildings



Source: own elaboration

Production and commercial buildings

The demand for heat in the period up to 2022 was calculated taking into account:

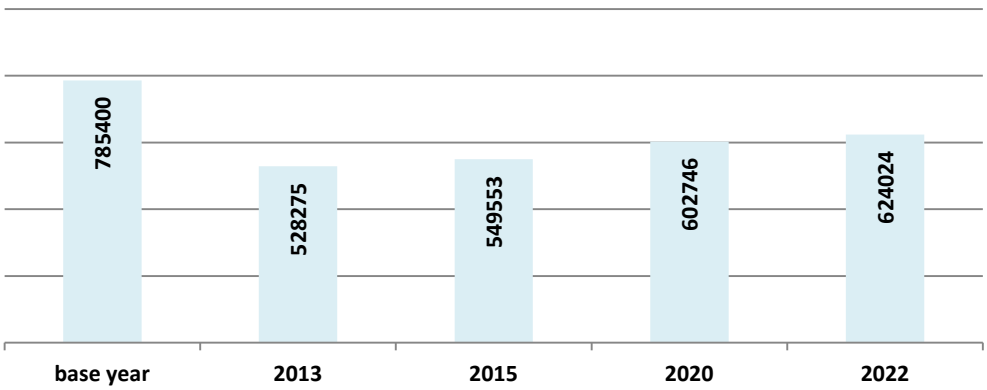
- the increase of the number of enterprises, in the period of 2002-2012 was approximately 27.3%. Increase of usable floor space in the production, trade and service was set at 10% compared to the status quo
- average rate of heat demand for new buildings at the 90kWh/m^2/year
- average rate of heat demand for the remaining buildings was set at 180 kWh/m^2/year
- heat for hot water production was set at 10% of the heat demand for heating buildings
- average efficiency of all heating systems was assumed at 0,7.

Table 37. Forecast of heat consumption for space heating and hot water production in production and commercial buildings.

	Base year	2013	2015	2020	2022
Heat consumption (GJ)	785 400	528 275	549 553	602 746	624 024
Increase (%)		100	104	114	118

Source: own elaboration

Graph 30. Heat demand forecast – production and commercial buildings



Source: own elaboration

Residential buildings (households)

The demand for heat in the period up to 2022 was calculated taking into account:

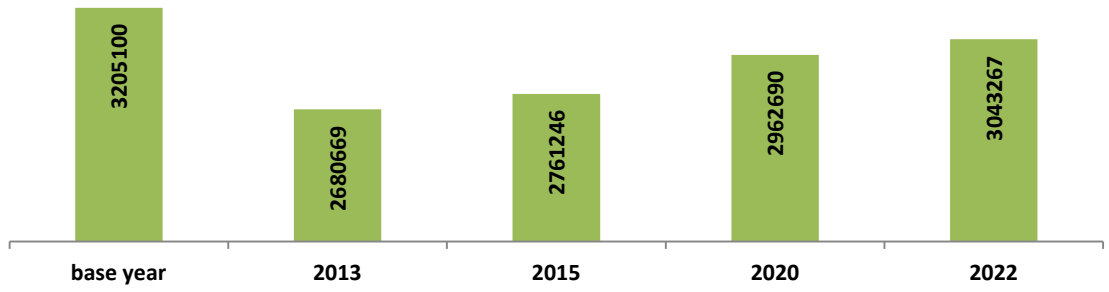
- the growth rate of the population of the county (in 2022 population higher by 1,5% compared to the status quo)
- constant increase of usable floor space in residential buildings (in 2022 approximately 10% of residential buildings in comparison to the status quo – based on the dynamics of the years 2002-2010 Central Statistical Office data)
- average rate of heat demand for new buildings at the 100kWh/m^2/year
- average rate of heat demand for the remaining buildings was set at 190 kWh/m^2/year
- heat for hot water production was set at 10% of the heat demand for heating buildings
- average efficiency of heating systems was assumed at 0,7 and for hot water production systems at 0,8
- average demand for energy for hot water production was set at3 500 MJ/resident/year.

Table 38. Forecast of heat consumption for space heating and hot water production in residential buildings.

	Base year	2013	2015	2020	2022
Heat consumption (GJ)	3 205 100	2 680 669	2 761 246	2 962 690	3 043 267
Increase (%)		100	103	110	113

Source: own elaboration

Graph 31. Heat demand forecast – residential buildings



Source: own elaboration

Results of forecasts - Summary

The total heat demand is the forecasted at 3 813 TJ in 2022, of which:

- Public buildings – 145,7 TJ
- Production and commercial buildings – 624,0 TJ
- Residential buildings – 3 043,3 TJ

Table 39. Changes in heat demand

	Unit	2013	2022	Increase/ decrease
Public building	GJ/year	125 069	145 688	16,5%
Production and commercial buildings		528 275	624 024	18,1%
Residential buildings		2 680 669	3 043 267	13,5%
Total		**3 334 013**	**3 812 979**	**14,4%**

Source: own elaboration

This forecast is based on the scenario without any actions on energy efficiency improvements, particularly such as modernization of installations and heat sources. In this scenario the thermal energy consumption will increase by about 14.4%.

Forecast of demand for fuels for space heating and hot water production.

The forecast assumes similar to the current structure of the fuels (domination of coal).

Table 40. Forecast of demand for fuels and energy for space heating and hot water production.

	District heating (GJ) *	Natural gas (th. m^3)	Coal and derivatives (Mg)	Biomass (Mg)	
				wood	chips
Residential buildings	154 085	11 050	90 530	16 300	
Public buildings	19 440	1 800	15	20	2200
Production and commercial buildings	13 242	3 000	18 065	3 300	
Total:	**186 767**	**15 850**	**108 610**	**21 820**	

Source: own elaboration

Forecast of demand for fuels in transport

The consumption of fuel in transport in 2022 was forecasted on the basis of:

- the number of vehicles registered in the Gorlicki County in 1999 - 2013 (according to the records of the Department of Transport and Roads of the County Office in Gorlice);
- the indicators of unit fuel consumption by vehicles (dm^3/100 km)and the publication of the Motor Transport Institute: "The methodology of of forecasting changes in the road transport sector of activity (in the context of the Law on the management of emissions of greenhouse gases and other substances)";
- the indicators of fuel consumption in road transport according to the information and statistical studies of CSO *"Energy efficiency in the years 2010 and 2011"* CSO;
- the indicators of diesel consumption in Polish agriculture

Table 41. Forecast of number of vehicles in the Gorlice County in 2022.

Vehicle	Number
Bus	216
Farm tractor	6 680
Road tractor	375
Motocycle	7 274
Moped	5 480
Universal truck	4 612
Specialized truck	380
Cargo-passenger and passenger car	52 540
Car - other	526
Total	**78 083**

Source: own elaboration

Table 42. A forecast of fuels used by vehicles in the Gorlice County in 2022

Fuel	unit	Amount
Petrol	dm^3	13 058 789
Diesel	dm^3	56 633 509
LPG	dm^3	8 045 654
CNG	m^3	53 368
Electricity	kwh	16 301

Source: own elaboration based on indicators

Summary:

It is estimated that, without the implementation of any action aimed at energy efficiency, the total energy demand of the Gorlice County will reach the amount of 7 241,60 TJ.

11. The local factors influencing energy efficiency

The improvement of the energy efficiency in the county is affected by many factors. Important are factors such as the national legal conditions and the economic situation in the macro scale. A detailed analysis of the local (countywide or less) factors was conducted. These conditions could be influenced by local governments and residents of the Gorlice County..

Households

Individual households have significant potential for energy efficiency. The greatest possible savings of the heat demand can be achieved by thermo-modernization and upgrading of heating systems and hot water production systems. The modern heating systems allow for daily temperature control and this may also bring significant energy savings and environmental benefits. In addition, households also have cases saving possibilities: lighting (e.g., installation of motion sensors in hallways and stairways) and the electricity consumption of household appliances.

Enabling factors	• Existing technical conditions to carry out the thermo-retrofitting in the majority of buildings • Awareness of the benefits of thermo-retrofitting • A wide range of high-performance central heating furnaces (for different fuels) available • Potential subsidies for home renewable energy systems
Hindering factors	• Lack of sufficient own funds for thermo-retrofitting • Lack of sufficient own funds for replacement of heat source • Relatively expensive household installations of renewable energy sources

Public buildings

From dozen or so years public buildings are being modernized by local governments. As part of the thermo-retrofitting the building envelopes were insulated and heating systems were modernized (including an exchange of heat source,) in most of the buildings. These actions were financed by own resources and by subsidies. The remaining objects, whose usable floor space represents about 10% of the total space of public buildings, will subject of thermo-retrofitting in the coming years. The most of the public buildings are suitable for RES installations (as an additional source of energy).

Enabling factors	• Relatively easy accessible external funds for thermo-retrofitting investments • Ability to obtain external funds for the installation of renewable energy sources • Relatively quick return on investment from savings in the purchase of fuel and energy
Hindering factors	• Lack of funds for investment – internal competition for resources • Seasonality of operation of educational institutions - schools do not run during the most favourable conditions for solar installations

Economy sector

Assessment of energy management by local enterprises is very difficult - the lack of detailed data for individual companies and even industries.

In the opinion of participants of consultation meetings, the sector has a significant potential to reduce energy demand, both for heating purposes, as well as for technological processes.

Investments in this area can be realized from their own funds or from external funding. In this case, an expert advice on the raising of funds for investment is crucial.

Enabling factors	• Competition in the market forces a cost reduction and this leads entrepreneurs to seek new technological solutions usually more energy efficient than the previously used • Production waste from certain branches of production can be used as an alternative fuel • The interest of local entrepreneurs in innovative technological solutions
Hindering factors	• Inadequate awareness of entrepreneurs on how to improve energy efficiency • Complicated environmental procedures for the introduction of new technologies • Social opposition to certain types of investments conducive to energy efficiency

Transport

In the county (as in the whole country) systematically increasing the number of registered vehicles. From 1999 to 2013 the number of passenger cars increased more than 5-fold, trucks - 6-fold, agricultural tractors - 2-fold. Very diverse are the age and condition of the vehicle, which has a significant impact on fuel consumption. The exhaust emission standards for vehicles are systematically tightened, but this applies to a new cars - older cars, produced at less tight emission regimes, will be driving for a long time on our roads.

The ability to reduce fuel consumption is mainly related to the improvement of traffic flow of vehicles in the urban areas, especially in peak hours.

Enabling factors	• Improving the condition of roads in the County • The experience of local governments that have implemented intelligent traffic control
Hindering factors	• The high cost of fleet replacement with a new vehicle • The limited popularity of group commuting

Lighting of public space

There is a systematic lighting upgrades (replacement of incandescent lamps and mercury for sodium and LED) in the area of street lighting performed by local governments. It is estimated that approximately 15-20% of luminaires is still waiting for a replacement

Elimination of old-style lamps completes the process of modernization of lighting systems - it is anticipated that in the next few years will steadily increase the number of LEDs used for lighting streets.

Enabling factors	• Easy access to different technical solutions for lighting of public spaces • Significant energy savings when comparing sodium systems vs. LED systems (fast return on investment)
Hindering factors	• The exchange of incandescent lamps and mercury vapor to sodium vapor lamps conducted in the last few years are not fully cushioned

12. Analysis of the potential of RES in the Gorlice County

The analysis capabilities of RES development in the county was conducted by two groups:

- commercial, large-scale renewable energy installations - production of electricity to the national power grid
- small-scale renewable energy systems (RES micro-installations) - energy production for own use, and in some cases, with the possibility of selling surplus electricity to the national power grid.

The development of renewable energy in the county is affected by many factors, of which the national legal conditions and the economic situation in the macro scale are the most important. A detailed analysis of the local (countywide or less) factors was conducted. These conditions could be influenced by local governments and residents of the Gorlice County.

Professional power generation based on RES

The economic potential of various renewable energy sources cited in Chapter 8 of as well as the analysis of the conditions described in the documents "SWOT analysis ...." and "Scenarios for the development of renewable energy in the Gorlice County" indicate that the professional power of RES in Gorlice County may rely on wind energy and solar

Professional wind power generation

The main barrier is the limited availability of areas with sufficient wind conditions (supply side barrier) and access to the national power grid (infrastructure barrier).

This limited availability of areas is due also to the presence of various forms of nature conservation (environmental barrier). The high risk of conflict is also a barrier to development (awareness and formal administrative barriers).

According to information from PGE Distribution SA the Commune of Lipinka a wind farm "Rozdziele" (4.5 MW power) is planned. However, due to social conflicts around the investments described, inter alia, in the "Scenarios for the development of renewable energy in the Gorlice County", do not expect a fast start of construction.

What can the local government do to promote the professional wind power generation:

- adjust space development / zoning plans to the needs of potential investors.

Professional photovoltaic power generation

The main barrier is a formal one - lack of appropriate provisions in the zoning plans which allow the construction of the installation of capacity bigger than 100 kW. Difficult accessibility to the grid is also a barrier to the development of professional photovoltaic power generation.

According to information provided by PGE Distribution SA in the Community of Biecz a photovoltaic system "Libusza" (5 kW) is planning to construct. In the Commune of Lipinki two installations with a total power of 76 kW are planned also.

What can the local government do to promote the professional photovoltaic power generation:

- adjust space development plans to the needs of potential investors.

RES micro-installations

According to the "SWOT analysis ..." the measures to improve the energy efficiency should be supplemented by compatible actions involving the production of energy from renewable sources at the point of energy use (ie **solar panels, photovoltaic systems, small wind turbines and heat pumps**).

In further analysis for each type of renewable energy the enabling and hindering factors on the use of the potential of RES through micro-installations will be indicated.

Solar thermal collectors

Enabling factors	• no limitations on the location • available and proven technology • availability of installers • high awareness on features and benefits of the installation of solar collectors • availability of good practices
Hindering factors	• relatively high investment costs • long payback period • lack of readily available financial and organizational support systems

Photovolataic panels

Enabling factors	• virtually no limitations on the location • available and proven technology • availability of installers • availability of good practices • opportunities related to the prosumer scheme (the self power generation and the ability to sell surplus energy to the national power grid)
Hindering factors	• insufficient awareness • high investment costs • long payback period • prolonged legislative uncertainty

Small wind turbines

Enabling factors	• virtually no limitations on the location • available and proven technology • availability of installers • opportunities related to the prosumer scheme (the self power generation and the ability to sell surplus energy to the national power grid)
Hindering factors	• insufficient awareness • high investment costs • long payback period • prolonged legislative uncertainty

Heat pumps

Enabling factors	• virtually no restrictions on location • available, proven and rapidly developing technology • availability of installers
Hindering factors	• insufficient awareness • high investments costs • long payback period • lack of good, available practices

Plans of local governments for the micro-installations of RES

In the most cases these are solar thermal collectors. The two governments have a more precise plan and will take action towards micro-installations of RES.

City of Gorlice:

PV panels will be installed on the following buildings:

1. MZK Ltd Gorlice at Krakowska.
2. Complex of Schools No. 4 Gorlice at Krasińskiego 9.
3. Complex of Schools No 5 Gorlice at Krakowska 5.
4. Cinema „Wiarus" Gorlice at Władysława Jagiełły 5.
5. buliding at Icerink Gorlice at Sportowa 9.

The energy audits of investment have already been prepared.

Commune of Sękowa:

The Commune of Sękowa in partnership with the Association of Municipalities of River Basin Wisłoka and 19 other Communes joined the project entitled "The installation of renewable energy systems on public buildings and private homes in the municipalities of the Association of Municipalities of River Basin Wisłoka".

The planned installations of solar thermal collectors are designed for hot water production. The process of contractor selection is currently running

Summing up:

- there is a large social acceptance of micro-installations of RES;
- informational efforts and wide spreading of good examples must be continued, especially in the latest technologies;
- there is a need of a thorough inventory of existing and planned RES micro installations;
- high investment costs combined with relatively long payback period require organizational activities and grant support for individual households.

13. Analysis of the possibilities of rationalization of energy in the Gorlice County

Analysis of the possibility of rationalization of energy in the Gorlice County was carried out in the following consumer groups:

- Households
- Public sector
- Economy sector
- Transport

Factors influencing the ability to carry out activities to rationalize energy management

1. **The right to dispose of the building** - thermo retrofitting activities or the installation of RES can be performed only when the investor is holding legal title to the property or the relevant power of attorney from the owner
2. **The own resources for investment** – it means financial resources to cover the full costs or part of it in the case of financial support schemes
3. **Availability of materials and equipment** - easy access to the materials and technologies which are necessary to perform the action
4. **Availability of contractors in the local market** - whether local contractors are able to complete the planned activities?
5. **Availability of consultancy** for retrofitting, RES, applications for external funds, etc. - whether in the County are entities that could provide comprehensive consulting services in compliance with the EEP?
6. **Availability of external financial support** (EU funds, national funds for environmental protection, etc.). - whether there are potential sources of aid, which can benefit local governments, residents and businesses of the County?
7. **Examples of good practice in the county** – whether there are in close proximity available technical solutions that the potential investor may see prior to the investment?

As assessed in Chapter 9 the reduction in energy demand, due to the large number of potential participants in the implementation of the EEP, will be long-term process.

Assessment of the current state of individual factors in each sector is described in the following tables, where:

+ means that you can start realizations actions

- means that actions must be taken to improve this factor

+/- means that the absence of this factor does not preclude the start of the action.

The last column shows the possible actions to improve the situation.

Households – thermo-retrofitting

In the Gorlice County the housing sector is dominated by single-family housing (approximately 80% of dwellings). The age and condition of the buildings are diversified. It is estimated that approximately 65% of single-family houses are heated with coal or wood. There is therefore great potential to make savings in heat demand. For single-family houses (except for historic buildings) there are no administrative barriers, e.g., permit for construction is not being required. There is a wide range of materials for insulation and the qualified contractors are available. The barriers are mainly the high investment costs and inaccessible forms of financial assistance to less privileged households.

Actions	1 Ownership	2 Own financial resources	3 Materials &equipment	4 Contractors	5 Available consulting	6 Financial suppsupport	7 Good practice	What should be done at the local level to implement the Energy Efficiency Plan
Thermo-retrofitting	+	-	+	+	-	-	+	• Improve the availability of financial aid - regional fund • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid
Heat source replacement	+	-	+	+	-	+*	+	• Improve the availability of financial aid - regional fund * • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid
Daily temperature control	+	+	+	+	-	-	+	• Create a local entity supporting participants and beneficiaries of EEP
Recovery of ventilation air	+	-	+	+	-	-	-	• Improve the availability of financial aid - regional fund ** • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid

*- anticipated is support to the exchange of heat sources within the Malopolska Regional Operational Programme framework

**- current subsidies are possible only for passive or energy-efficient building

Households – Renewable energy sources

Public interest in renewable energy sources (especially solar thermal collectors) is assessed as high, and thanks to the frequently occurring presence of the topic in the media one can expect further increase interest in this subject. The basic criterion is, however, considerable investment cost in comparison with the expected payback time.

Furthermore, lack of favourable legal regulations concerning the sale of surplus power to the national power grid is a barrier for the development of solar PV panels. With attractive financing schemes for RES installations, one can expect a significant increase in the number of such installations in the County.

Actions	1 Ownership	2 Own financial resources	3 Materials &equipment	4 Contractors	5 Available consulting	6 Financial suppsuppor	7 Good practices	What should be done at the local level to implement the Energy Efficiency Plan
Installation of solar collectors	+	-	+	+	-	+	+	• Improve the availability of financial aid - regional fund * • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid
Installation of photovoltaics cells	+	-	+	+	-	-	-	• Improve the availability of financial aid - regional fund • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid
Installation of heat pumps	+	-	+	+	-	+	+	• Improve the availability of financial aid - regional fund * • Create a local entity supporting participants and beneficiaries of EEP • Simplification of the procedures for obtaining financial aid

*- at present the sources of financing are the National and Regional environmental funds

Conclusion: direct support (grants / subsidies to thermo retrofitting measures and RES) for individual households through local funds can remove the basic problems that hold off the thermo activities and development of RES – i.e. insufficient own financial resources and long payback period.

Public sector

In the area of thermo retrofitting and modernization of heating systems in the public buildings there is little left to do. Thanks to the investments carried out by individual governments and by the programme of thermo retrofitting of public buildings, implemented by the Association of Municipalities of Gorlice Region, all major government buildings have been upgraded.

Other buildings: including rural community centres and fire stations are important for the local community - it will be necessary to carry out the thermo retrofitting of these buildings.

Potentially large energy reserves lie in energy management systems - in public buildings is easy to define periods (day and week), when the temperature can be lowered in the rooms without harm to the functioning the facility.

Actions	1 Ownership	2 Own financial resources	3 Materials &equipment	4 Contractors	5 Available consulting	6 Financial suppsuppor e	7 Good practices	What should be done at the local level to implement the Energy Efficiency Plan
Thermo retrofitting	+	-	+	+	-	+	+	• Create a local entity supporting participants and beneficiaries of EEP
Heat source replacement	+	-	+	+	-	+	+	• Create a local entity supporting participants and beneficiaries of EEP
Daily and weekly temperature control	+	-	+	+	-	-	+	• Create a local entity supporting participants and beneficiaries of EEP

Conclusion: Those public buildings, which are not retrofitted yet, will be thermo retrofitted in the coming years. The acquisition of external funding should accelerate this process.

Economy sector

The building structures in the economic sector vary in size, purpose, type of work performed there. Heat sources must be adapted to the heated volume and production technology. Although thermo retrofitting can deliver significant energy savings (and therefore the cost savings incurred) actions of this kind are quite rare priority for entrepreneurs. The reason for this is the need to incur relatively large expenditures, with difficult to determine the time of their return.

Actions	1 Ownership	2 Own financial resources	3 Materials &equipment	4 Contractors	5 Available consulting	6 Financial suppsuppor	7 Good practices	What should be done at the local level to implement the Energy Efficiency Plan
Thermo-retrofitting of office building	+	-	+	+	-	-	+	• Create a local entity supporting participants and beneficiaries of EEP • Better flow of information concerned available external funding opportunities
Thermo-retrofitting of production / commercial building	+	-	+	+	-	-	+	
Replacement of heat source in office building	+	-	+	+	-	-	+	
Replacement of heat source in production / commercial building	+	-	+	+	-	-	+/-	
Daily and weekly temperature control in the building	+	+	+	+	-	-	+	
Reduction of energy consumption in the technological processes	+	-	-	-	-	-	+/-	
Use of renewable energy for heating and domestic hot water production	+	-	+	+	-	-	+	

Conclusion: Within the EEP framework direct financial support to entrepreneurs is not planned. But due to the estimated significant potential of energy demand reduction in this sector an advisory support will be deliberate, mainly by raising external funds for companies interested in thermal efficiency, renewable energy and a reduction of the energy intensity of production processes.

Transport

The local governments have minimal impact on the improvement of energy efficiency in transport. The renovation and modernizations of roads and improvements in the traffic flow conducted by the road authorities (national, provincial, district and commune), have no noticeable effect on energy consumption due to the steadily increasing number of vehicles travelling on these roads. In addition, long-term habits of road users are preventing any organizational changes.

Actions	What should be done at the local level to implement the Energy Efficiency Plan
Improved organization of local and transit transport	• Cooperation between the road authorities of various levels (national, provincial, district and commune) • Mainstreaming of transport in the spatial planning
Improving the efficiency of existing forms of transport	• Provide information and promotion • Secure bicycle routes in land use planning
Improving the energy efficiency of vehicles	• Provide information and promotion • Popularization of clean and energy efficient technology in transport

14. SWOT and muli-criteria analysis

During the development of proposals for the Energy Efficiency Plan the authors of the study, as well as participants in workshops and discussions, took advantage of the analysis and conclusions of the documents developed under the VIS NOVA project:

- "SWOT Analysis of the District Gorlice in the field of renewable energy and energy efficiency";
- "Scenarios for the development of renewable energy in Gorlice County".

SWOT analysis was performed according to the methodology of the VIS NOVA project taking into account the principles applied also in the strategic planning of business organizations described among others in "Key Management Models" M. van Assen, G. van den Berg and P. Pietersma, Prentice Hall, 2009.

To assist the decision making process in determining the activities of the Energy Efficiency Plan multi-criteria analysis were also used.

SWOT analysis of each Renewable Energy Sources

Straw

Conclusions:

The strategy is based on the energy from the straw is fraught with many risks: organizational, economic and technological.

The proposed priority for the strategy: **low**

Forestry biomass

Conclusions:

No possibility of increasing the use of energy from the forestry biomass. The economic potential of energy from forestry biomass is set at 326 TJ / year. This potential is currently used completely. No one can expect significantly higher level of the forestry biomass use.

It is possible to improve the efficiency of biomass use for energy production among the users. Contribute to this:

- increase awareness - neutralizing - improvement, identified as weakness, lack of knowledge of users on the effective use of wood for energy production;
- the introduction of support schemes - identified as an opportunity in the SWOT analysis. The current shape of the work in this field gives rise to cautious optimism in this regard.

The proposed priority for the strategy of forest biomass - **medium**.

Weaknesses (no growth) are balanced by the strengths (stable supply and promotional values - teaching) - hence the proposed medium priority.

Professional wind power generation

Conclusions:

The strategy based on a professional wind power generation is subject to a high risk of conflicts. And brings virtually no economic benefits for the region.

The proposed priority for the strategy: **low**

Small windmills

Conclusions:

Due to the wide availability of the wind, a wide range of sizes available small wind turbines and proven technologies:

The proposed priority strategies - **high**

Solar thermal collectors

Conclusions:

Due to the widespread availability and inexhaustible resources, the ability to obtain significant savings, the wide availability of technologies:

The proposed priority strategies: **high**

Solar PV panels

Conclusions:

Due to the widespread availability and inexhaustible resources, high dynamics of development of technology and the wide availability of systems:

The proposed priority strategies: **high**

Hydro power

Conclusions:

Due to the small potential in the region, and a small public interest:

The proposed priority strategies: **low**

Deep geotherm

Conclusions:

The conclusions of the SWOT analysis conducted in 2012 indicate that due to the anticipated significant cost of using geothermal heat directly to supply heating systems (production/sourcing and distribution of heat), especially in scattered settlements and the hilly terrain, a priority of strategy should be adopt as **low**.

However, with good knowledge of the geothermal energy resources in the Gorlice County and interest in their use in medicinal or recreational purposes one should carefully observe potential investment activities, which with proper planning can also serve as a power source to heat nearby homes or estates.

Shallow geotherm – heat pumps

Conclusions:

Due to the unlimited resources and wide availability, constantly evolving technology and the clear economic benefits:

The proposed strategy priority: **medium**:

SWOT analysis of the energy efficiency

Thermo retrofitting

Conclusions:

1. The potential (technical) of savings resulting from thermo retrofitting is significant (estimated at 337 TJ per year). Even assuming that it will be fulfilled only partly due to the technical and economic barriers - it still will be the main source of the energy savings.
2. Thermo retrofittings of the buildings in the County are implementing continuously by the owners, in the majority at the expense of its own (without grants and preferential credits). This demonstrates the high public awareness of energy saving by insulation of buildings.
3. Thermo retrofitting - due to the potential and considerable public interest - can bring the greatest proportion in energy savings.
4. Increased availability of external funds could significantly speed up the process of adapting the buildings to the current thermal standards.
5. Actions of local governments in the area of thermo retrofitting are a good example of this process and promote the energy conservation.

The proposed priority for energy-saving strategies through action thermo modernization - **high**.

Energy efficient equipment and technologies

Conclusions:

Despite the relatively small potential of savings this strategy can be considered as import, because the replacement of equipment and lighting for energy efficient one is done as if "by the way" by replacement of obsolete and worn out old appliances.

The local governments can facilitate this process by organizing a system for the collection of waste household appliances and bulky waste.

The proposed priority strategies: **moderate**. The strengths outweigh weaknesses. Priority classified as moderate due to low potential (on the County scale).

Energy management in buildings

Conclusions:

Potential (technical) of savings resulting, inter alia, with the introduction of temperature control in the rooms and temporary lowering temperature is estimated as 112,5 TJ per year in the County. Despite the expected technical and economic barriers to the dissemination of energy management can produce significant savings.

An important element of the popularization of energy management can be a local example of the effective functioning of such a system.

The proposed priority for the strategy - **high**. After installing the system (investment costs incurred) further costs of obtaining savings are practically nil.

Modernization of heat source

Conclusions:

The technical potential of savings associated with the exchange of heat sources for devices with higher efficiency in the County was estimated at 72 TJ per year. Due to the significant investment costs it was assumed that this will be implemented gradually over the next few years - in some cases due to the desire to achieve savings and other due to the necessity arising from the worn out of the existing heat source.

An advisable action is promotion of modern heat sources with complex regulation systems and heat supplied from renewable sources.

The proposed priority for the strategy - **high**. The significant energy savings are possible to achieve and this approach can introduce to the local market new, advanced technologies for renewable energy sources.

Street lighting

Conclusions:

The public space lighting is gradually modernized by local governments.

Rapid technological progress can affect the recently made investments as in a short time they will become obsolete, but still will continue to bring the expected benefits.

The proposed priority for the strategy - **medium**. The strengths outweigh weaknesses. A small potential of savings resulting, inter alia, from the fact that investments in this area were carried out over several years and most of the tasks are completed already.

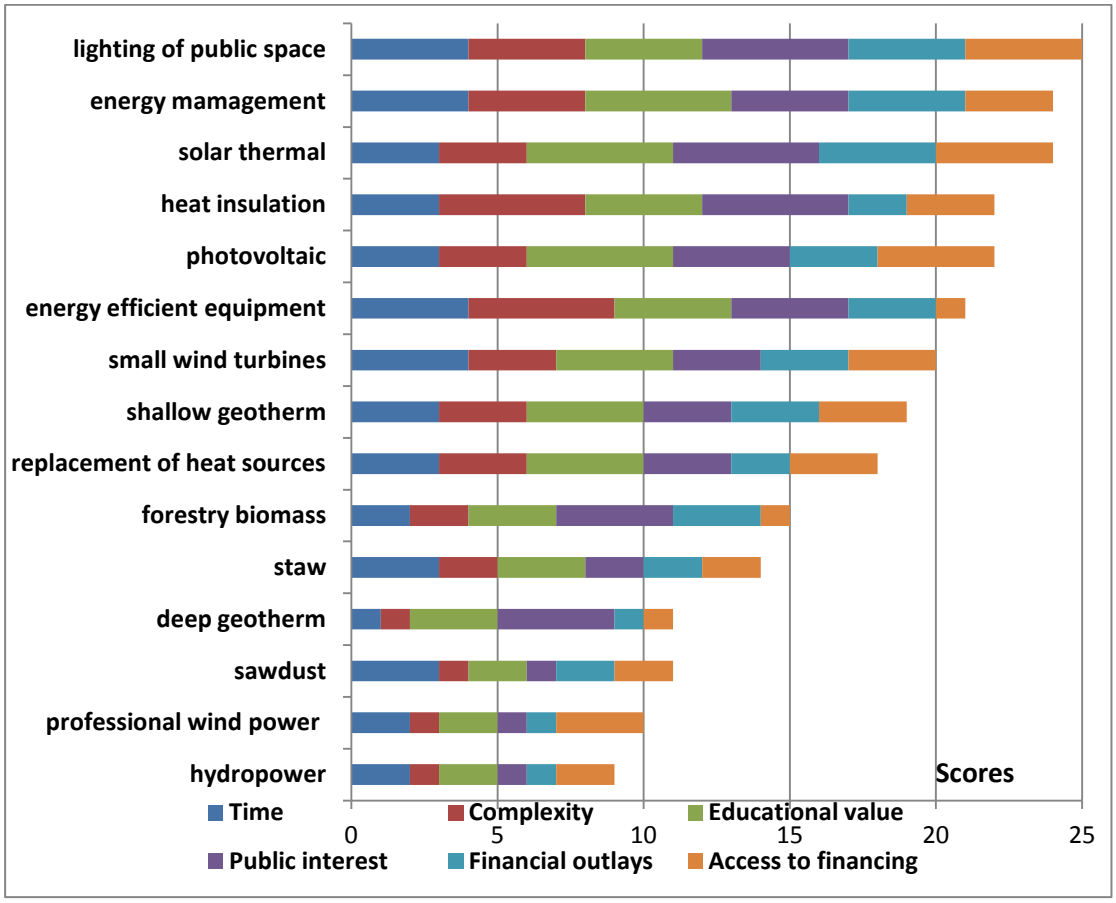
Summary of the economic potential and conclusions of the SWOT analysis

The chart below shows the economic potential of renewable energy and energy efficiency identified in the preparation of the document "SWOT Analysis of the Gorlice District in the field of renewable energy and energy efficiency."

The economic potential is understood as that part of the technical potential that can be exploited, taking into account mainly the economic criteria, but also organizational criteria.

The chart below shows the results of multi-criteria analysis carried out in the above mentioned document concerning the selection of the most attractive strategy for developing the use of renewable energy sources and improving energy efficiency in the Gorlice County.

Graph 32. Multi-criteria analysis of strategies of RES and EE development in the Gorlice County.



The authors of a SWOT analysis have proposed the adoption as the leading all strategies and activities related to **energy efficiency improvements**, complemented by compatible strategies and actions related to the prosumer generation of power or the production of energy at the point of use (ie **solar thermal collectors, solar PV panels, small wind turbines and heat pumps**).

The multi-criteria analysis

In the multi-criteria analysis of activities to be implemented under the Energy Efficiency Plan the following criteria were taken into account and were given the rank (the desirable, beneficial is 5 and undesirable is 1):

1. The **technical** criterion: simplicity of solutions, innovation, need to use the advanced expertise
2. **The organizational criterion**: the complexity and time needed to carry out the action;
3. **The educational – promotional criterion**: the impact of activities to increase public awareness
4. **The social criterion**: public interest - how much of the public may be interested in direct participation in the implementation of the action
5. **The financial criterion** – sources of financing: how easy is an access to external financing

This analysis was used to determine the action plan and the results are presented in Chapter24 Summary.

15. The best practices related to energy efficiency and renewable energy

Now, thanks to information and promotional activities of many organizations and institutions, there are a large number of good practices in energy efficiency and renewable energy available. It is worth mentioning, among others, the resources for good practices:

- Best Energy Project – www.bestenergyproject.eu (the project was finished in 2012)
- Stowarzyszenie Gmin Polska Sieć „Energie Cites" - manual „Renewable energy sources in the Maloposka Region""

The analysis of available good practices was carried out on two levels:

- the organizational aspects
- the financial aspect

and highlights those solutions that can be applied or provide inspiration to action in the Gorlice County.

The organizational aspect

Organizational activities within the local government units

According to the manual for "Plan for Sustainable Energy" prepared by the Covenant of Mayors to develop the plan and for its implementation one should ensure adequate human and financial resources. Local authorities can use a variety of approaches here, among others.:

- use its internal resources, such as the department dealing with the issues of sustainable development (e.g. local Agenda 21 office, department of environmental and / or energy);
- create a new unit within the local administration (average of 1 person per 100 000 inhabitants);
- use of external resources (outsourcing) such as private consultants, universities, etc.;
- share a common coordinator with other municipalities (in the case of small municipalities).

The authors of the guide pointed out that the human resources allocated to the development and implementation of the SEAP may prove to be highly efficient from a financial point of view, due to the reduction of the energy bills, and through access to European funds allocated to projects in the field of energy efficiency and use of renewable energy sources.

An example of the practical implementation of the above described approach is to create in the City Jaslo position of Chief Specialist for energy management – the City Energy Officer, which reports directly to the Mayor.

The responsibilities of the City Energy Officer, among other things:

- conducting activities related to energy policy of the City including:
  - the establishment and maintenance of information system of energy consumption
  - supervising the implementation of energy policy in the City,
- conducting activities related to planning, investments, and services in the area:
  - energy efficiency

  - thermo retrofitting
  - supply of heat, electricity and gas,
- carrying out activities aimed at saving energy in the public sector
  - organization of tenders for the purchase of energy
  - monitoring and analysis of energy consumption in buildings managed by the city
  - information activities in the field of energy use
  - ensuring the participation of the city in the EU and other international programs and projects in the field of efficient use of energy, water and environmental protection.

The City Energy Officer also uses the support of external companies.

Organizational activities leading to cooperation of local governments for residents of communes

Under the "Program to increase the use of renewable energy and improve air quality within the NATURA 2000 areas of the Sucha County" renewable energy systems based on solar thermal collectors for 2 349 residential buildings in the County and in the County Hospital" were installed. The project included 9 cities and communes. This project should be considered as a pilot, and its solutions can be applied in future on a larger scale.

The program was financed as follows:

Financial arrangements for individual buildings:

- Swiss-Polish Cooperation Programme -12, 9 million zł
- National Fund for Environmental Protection and Water Management in Warsaw - 13.5 million zł
- residents own contribution of 15% of investments

Financial arrangements for the County Hospital:

- Swiss-Polish Cooperation Programme - 712 748 zł
- Regional Fund for Environmental Protection and Water Management in Cracow - 398 880 zł

Very practical information on how to carry out the project can be found at www.solary.powiatsuski.pl.

16. Conclusions of the diagnosis, analysis, best practice and discussion panels with Local Support Group of VIS NOVA Project

Summary of diagnosis

The analysis of energy consumption in the adopted base year (1999), in 2013 and a forecast for 2022 were performed. Despite of the expected growth in energy demand the significant change the structure of energy consumption in various sectors of the public is not anticipated. The following is a summary of the current energy demand in the county and the main conclusions concerning the possibility of reducing this demand.

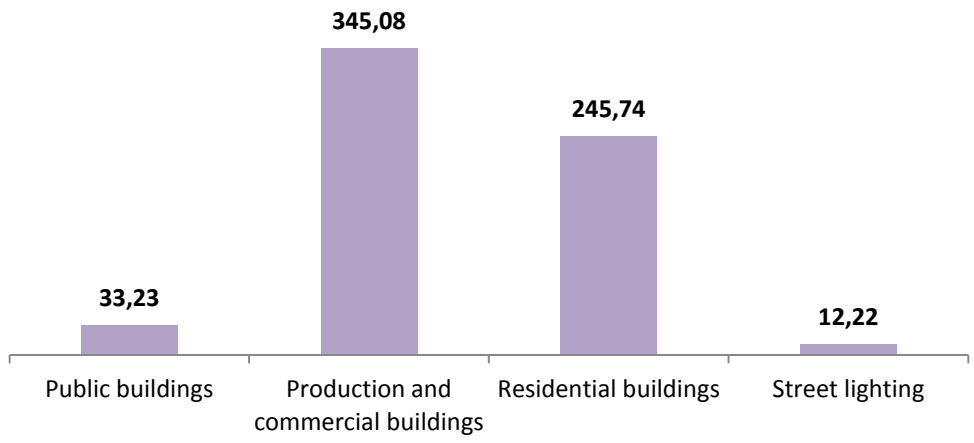
Energy demand

There is no energy-intensive industries in the Gorlice County. The structure of energy consumption is dominated by the household sector. Below are the estimated annual energy demand in 2013 broken down by types of energy and a group of major customers:

Electricity:

- Public buildings (lighting, equipment, etc.): 9 229,5 MWh = 33,23 TJ
- Economy sector (lighting, equipment and machinery, technological processes): 95 856,4 MWh = 345,08 TJ
- Residential buildings (lighting, equipment, etc.): 68 261,0 MWh = 245,74 TJ
- Street lighting: 3 393,5 MWh = 12,22 TJ

Graph 33. Demand for electricity



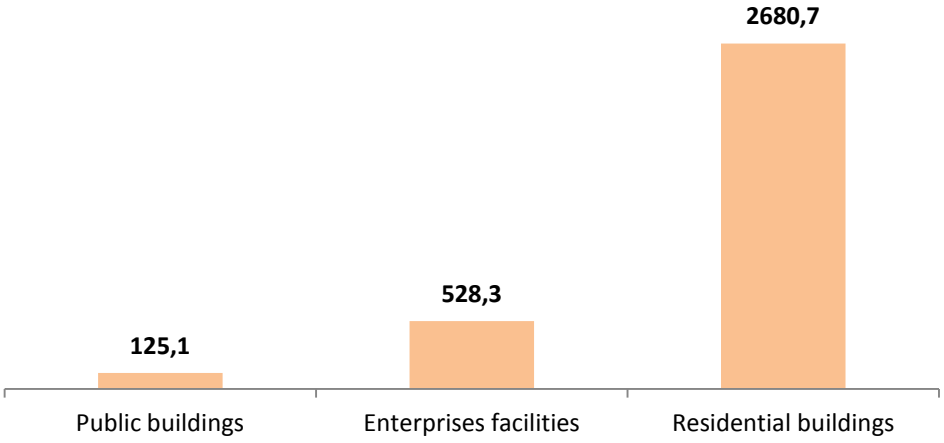
Source: own elaboration

Heat (space heating and hot water production):

- Public buildings: 125,1 TJ
- Production and commercial buildings: 528,3 TJ
- Residential buildings: 2680,7 TJ

The energy from the combustion of coal, wood and natural gas were taken into account.

Graph 34. Demand for heat

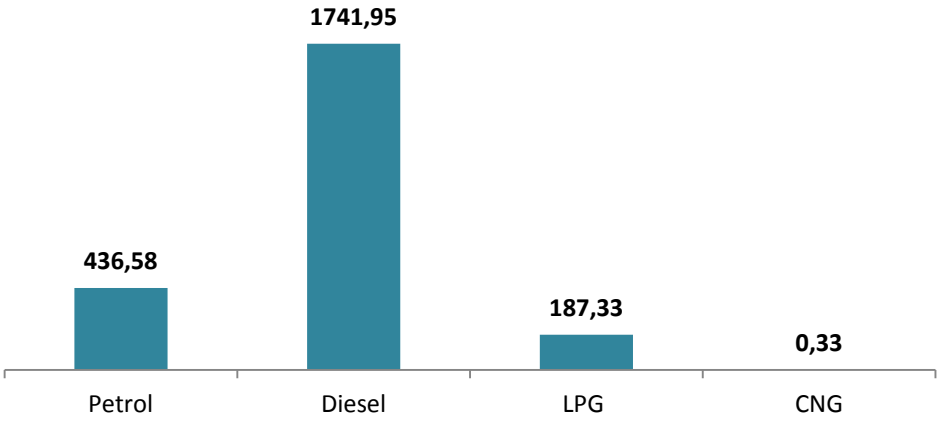


Source: own elaboration

Transport (fuel consumption in transport and in agriculture):

- Petrol: 13 044 647 dm^3 = 436,58 TJ
- Diesel: 48 423 805 dm^3 = 1 741,95 TJ
- LPG: 7 783 545 dm^3 =187,33 TJ
- CNG: 9 966 m^3 = 0,33 TJ

Graph 35. Demand for energy in transport



Source: own elaboration

Energy demand by groups of recipients – current state:

The Gorlice County total: 6 336,56 TJ, of which:

- Public sector (buildings and street lighting): 170,55 TJ = 2,70%
- Economy sector: 873,38 TJ = 13,78%
- Residential buildings: 2 926,44 TJ = 46,18%
- Transport: 2 366,19 TJ = 37,34%

Energy demand by groups of recipients – base year 1999:

The Gorlice County total: 5273,97 TJ, of which:

- Public sector (buildings and street lighting):: 336,2 TJ = 6,37%
- Economy sector: 1178,94 TJ = 22,35 %
- Residential buildings: 3323,94 TJ = 63,03%
- Transport: 435,5 TJ = 8,25%

Energy demand by groups of recipients - forecast 2022:

The Gorlice County total: 7241,60 TJ, of which:

- Public sector (buildings and street lighting): 198,59 TJ = 2,75%
- Economy sector: 1 017,39 TJ = 14,05 %
- Residential buildings: 3 355,31 TJ = 46,33%
- Transport: 2 670,3 TJ = 36,87%

Summary:

In recent years the biggest impact on the structure of energy consumption was due to rapidly increasing number of vehicles. There is a visible change in energy demand in the residential sector resulting from the implementation of thermal retrofitting measures.

Opportunities to improve energy efficiency

Below is a summary of analysis and recommendations for the main groups of recipients (consumers) of energy.

Public sector

Opportunities to reduce energy consumption by:

- thermo retrofitting - buildings to be insulated constitute about 10% of the total public buildings – this is very important for the local community but has a small energy effect in the County scale.
- improving the efficiency of heating systems - the vast majority of buildings a heat source in recent years was upgraded, in 15 buildings is necessary to modernize the heating systems – this is of great importance to the local community but has a small energy effect in the County scale.
- energy management in buildings - the ability to improve efficiency in most public buildings - schools, offices, etc.

Recommendations:

Completion of thermo retrofitting of public buildings is an action expected by the local community - the users of these facilities. In addition, such actions are a good example, which may result in an increased interest in similar activities in residential buildings. A good example that can be used as a model for other public buildings is an investment carried out in the Secondary School No. 1 in Gorlice in the framework of the VIS NOVA project.

Economy sector

Opportunities to reduce energy consumption by:

- thermo-retrofitting of buildings – large energy saving potential
- modernization of heating systems – large energy saving potential
- energy efficiency in technological processes – large energy saving potential, hardly available financial and advisory support

Recommendations:

It is estimated that the business sector has significant potential to reduce energy demand. The recommended form of assistance for companies in the process of improving energy efficiency is the organization of advisory assistance in acquiring an external financial support.

Residential buildings

Opportunities to reduce energy consumption by:

- thermo retrofitting – very large energy saving potential, financial support practically not available
- modernization of heating systems – very large energy saving potential, financial support of regional funds is foreseen
- energy management in buildings – medium energy savings potential, temperature control systems on the premises are part of modern heating systems

Recommendations:

The biggest reserves of energy efficiency improvements are in residential buildings. Modernization activities are easy from a technological point of view, the materials and contractors are available.

The main barrier is the lack of financial support for disadvantaged families. The solution would be to the establishment of a local support scheme in the County which can organize the distribution of acquired external financial resources.

Transport

Opportunities to reduce energy consumption by:

- improving the organization of transport and improvements in traffic flow (including construction of bypasses and rings, "intelligent traffic control")
- better use of existing means of transport
- increasing the energy efficiency of vehicles (fleet modernization)

Recommendations:

The measures to improve transport efficiency and economical use of vehicles should be part of the information and promotional campaigns under the Energy Efficiency Plan. As the number of vehicles is growing, the intelligent traffic control systems and the creation of alternative routes will be of big importance.

Most of the conclusions and recommendations resulting from the work and analysis in the diagnosis part were also confirmed during the consultation meetings and as a result were reflected in the actions proposed in the program section of the study.

Renewable Energy Sources

According to the conclusions of the "SWOT Analysis for the District Gorlice" it is advisable to promote small, domestic installations of RES. The following recommendations for the EEP were defined:

- solar thermal collectors - further increasing of public interest is anticipated. In most households, this installation can be used. The same is for public buildings used year-round. Increasing the number of operating solar collectors in the Gorlice County can be considered as a task of key concern.
- solar photovoltaic panels - further increasing of public interest is expected in the case of positive legal regulation (prosumer power generation). Supporting the development of photovoltaic technology should be included in the EEP.
- heat pumps - now there is a little public interest. This is a measure of great importance to reduce the demand for energy from conventional sources and should be included in the EEP.

Consultation meetings - the conclusions of the discussions

As part of the PEE development process, there were 3 consultative meetings with representatives of the Local Support Group of VIS NOVA project. There have also been a number of meetings with representatives of local governments and NGOs operating in the County. During the meeting the main problems of energy management in the region and possible actions to reduce their energy consumption were discussed. It also highlighted the need to include in the EEP also the business sector, despite the fact that local governments have virtually no significant tools to influence the decisions of entrepreneurs in the field of energy efficiency. The creation of conditions for support, mainly advisory type, for entrepreneurs was recommended

Below are the issues addressed and the conclusions of these meetings:

<u>The problems</u>

- the large number of residential buildings do not meet current thermal standards
- the hardly available support measures (e.g. national thermo retrofitting fund) and the actual level of support is much lower than it follows from the assumptions of the support (the need to incur additional expenses such as energy audits)
- the hardly available data on energy consumption in previous years and the difficulty of defining the level of the base year
- the lack of funds for thermo retrofitting of a large number of households
- the poor quality of fuel combusted in house boiler (resulted in low emissions) and the inflow of pollutants from other regions (south west wind direction)
- the complicated legal situation in the field of public lighting - Power Plants are in some cases the owners of the poles and luminaires and are not always interested in the modernization which results in a reduction of energy consumption

The positives

- the growing interest in renewable energy (mainly solar thermal and photovoltaics)
- the Sękowa Commune - in the framework of the Association of Municipalities of the River Basin Wisłoka - carries out a program to install solar thermal collectors on public buildings and private homes
- the City of Gorlice implements the programme "KAWKA"
- the City of Gorlice proceeds to develop a Plan of Low-Carbon Economy
- thermo retrofitting of public buildings in the framework of the Association of Municipalities of the Gorlice Region
- the high degree of an access to natural gas network in the County
- the energy management in the Secondary School No. 1 as a good practice - preview their work control system through a website soon will be available
- the relatively high public awareness of the savings resulted from thermo retrofitting (investments made with their own funds, often in stages)

The proposed actions:

- the cooperation of local governments in promoting the thermo retrofitting and the use of RES
- the cooperation of local governments in raising funds for investment in the field of renewable energy (e.g.solar collectors for private buildings)
- the organization of advisory assistance for entrepreneurs
- improving the flow of information on the needs of local (database) and the available sources of financial support

Proposed actions - as part of the EEP:

1. Finding the optimal formula of cooperation between local governments of the Gorlice Region to improve energy efficiency in the region and coordinate activities in this area
2. The creation of regional databases, including potential participants in the activities defined in the EEP
3. Finding the organizational formula, with simple procedures, supporting the thermal modernization of private buildings, replacement of heat sources or micro-installations of RES

Programme of energy efficiency improvements

17. Vision, mission and strategic objectives of the County in terms of energy efficiency

As a result of consultation meetings and discussions we propose the adoption of such a shape of the mission, vision and strategic objectives of the Gorlice County in terms of energy efficiency:

Mission:

The Gorlice Region –a region of energy used efficiently.

Vision:

In 2022 years the Gorlice County is a regional leader in energy efficiency and energy produced by consumers.

Strategic objectives:

1. Increasing environmental and energy awareness of the County residents

Improving the energy efficiency of the County requires the cooperation of all energy users. The development of a system providing information about local needs and opportunities is crucial for achieving this objective.

2. Efficient energy management in public buildings

The public buildings should be a local demonstration sites and visualization of best practices in the area of energy efficiency, efficient heating, energy management in the building and use of RES.

3. Improving the effectiveness of lighting of public spaces

Local public space lighting systems are in the process of modernization. Continuation of this process and use the available modern technologies will reduce energy consumption and improving safety.

4. Reducing the energy demand in residential

The analyses show that the residential buildings in the County have the greatest potential to improve energy efficiency, mainly by thermo retrofitting, modernization and upgrading of space heating and hot water production systems. To exploit this potential the organization of a local support system should be developed.

5. Rationalisation of energy use in the economic sector

The business sector represents a significant reserve for the reduction of energy demand for heating, technological processes and transport. The aim of the PEE is supporting this sector in efforts to improve energy efficiency.

As a consequence of achieving the strategic objectives, the low emission will be mitigated in the area of the Gorlice County.

18. Action Plan to improve energy efficiency

Action Plan to improve energy efficiency include:

- description of each activity
- estimated cost of implementation

The timetable for the Implementation the plan is provided in Chapter 20

Description of activities działań

Activities have been grouped according to their performers and participants:

- The County Office ensures the sustainability of the VIS NOVA project – Activities 1 - 2
- Local Governments' Agreement – Activities 3 - 4
- Local Governments' Agreement and the County residents – Activities 5 – 7
- Local Governments – Activities 8 – 11
- Entrepreneurs – Activities 12 -15

The County Office

1. Monitoring of the Energy Efficiency Plan implementation and reporting

Responsible for the implementation

The Energy Competence Centre

Cooperation

The Programme Council

The Local Governments

Goal and description of the action

The purpose of this activity is to conduct ongoing monitoring of the implementation of the PEE, reporting to the Program Council and local governments and the preparation of proposals for actions resulting from the analysis of these reports.

Results

The efficient flow of information among key stakeholders and the ability to use the reports to correct the current work of the Energy Competence Centre and the possible adjustments of the Energy Efficiency Plan.

2. Creating and running the information system and the promotion of energy efficiency

Responsible for the implementation

The Energy Competence Centre

Cooperation

The Programme Council

Schools in the County

NGO's

Goal and description of the action

The aim is to create efficiently managed information system and promote energy efficiency in the Gorlice County. The system will use modern means of communication (internet, social media, mobile devices, multimedia presentations) as well as classical forms (posters, leaflets, articles in the press, the local electronic media).

A large role of schools and various social initiatives, both local and of national coverage, is foreseen.

Target groups are:

- Students and school pupils
- Local Governments
- Building Managers / Administrators
- Property owners
- Entrepreneurs

The benchmarking system will be developed covering initially only public buildings.

Ways to reach each target group, subject / area of education and promotion as well as the form of the action will be defined in the Action Plan of Energy Competence Centre and will take into account the possibility of raising funds from public sources.

The system will also communicate the progress in implementing the Energy Efficiency Plan.

Results

- A well-functioning system of information and the promotion of energy efficiency
- Increased public awareness of energy efficiency and renewable energy sources

Local Governments' Agreement

3. Creation and running a database of energy efficiency

Responsible for the implementation

Energy Efficiency Centre

Cooperation

Local governments

Schools in the County

Goal and description of the action

The purpose of this action is to create and maintain a database, which will allow:

- monitoring the implementation of the PEE in terms of quantity;
- assessment of the needs for energy efficiency improvements;
- defining areas / subjects of promotional and informational activities;
- efficient preparation of proposals for external funding (exact data on the current state and expectations or needs).

The database will contain information on two groups of objects:

- public buildings;
- residential buildings (single family, multifamily, cooperatives).

The incentive to supply data to the database for individual owners will be participating in programmes subsidizing retrofitting measures and / or related to the RES.

Results

Continuously updated database on energy use in public buildings and residential in the County is the basis for monitoring the implementation of the Plan for Energy Efficiency and is used for ongoing operating activities of the **Energy Competence Centre** and the **Energy Efficiency Centre** and provides a basis for strategic decisions of local goverments.

4. Support for Local Governments

Responsible for the implementation

Energy Efficiency Centre

Cooperation

Local governments

Goal and description of the action

The purpose of this action is to support the local governments in their efforts to acquire external funding for implementation of the Energy Efficiency Plan. The activities will include:

- monitoring of potential financial sources consistent with the objectives of PEE;
- securing the flow of information on potential funding between local governments
- expert support in application processes;
- assistance in the preparation of proposals for external funding;
- supporting role in managing and settlement of projects.

Results

The creation of the "rapid response" system to seize the opportunity for external funding to perform actions defined in the PEE.

5. Thermal Retrofitting Fund

Responsible for the implementation

Energy Efficiency Centre

Cooperation

The Programme Council

Local governments

Goal and description of the action

The current system of cofinancing of energy efficiency improvements secures repaying off by the State the part of commercial bank credit. Grant funds are not transferred directly to the investor, but the bank pays invoices. This system is designed for individuals, cooperatives and housing communities and local governments. Based on many years of experience one can state that an individual owner of buildings practically do not use this form of assistance. Thermal retrofitting of single family houses is usually carried out in stages and with own work of the investor, and this means that the investor is not eligible for cofinancing. The aim is to fill the gap that exists in the support schemes in thermo modernization of single family buildings. The Fund will acquire external funding (EU programs, funds for environmental protection and others), and will manage their distribution to eligible participants – residents of the County. The Fund will refund part of insulation materials as well as financing the energy audits for the buildings included in the scheme. In this scheme investors own work is acceptable.

The rationale for the idea:

- *The system of financing of the energy efficiency through thermal retrofitting is based on repayment by the State the part of commercial bank credit. The money is not transferred directly to the investor, but the bank pays invoices issued by companies performing insulation.*
- *This system is designed for individuals, cooperatives and housing communities as well as for the local governments. However, based on many years of experience in energy auditing, one can say that individuals practically do not use this form of assistance.*
- *The thermo retrofitting of the single-family houses is usually carried out in stages and with the participation of the investor's own labour, and this means that the conditions for participation in the program are not met.*
- *So, it would be advisable to create a support system in the field of thermo retrofitting to suit the needs of individuals – owners of small residential buildings which do not fit practically into the national support schemes.*
- *Analysis of the opportunities of the energy efficiency improvements of the Gorlice County leads to the conclusion that the single-family residential buildings - due to the age and poor condition of buildings, their weak thermal insulation of external walls in most of these buildings - are the biggest source of energy savings.*

The basic description of the Thermo Retrofitting Fund

1. *Support the thermo retrofitting of private buildings (for which there is no real support in existing systems)*

2. *The cashless support - a grant to purchase some materials for insulation*
3. *The need for the financial involvement of the beneficiary (the grant is to cover part of the cost (e.g. 30%) of the purchase of building materials and the cost of the energy audit)*
4. *Ensure the achievement of the current requirements of insulation of external walls (the energy audit)*
5. *The investor's own labour is acceptable in this scheme*
6. *A significant simplification of procedures (compared to the national scheme)*

The impact on the realization of the objectives of the Energy Efficiency Plan for the Gorlice County

The individual residential buildings have a significant share in the district heating demand. New buildings and buildings subjected to thermo retrofitting are only part of the housing stock, but in most buildings, due to age and condition, there are significant energy losses. In addition - due to the predominant heating system (coal and wood) - these buildings are the main producer of "low emission". Thermo retrofitting of these buildings will therefore not only reducing the demand for heat, but reduces significantly low emissions by the way.

Results

Increasing the number of the retrofitted residential buildings in the County.

6. RES development Fund

Responsible for the implementation

Energy Efficiency Centre

Cooperation

The Programme Council

Local governments

Goal and description of the action

The goal is to increase interest of residents of the County to purchase and install the micro installation of RES for the individual needs of the investor (heat pumps, solar panels, photovoltaic cells, small windmills).

An eligible investor could get a partial refund of expenses incurred for the purchase and installation of RES micro installation.

Results

Increasing the number of RES installations operating in the County

7. Fund to improve fuel efficiency

Responsible for the implementation

Energy Efficiency Centre

Cooperation

The Programme Council

Local governments

Goal and description of the action

The goal is to increase interest of residents of the County to purchase and install in the households new and highly efficient heating systems.

An eligible investor could get a partial refund of expenses incurred for the purchase and installation of a new heat source and modernization of the internal system of space heating and hot water production.

Results

Reduce the heat demand for space heating by improving the efficiency of heating systems (side effect will be a low emission mitigation)

Local governments

8. Improving the energy efficiency of public buildings – thermal retrofitting

Responsible for the implementation

Local governments

Cooperation

Energy Efficiency Centre

Assistance to local governments in the search for external funding of the investment, support in the development of applications for external funds, etc.

Goal and description of the action

Local governments for several years systematically conduct the thermomodernization investments. These activities were implemented by each individual commune or jointly under the project implemented by the Association of Communes of the Gorlice Region. In the framework of this action the completion of the thermal improvements in public buildings is planned.

The task of the Energy Efficiency Centre is to support organizational and technical activities of local governments.

Results

The achievement of 100% of public buildings retrofitted, and subsequently a further reduction in energy demand for space heating in these buildings.

9. Renewable Energy Sources in public buildings

Responsible for the implementation

Local governments

Cooperation

Energy Efficiency Centre

Assistance to local governments in the search for external funding of the investment, support in the development of applications for external funds, etc.

Goal and description of the action

The preliminary analysis shows that for some public buildings there are the technical and economic justification of installation of RES as a support for systems for space heating and hot water production. Installation of renewable energy systems on public buildings is also a good example for residents. In the framework of this action plan various renewable energy systems (depending on needs) in public buildings will be installed.

The task of the Energy Efficiency Centre is to support organizational and technical activities of local governments.

Results

- Increasing the share of renewables in the energy balance of the county.
- A good example for residents

10. Energy management in public buildings

Responsible for the implementation

Local governments

Cooperation

Energy Efficiency Centre

Assistance to local governments in the search for external funding of the investment, support in the development of applications for external funds, etc.

Goal and description of the action

In the framework of the VIS NOVA project, an extensive system of energy management was installed in the Secondary School No. 1 in Gorlice. This system, apart from the practical aspect (reducing the energy intensity of the object) has also an important goal to accomplish: education and promotion. Based on the experience gained in this project one can examine the possibility of application (on a different scale, depending on the nature of the object) similar solutions in other public buildings.

As part of this action installation of a variety of energy management measures in the public buildings (including systems for temperature control of the hours and off hours, lights switched on motion sensors) are planned. This can result in double-digit reduction in energy demand.

The **Energy Efficiency Centre** will organizationally and technically support the local governments in these activities.

Results

Reducing the demand for energy in public buildings

11. Reducing energy demand for street lighting in the Gorlice County

Responsible for the implementation

Local governments

Cooperation

Energy Efficiency Centre

Support in finding external financing and preparation of appropriate application documents.

Goal and description of the action

Local governments systematically modernizing street lighting systems - currently the exchange was a small part of the lighting fixtures. The aim is to complete the modernization of the lighting and the analysis of the applicability of the installation of energy-efficient (e.g. LED, hybrid systems). New technology in the lighting industry has a number of advantages (low demand for energy, longer life, better performance), but there are also some technical limitations and the relatively high investment costs. As part of the activities one can develop a perspective model of the public space lighting system and proceed to the phased implementation of the system.

Reducing energy demand for lighting purposes is consistent with the objectives of the Energy Efficiency Plan for the Gorlice County.

The Energy Efficiency Centre will organizationally and technically support local governments in activities described in EEP

Results

Reducing energy demand for lighting public spaces.

The entrepreneurs of the Gorlice County

12. Improving the energy efficiency of companies – thermo retrofitting

Responsible for the implementation

Entities conducting business activity

The companies participating in implementation of the Energy Efficiency Plan will be listed in an updated Annex to the Plan.

Cooperation

Energy Efficiency Centre

Help businesses in the search for external financial sources, aid in the development of applications for external funds, assistance in settlement of grants, etc.

Goal and description of the action

Entities conducting business activity have various buildings - office and administrative buildings, warehouses, manufacturing, etc. – which are different in terms of age and construction standard and therefore in a different technical condition. Some of these objects requires heating - reducing energy demand achieved by thermo retrofitting is consistent with the objectives of the Energy Efficiency Plan (EEP). Thermo retrofitting measures may be implemented separately or together with other measures to increase energy efficiency.

The task of the Energy Efficiency Centre is to develop, maintain and update a database of companies - participants of the Plan and to give them organizational and technical support.

Results

Reduction of energy demand for space heating. As a result one can expect a reduction of operating costs and improvement of competitiveness.

13. Improving the energy efficiency of companies - RES

Responsible for the implementation

Entities conducting business activity

The companies participating in implementation of the Energy Efficiency Plan will be listed in an updated Annex to the Plan.

Cooperation

Energy Efficiency Centre

Help businesses in the search for external financial sources, aid in the development of applications for external funds, assistance in settlement of grants, etc.

Goal and description of the action

The entities conducting business activity use different forms of energy for heating purposes and technology. In some cases it is possible to change the traditional sources of energy to renewable ones. Replacement (total or partial) of this traditional source of renewable energy sources is an action consistent with the objectives of the Energy Efficiency Plan (PEE). Operators may introduce RES separately or together with other measures to increase energy efficiency.

The task of the Energy Efficiency Centre is to develop, maintain and update a database of companies - participants of the Plan and to give them organizational and technical support.

Results

Increasing the share of energy from renewable sources in the energy balance of the County. As a result one can expect a reduction of operating costs and improvement of competitiveness.

14. Improving the energy efficiency of companies – modernization of technological processes

Responsible for the implementation

Entities conducting business activity

The companies participating in implementation of the Energy Efficiency Plan will be listed in an updated Annex to the Plan.

Cooperation

Energy Efficiency Centre

Help businesses in the search for external financial sources, aid in the development of applications for external funds, assistance in settlement of grants, etc.

Goal and description of the action

The manufacturing and service enterprises are using the energy in technological processes and some companies have outdated, energy-intensive machinery and equipment. As part of the modernization of technological processes, including implementation of technological innovation to the local market – it is possible to reduce the energy intensity. These actions are consistent with the objectives of the Energy Efficiency Plan (EEP). Operators may introduce energy efficiency measures in technological processes separately or together with other measures to increase energy efficiency.

The task of the Energy Efficiency Centre is to develop, maintain and update a database of companies - participants of the Plan and to give them organizational and technical support.

Results

Reduction of the demand for energy in technological processes has a direct effect on operating costs decrease and improvement of competitiveness.

15. Improving the energy efficiency of companies – energy-efficient transport

Responsible for the implementation

Entities conducting business activity

The companies participating in implementation of the Energy Efficiency Plan will be listed in an updated Annex to the Plan.

Cooperation

Energy Efficiency Centre

Help businesses in the search for external financial sources, aid in the development of applications for external funds, assistance in settlement of grants, etc.

Goal and description of the action

The fuel used by transport contribute significantly to the energy balance of the County. The modernization of the fleet (mostly in transport companies, but not limited to) and the introduction of organizational solutions to reduce fuel consumption are an action consistent with the objectives of the Energy Efficiency Plan (EEP). Companies can take action to improve transport efficiency separately or together with other measures to increase energy efficiency.

The task of the **Energy Efficiency Centre** is to develop, maintain and update a database of companies - participants of the Plan and to give them organizational and technical support.

Results

Reduction of fuel consumption in a business that is reducing costs and improving competitiveness.

Estimated costs of implementation of the actions

The costs of implementing the measures were analysed in two categories:

- staff and administrative costs
- investment costs or other operating costs

Staff and administrative costs

To run actions 1 and 2, under the VIS NOVA project, the estimated workload of five days a month is required. The total annual cost would be about 9 000 zł.

The costs of administrative support of actions 3-15 will depend on the scope of the work. It is anticipated that the implementation of the all action a staff of 3 permanently employed people is necessary. Also outsourcing of external experts (e.g., to assess the technical implementation of the investment) will be a must. The total costs would be around 100 000 per year.

It is assumed that a significant portion of the administrative costs will be covered by external sources as the most of them allows to finance managerial costs of the project

Investment costs / other operating costs

The total cost of the tasks was estimated for tasks 5-7 for described in this PEE "average" single-family building with a usable area of 100 m2.

Estimated costs of implementation of individual tasks within the ranges:

- Thermo retrofitting: from 10 000 to 50 000 zł (depends on the range)
- Modernization of heating system: from 10 000 to 20 000 zł
- Heat source replacement: from 5 000 to 15 000 zł
- Heat pump installation: from 20 000 to 50 000 zł
- Solar collector installation: from 10 000 to 20 000 zł
- Photovoltaic cell installation: 25 000 to 85 000 zł

For the calculation the cost of an "average" measure:

- Thermo retrofitting (T) - 30 000 zł
- Heat source replacement and modernization of heating system (Zc) – 25 000 zł
- RES installation (OZE) – 15 000 zł

For the purposes of this study assumed investment scenarios, depending on the amount of funds raised:

- Pessimistic - only tasks 01 and 02 will be implemented, ie organizational; these tasks do not bring direct effects of energy and environmental objectives, but are raising awareness
- Few optimistic - manage to gain enough resources and will be completed approximately 100 investments per year (50T, 25 Zc, 25OZE)

- Medium optimistic - manage to gain a little more money and will be completed approximately 300 investments per year (150T, 75Zc, 75OZE)
- Very optimistic - manage to raise a lot of funds and will be completed approximately 500 investments per year (250T, 125Zc, 125OZE)

The total costs of the actions 5 - 7:

- Few optimistic – 2 500 000,- zł
- Medium optimistic – 7 500 000,- zł
- Very optimistic – 12 500 000,- zł

These costs also include own contribution (in-kind and in-kind contribution in the form of their own work) of beneficiaries. It is necessary to raise from external sources about 40% of the estimated cost of these tasks.

<table>
<tr><th>Action</th><th>Staff and administration</th><th>Investment costs (PLN)</th></tr>
<tr><td>1</td><td rowspan="2">The County Office
(VIS NOVA project)</td><td>-</td></tr>
<tr><td>2</td><td>5000</td></tr>
<tr><td>3</td><td rowspan="5">Local Goverments' Agreement
External funding</td><td>5000 (once – database)</td></tr>
<tr><td>4</td><td>-</td></tr>
<tr><td>5</td><td>average cost of 1 action – 30 000</td></tr>
<tr><td>6</td><td>average cost of 1 action – 15 000</td></tr>
<tr><td>7</td><td>average cost of 1 action – 25 000</td></tr>
<tr><td>8</td><td rowspan="4">Local governments</td><td rowspan="4">Depending on the range of tasks
Costs to be defined</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td></tr>
<tr><td>11</td></tr>
<tr><td>12</td><td rowspan="4">Entrepreneurs</td><td rowspan="4">Depending on the range of tasks
Costs to be defined for each task</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td></tr>
<tr><td>15</td></tr>
</table>

19. The proposed management system of implementation of Energy Efficiency Plan

At present, at the Gorlice County there are no institutions or structures that could take on the management of this plan. As local governments, economic sector and local communities are included in the Energy Efficiency Plan, the management structure must be approved and supported by all stakeholders. It seems that the key to effective implementation of the plan is the cooperation of all the governments of the Gorlice Region. Taking this into account, the proposed management system should fully exploit synergies and at the same time ensure the efficiency of operations. The proposed model is one of the possibilities and does not prejudge the final shape adopted in the future by local governments.

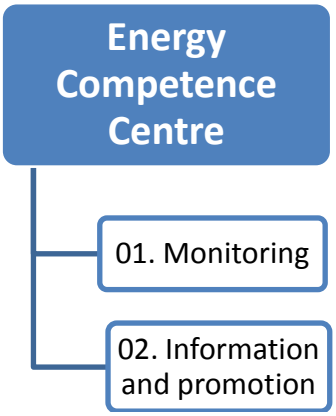
The management system the implementation of the Energy Efficiency Plan can be developed in stages. We propose four steps, wherein the fourth step has three variants. However, the final shape of the system and the way it was created will depend on the agreed plan of key stakeholders – local governments. The following proposition can be useful in the further development of the management system.

Phase 1– The Energy Competence Centre

The **Energy Competence Centre**, located in the Secondary School No. 1, is established as a result of the VIS NOVA project.

Implements:

- Action 01. „Monitoring of the Energy Efficiency Plan implementation and reporting (obligatory – VIS NOVA project sustainability)
- Action 02. „Creating and running the information system and the promotion of energy efficiency" (optionally)

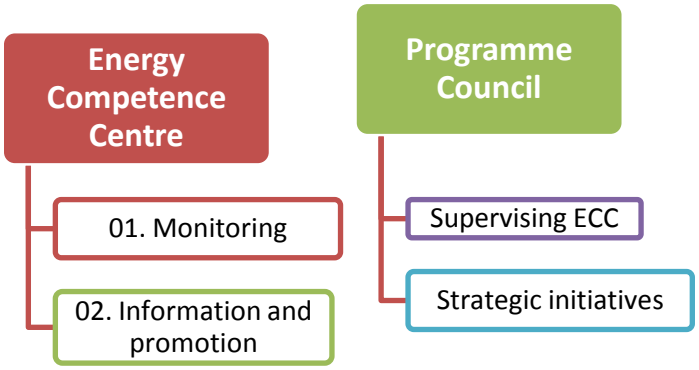


Phase II – The Programme Council of Energy Efficiency in the Gorlice Region

The Programme Council of Energy Efficiency in the Gorlice Region, consisting of local leaders and selected experts) is created.

This council could arise as a result of the evolution of the Local Support Group of VIS NOVA project. The proposed responsibilities of the Council:

- supervising the Energy Competence Centre
- develop strategic initiatives in the area of energy efficiency



Phase III – Local Governments' Agreement for Energy Efficiency of Gorlice Region

As a result of a strategic decision of the Programme Council, the **Local Governments' Agreement on Energy Efficiency of the Gorlice Region**, is formed with the optional Secretariat of the Agreement at:

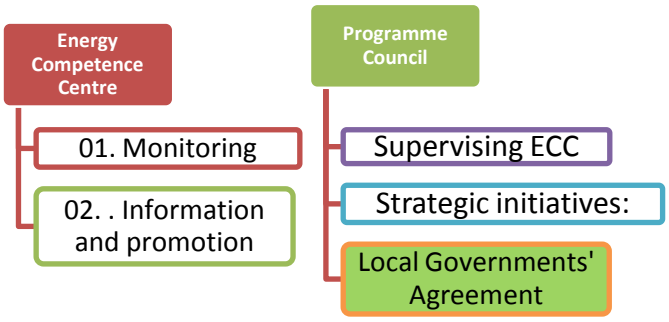
- the County Office

or

- the Association of Municipalities of the Gorlice Region

One of the tasks of the Local Governments' Agreement could be an active implementation of the Energy Efficiency Plan by creating a functional and an organizational framework for the conduct of other activities of the Plan (actions from 03 to 15).

At least three scenarios for the implementation of the Energy Efficiency Plan, described later, may be considered.



Phase IV variant A – Implementation of the Energy Efficiency Plan through the establishment of the Energy Efficiency Centre

The Local Governments' Agreement **appoints <u>new</u>** organizational structure – the Energy Efficiency Centre.

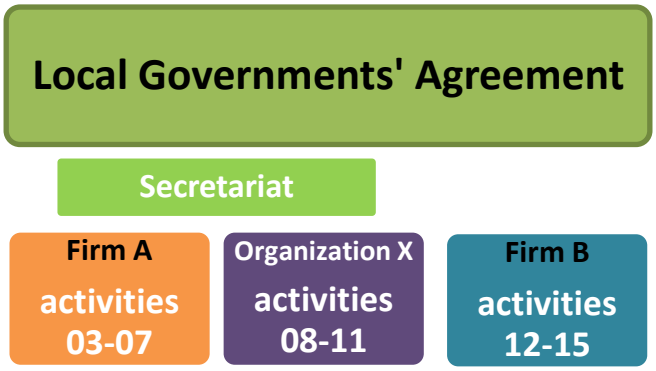
The purpose of the Centre is implementing the Energy Efficiency Plan - Actions 03 - 15

Phase IV variant B – Implementation of the Energy Efficiency Plan by the institution employed to perform tasks of the Energy Efficiency Centre

The Local Governments' Agreement **shall commission <u>all</u> the activities** of the implementation of the Energy Efficiency Plan to the existing organizational structure and sign a contract with them for **<u>conducting</u> the Energy Efficiency Centre**.

Phase IV variant C – Implementation Plan for Energy Efficiency through outsourcing by the Secretariat of the Agreement of individual actions

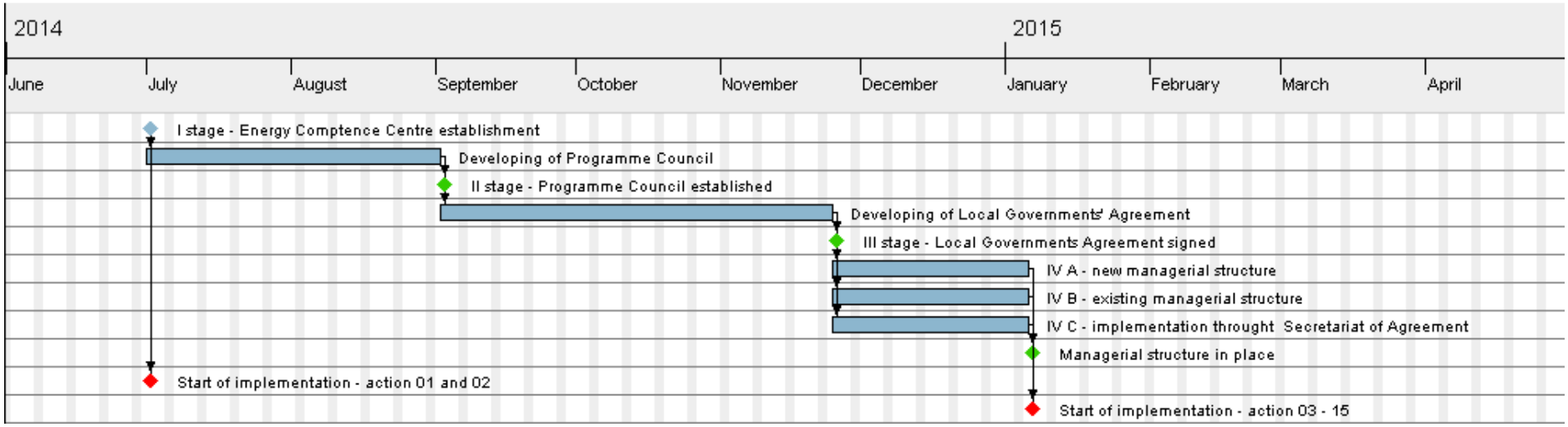
Local Governments' Agreement, through its Secretariat, shall **commission individual actions** of the Energy Efficiency Plan to organizations / companies.



20. Timetable

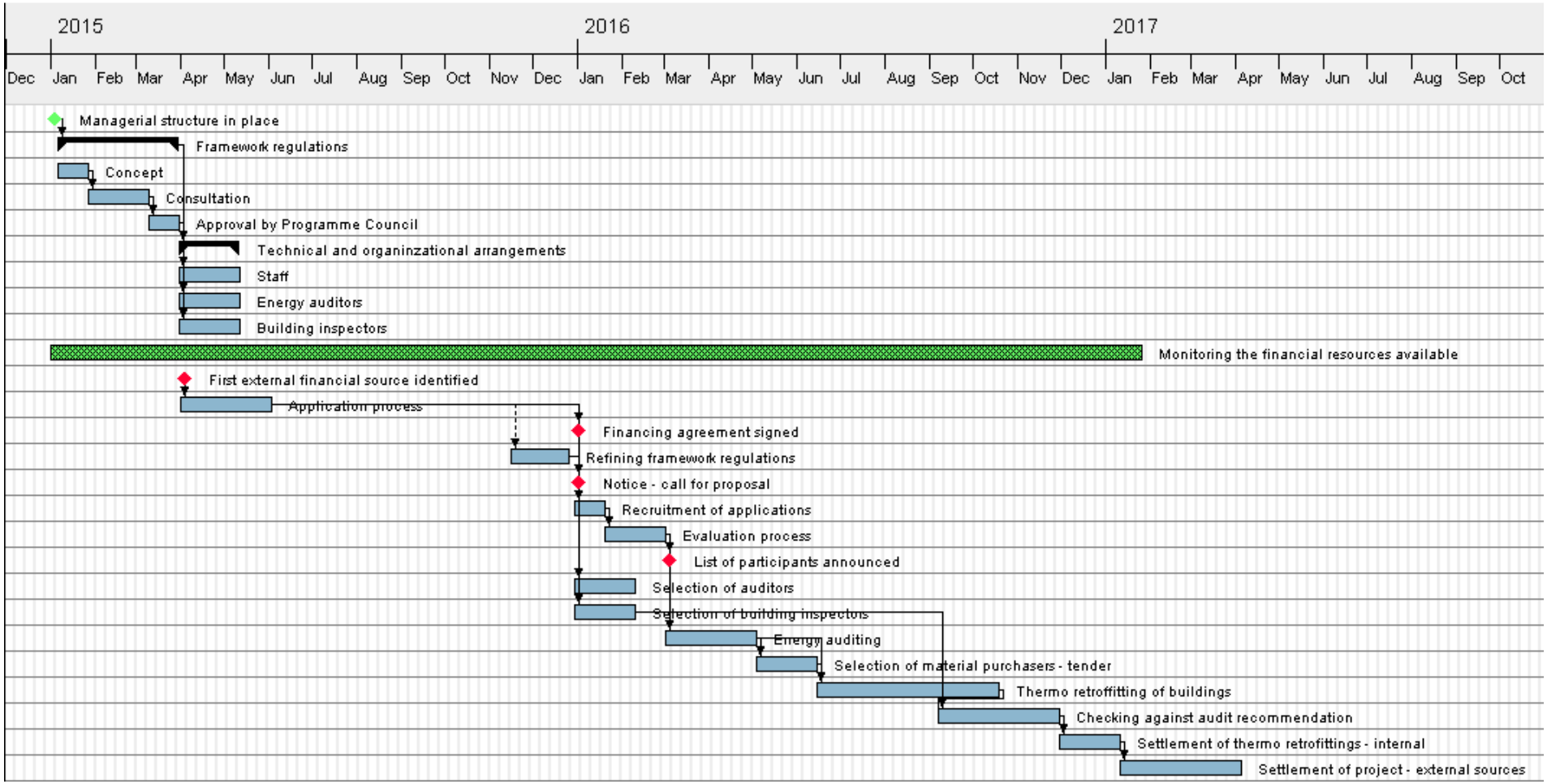
The objectives set out in the for Energy Efficiency Plan to be achieved as a result of the measures implemented in the period 2015-2022. To implement most of the measures stipulated in the Energy Efficiency Plan required are two elements: 1/management structure (Energy Efficiency Centre or other structure) and 2/ funds from external sources. The Energy Competence Centre, which is a result of the VIS NOVA project, will be a management structure for actions no. 1 and no.2. Others actions require a management structure. The procedure for the creation of a management structure for the implementation of the Plan is described in Chapter 19

The following is a proposed schedule for the process, assuming that the Energy Competence Centre will start actions from 1 July 2014.



After the establishment of the management structure the first actions should be to start operations 5 - 7 which is the creation and launch of the funds supporting the residents of the Gorlice County in thermo retrofitting (action no. 5), RES micro installations (action no. 6) better use of fuel – heat source replacement (action no. 7).

Quick launch of these funds is important as the first funding opportunities in the region (Malopolska Regional Operational Programme) are expected at the beginning of 2015. The process of creating the Thermo Retrofitting Fund and its operation (action no. 7) is shown in the following Gantt chart.



It was assumed, that:

- the creation of regulations and technical facilities - organizing the Fund will begin immediately after the formation of a management structure (the Energy Efficiency Centre) - the beginning of January 2015
- notice of the call for proposals in the area of thermo retrofitting and the principles for financing the activities of individuals appears at the beginning of the second quarter of 2015

When estimating the time to complete each task is assumed that 150 buildings will be thermo retrofitted (medium optimistic scenario).

A similar scheme and timetable for action will apply to the creation and operation of the Fund for the Development of RES (action no. 6) and the Fund for the Improvement of Fuel Use (action no. 7), of course, taking into account also the technical specifics of renewable energy and heat source replacement.

21. Sources of funding a plan to improve energy efficiency

The financial resources allocated to support investment in energy efficiency can come from domestic sources, foreign and are awarded at the central or regional level.

Funding of investments may be different from co-financing such as the Regional Operational Programme or Operational Programme, by a grant, loans, interest rate subsidies or loan capital up to foreign aid on the basis of signed agreements of cooperation.

Regional Operational Programme of the Malopolska Region for 2014-2020

Priority axis 4. Regional Energy Policy

Operational Programme Infrastructure and Environment for the years 2014 - 2020

I. Priority axis. Reducing the of the emissivity of the economy

V. Priority axis. Improving energy security

The Rural Development Programme for the years 2014 - 2020

Priority 5. Promoting resource efficiency and the transition to a low carbon economy and climate resilient in the agricultural, food and forestry sectors

National Fund for Environmental Protection and Water Management

Norwegian Financial Mechanism and the Financial Mechanism of the European Economic Area by 2014

Priority 1: Protection of the environment, including the human environment, through, inter alia, reduction of pollution and promotion of renewable energy

Swiss-Polish Cooperation Programme

Cross Border Cooperation Programme Poland - Slovak Republic

Priority 1: Infrastructure for cross boarder cooperation

European Energy Efficiency Fund
(www.eeff.eu)

European Union Framework Programme Horizon 2020 for research and innovation.

Secure, Clean and Efficient Energy.

22. Analysis of the impact of planned actions on reduction of greenhouse gas emissions

In order to determine the impact of the planned measures on reduction of greenhouse gas emissions amount of emissions were set out for the base year 1999, for the present state and for the last year of the analysis (2022 – forecast based on the pessimistic scenario – no actions or investments).

An inventory of CO_2 emissions was based on:

- the consumption of energy and fuels within the Gorlice County broken down by sectors (public, business, housing and transport) in the base year, at present and in the last year of the forecast
- the indicators of the CO_2 emissions from the consumption of 1 MWh of electricity, district heating, heat from natural gas and other heat energy carriers (coal, coke, liquefied petroleum gas, fuel oil, biomass) adopted by the European Secretariat of the Covenant of Mayors, according to the technical annex the instructions for filling out the SEAP template for Polish and standard indicators

Table 43. CO_2 emission factors - 1 MWh – according to SEAP

Electricity	Heat form district heating system	Natural gas combustion	Coal combustion	Heat from combustion of other fuels	Fuels for vehicles
Standard emission rate: Mg CO_2/MWh					
1,191	0,343	0,202	0,341	0,26	0,258

Source: own elaboration based on Technical attachment to SEAP instruction and on literature

CO_2 emission for the base year 1999

Table 44. Energy consumption and CO_2 emission for base year 1999

Energy/sector	Energy consumption (MWh/year)	CO_2 emission MgCO_2/year)
Electricity	152 678,6	181 840
Heat from natural gas combustion	134 996,2	27 269
Heat from coal combustion	953 827,5	325 255
Heat from combustion of other fuels	99 922,2	25 980
Transport	119 535,2	30 840
Total:	**1 460 959,7**	**591 184**

Source: own elaboration

Table 45. CO_2 emission for base year 1999 by sectors

Sector	CO_2 emission MgCO_2/year)
Public	37 759
Enterprises	199 555
Housing	323 030
Transport	30 840
Total:	**591 184**

Source: own elaboration

CO_2 emission at present

Table 46. Energy consumption and CO_2 emission at present

Energy/sector	Energy consumption (MWh/year)	CO_2 emission $MgCO_2$/year)
Electricity	176 740,4	210 498
Heat from district heating	51 879,7	17 795
Heat from natural gas combustion	136 940,0	27 662
Heat from coal combustion	659 027,8	224 728
Heat from combustion of other fuels	78 833,3	204 97
Transport	654 339,8	168 820
Total:	**1 757 761,0**	**669 999**

Source: own elaboration

Table 47. CO_2 emission at present by sectors

Sector	CO_2 emission $MgCO_2$/year)
Public	22 317
Enterprises	159 656
Housing	319 206
Transport	168 820
Total:	**669 999**

Source: own elaboration

CO_2 emission for last year of the forecast (2022)

Table 48. Energy consumption and CO_2 emission for year 2022

Energy/sector	Energy consumption (MWh/year)	CO_2 emission $MgCO_2$/year)
Electricity	210 639,6	250 872
Heat from district heating	51 879,7	17 795
Heat from natural gas combustion	158 500,0	32 017
Heat from coal combustion	754 236,1	257 195
Heat from combustion of other fuels	90 916,7	23 638
Transport	738 821,0	190 616
Total:	**2 004 993,1**	**772 132**

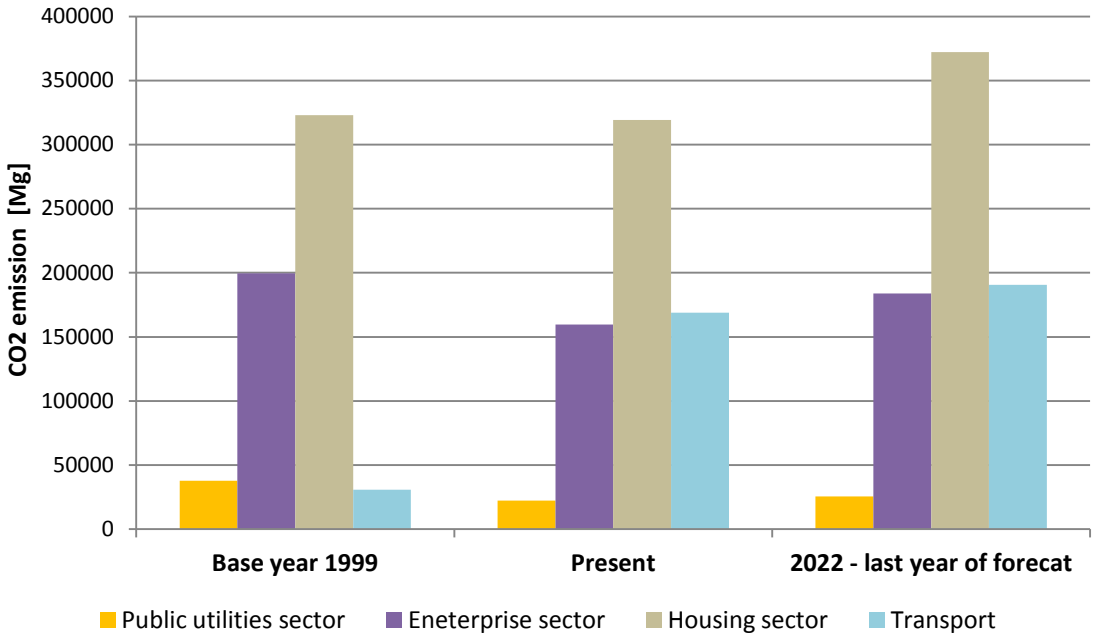
Source: own elaboration

Table 49. CO_2 emission for year 2022 by sectors

Sector	CO_2 emission $MgCO_2$/year)
Public	25 429
Enterprises	183 823
Housing	372 264
Transport	190 616
Total:	**772 132**

Source: own elaboration

Graph 36. Greenhouse gas emission by sectors



Source: own elaboration

The following variants of implementation of the Energy Efficiency Plan were considered:

- Pessimistic - only tasks 01 and 02, ie organizational, will be implemented and these actions do not bring any direct effects on energy consumption or the environmental objectives, but will raise the public awareness
- Few optimistic – the external financial resources will be acquired in the amount sufficient to carry on an approximately 100 investments per year (of which: thermo retrofitting 50, replacement of heat source 25 and the installation of RES 25)
- Medium optimistic - the external financial resources will be acquired in the amount sufficient to carry on an approximately 300 investments per year (of which: thermo retrofitting 150, replacement of heat source 75 and the installation of RES 75)
- Very optimistic - the external financial resources will be acquired in the amount sufficient to carry on an approximately 500 investments per year (of which: thermo retrofitting 250, replacement of heat source 125 and the installation of RES 125)

The "few optimistic", "medium optimistic" and "very optimistic" are the investment scenarios for each the expected size of the reduction of CO_2 was evaluated. The assumptions used in the calculations are as follows:

- investments consisting of thermo retrofitting and the replacement of heat sources in residential buildings in which the heat previously was produced by the combustion of carbonaceous fuels
- investments consisting of the installation of RES in residential buildings, in which the heat previously was produced by the combustion of carbon-free fuels.

Table 50. Reduction of GHG emissions Mg) - „few optimistic" variant

	2016	2017	2018	2019	2020	2021	2022	Total 2016-2022
Reduction of energy demand (MWh)	687,5	1 375	2 062,5	2 750,0	3 437,5	4 125,0	4 812,5	**19 250**
Reduction of CO_2 emission (Mg)	231	463	694	925	1 157	1 388	1 619	**6 540**

Source: own elaboration

Table 51. Reduction of GHG emissions Mg) - „medium optimistic" variant

	2016	2017	2018	2019	2020	2021	2022	Total 2016-2022
Reduction of energy demand (MWh)	2 062,5	4 125	6 187,5	8 250,0	10 312,5	12 375,0	14 437,5	**57 750**
Reduction of CO_2 emission (Mg)	694	1 388	2 082	2 776	3 470	4 164	4 858	**19 625**

Source: own elaboration

Table 52. Reduction of GHG emissions Mg) - „very optimistic" variant

	2016	2017	2018	2019	2020	2021	2022	Total 2016-2022
Reduction of energy demand (MWh)	3 437,5	6 875,0	10 312,5	13 750,0	17 187,5	20 625,0	24 062,5	**96 250**
Reduction of CO_2 emission (Mg)	1 157	2 313	3 470	4 627	5 784	6 940	8 097	**32 710**

Source: own elaboration

Summary:

The greatest impact on the growth of greenhouse gas emissions in the County had the transport sector. The 2022 projected emissions of this sector will more than 6 times compared to 1999.The projected growth in emissions from transport in relation to the status quo will be around 13%.

The expected increase in emissions in the residential sector is mainly due to the anticipated increase of usable floor space and at the dominance of coal as fuel for heating.

The expected increase in demand for electricity will increase greenhouse gas emissions, but this will take place at the site of energy production - that is, outside the County.

The proposed investment options of EEP will contribute to the reduction of CO_2 emissions, but for the area of inventory this will be a slight reduction - just over 4% in the most favourable scenario

CO_2 emission (Mg)	Base year 1999	Current state	Year 2022 variants:			
			Pessimistic	Few optimistic	Medium optimistic	Very optimistic
Total	**591 184**	**669 999**	**772 132**	**765 592**	**752 507**	**739 422**

Source: own elaboration

Referring only to the results for the housing sector may be noted that the reduction of greenhouse gas emissions for the most favourable scenario will be close to 9%.

CO_2 emission (Mg)	Base year 1999	Current state	Year 2022 variants:			
			Pessimistic	Few optimistic	Medium optimistic	Very optimistic
Housing sector	**323 030**	**319 206**	**372 264**	**365 724**	**352 639**	**339 554**

Source: own elaboration

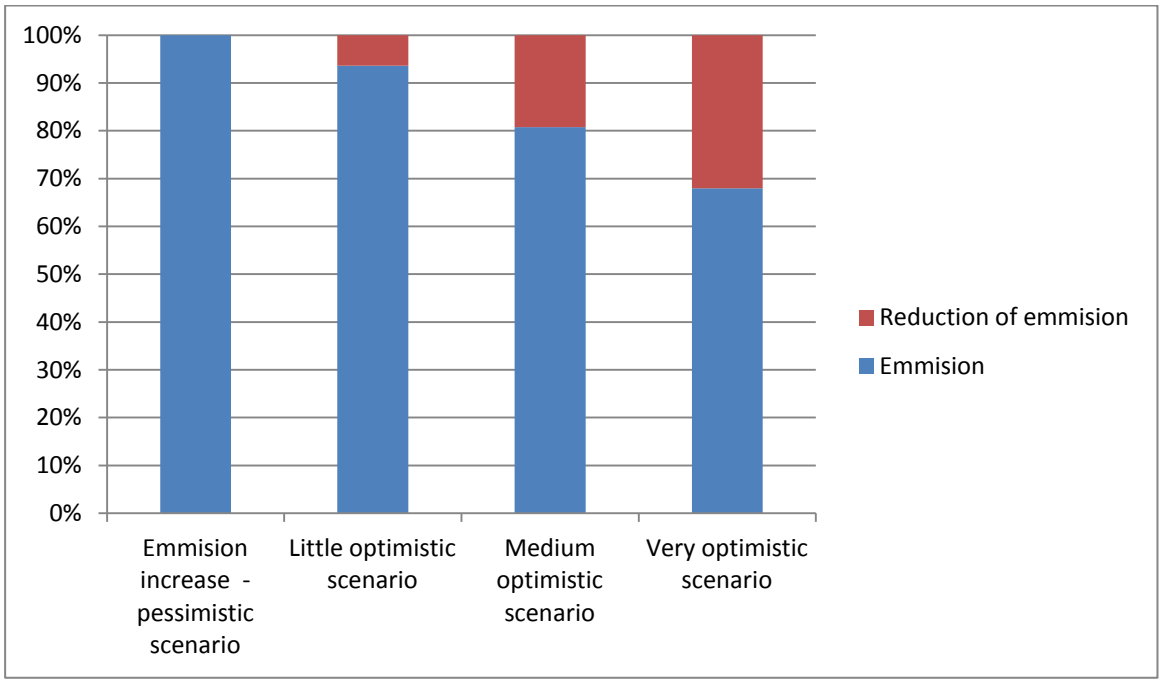
In the pessimistic scenario the projected increase in CO_2 emissions compared to the current year will amount to 102 133 Mg. Implementation of the EEP will reduce this increase:

- few optimistic scenario – by 6,4 %
- medium optimistic scenario - by 19,2 %
- very optimistic scenario – by 32,0 %

	Increase of emission - pessimistic variant	Few optimistic variant	Medium optimistic variant	Very optimistic variant
CO_2 emission	102 133	95 593	82 508	69 423
Reduction of emission	0	6 540	19 625	32 710

Source: own elaboration

Graph 37. Forecast of reduction of emission



Source: own elaboration

23. Monitoring and Evaluation

An important requirement for documents of a strategic nature is an internal system of monitoring and evaluation of progress in implementing and achieving the targets and, consequently, the degree of realization of the mission.

The purpose of monitoring is to ensure the maximum effectiveness of the Plan and conducting the corrective action - if needed.

The proposed monitoring system of the Energy Efficiency Plan assumes:

- maintaining databases and the current monitoring by the Energy Competence Centre at the School No. 1 in Gorlice,
- preparation by the ECC periodic reports (every 6 months) for the Programme Council
- preparation by the ECC proposals for action resulting from the analysis of reports,
- dissemination of information on the status of the different measures under the Energy Efficiency Pan among the partners and beneficiaries

Sources of monitoring indicators will be:

- • in relation to product indicators: entries in the database, the applications lodged in the institution coordinating the project, audits, reports, logs and records of acceptance of construction works, reports on the implementation of the investment as well as information received from the local governments
- • in relation to outcome indicators: calculations based on data collected by the EEC or from reports for the Programme Council.

Table 53. Proposed indicators for monitoring:

No.	Action	Output indicators	Outcome indicators
1	Monitoring and reporting	Number of monitoring plans Number of evaluation plans Number of evalutaion performed Number of half-year reports submitted to the Programme Council	Number of new measures as a result of analysis and reporting
2	Information and promotion system	Number of promotional activities Number of promotional materials produced	Size of target group (persons) Number of inwestments resulted from promotional activities Awareness increase in the area of energy efficiency and RES
3	Database	Number of records in database Number of surveys performed Number of information campaign	Number of projects, applications and documents based on database content
4	Support for local governments	Number of local governments participating in projects Number of developed, implemented and setlled projects	Value of investment projects Percentage of successful applications
5	Thermo Retrofitting Fund	Number of investors participating in the scheme Number of investments	Value of investment projects Estimated amount of energy savings
6	RES Fund	Number of investors participating in the scheme Number of investments	Value of investment projects Estimated amount of energy savings
7	Fundusz poprawy efektywności wykorzystania paliw ziemi gorlickiej	Number of investors participating in the scheme Number of investments	Value of investment projects Estimated amount of energy savings
8	Public buildings – thermo retrofitting	Number of buildings retrofitted	% of energy demand reduction Estimated amount of energy savings
9	Public buildings – RES micro installations	Number of buildings with RES micro installations	% of energy demand reduction

		Power / capacity installed	% of increase of RES share in the County energy balance Estimated reduction of emission
10	Public buildings – energy management	Number of buildings with energy management systems	% of energy demand reduction
11	Street lighting	Number of investments Number of luminaires and light sources replaced Number of actions other than light source replacement	% of energy demand reduction
12	Enterprises – thermo retrofitting	Number of enterprises in database Number of retrofitting measures supported Number of of complex measures applied (retrofitting plus other energy efficiency measures)	% of energy demand reduction
13	Enterprises - RES	Number of buildings with RES installations Power / capacity installed	Estimated reduction of emission % of increase of RES share in the County energy balance
14	Enterprises – technological processes	Number of enterprises participating in the EEP implementation Numbers of the measures implemented	% of energy demand reduction
15	Enterprises – energy efficient transport	Number of enterprises participating in the EEP implementation Numbers of the measures implemented Number of new energy efficient vehicles	% of energy demand reduction

The evaluation of the Energy Efficiency Plan will be made in relation to each action as well as to the whole EEP:

- before starting the implementation of interventions - ex-ante evaluation, involving for example the creation of a database or investigating the consistency between specific intent and provisions of the PEE,
- in the course of the action - on-going evaluation, degree of effectiveness achieved in the course of monitoring of the implementation of action
- after completion - ex-post evaluation, involving a comparison of the goals with the objectives actually achieved. Ex-post evaluation of individual activities and the implementation PEE should be completed no later than 6 months after the end of the PPE that is to 30.06.2023 year.

	Evaluation criteria
accuracy	whether the actions meet the needs
effectiveness	whether the objectives defined at the design stage are / have been achieved whether the management and implementation is / turned out effective
efficiency	whether the effects could be achieved by other instruments whether the results could be achieved at lower financial expenses
usefulness	are expectations of recipients met whether the actions have contributed to the opportunities of development whether the actions have spurred new initiatives
sustainability	whether the effects are / have proven to be sustainable in the long term whether the effects are / have proven to be felt after the operation

For evaluations of the Energy Efficiency Plan the Energy Competence Centre and Programme Council.

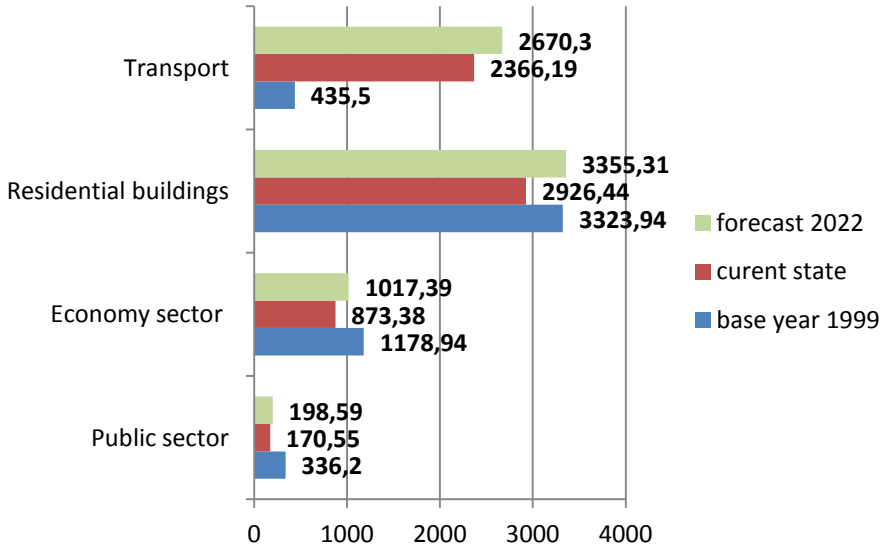
24. Summary

Diagnosis

In the diagnostic part energy demand for the base year (1999), for the current state (2013) and a forecast for 2022 was estimated. The forecast does not include changes resulting from the implementation of the Energy Efficiency Plan. An important component of the diagnostic work was a series of consultation meetings with local leaders. Due to incomplete data (lack of information, especially for previous years in surveys) it was necessary to employ indicator methods. The adopted methodology error is not significant and one can draw conclusions regarding anticipated developments and trends.

Below is a graphical representation of changes in the structure of energy demand in the particular sectors:

Graph 38. Demand for energy (TJ) in base year, at present and forecast 2022 by sector.



Source: own elaboration

The most significant changes occur in the transport sector, consuming liquid fuels. Dynamic increase of number of vehicles results in a large increase of energy demand in the County. These are the changes that the activities of this PEE have a little effect. Therefore the activities of PPE focus on the residential sector (activities aimed at financial support of investments) and public and economic sectors (advice and support).

As a result of analysis of available data and the conclusions of the consultation 15 activities are proposed. Their implementation should have a significant impact on the reduction of energy demand in the region. Advisory activities will be directed to the business sector and local governments, while financial schemes for supporting of specific investments (thermo retrofitting, modernization of heating systems, installation of the RES) are directed for the housing sector – for the individual households. Analyses show that this sector has the greatest potential to reduce energy demand and is the least supported by the currently existing financing schemes.

The following is a summary of multi-criteria analysis of the tasks proposed in PEE.

Results of multi-criteria analysis

The following table summarizes the results of multi-criteria analysis carried out on the basis of:

- SWOT analysis,
- the experience of the authors in the preparation and implementation of activities relating to renewable energy and energy efficiency,
- discussion and comments from experts.

Criteria \ Activities	Technical	Organizational	Educational and promotional	Social	Availability of financing	TOTAL
1. Monitoring and reporting	5	3	2	1	5	16
2. Information and promotion	4	3	5	4	4	20
3. Database – creation and maintenance	2	2	4	4	3	15
4. Support for Local Governments	2	3	2	2	2	11
5. Thermo retrofitting Fund	2	2	5	5	3	17
6. RES Fund	1	2	5	5	4	17
7. Fuel efficiency Fund	2	1	5	5	5	18
8. Public buildings- thermo retrofitting	5	4	4	4	4	21
9. Public buildings - RES	2	4	4	4	5	19
10. Public buildings – energy management	1	3	5	3	4	16
11. Energy efficient street lighting	2	2	3	5	4	16
12. Energy efficiency of companies – thermo retrofitting	4	3	2	3	3	15
13. Energy efficiency of companies - RES	2	3	4	3	3	15
14. Energy efficiency of companies – technological processes	1	3	2	3	3	12
15. Energy efficiency of companies – energy efficient transport	4	3	2	3	1	13

The activities set out in the Plan for Energy Efficiency belong to several categories:

- I. Action for the sustainability of the project VIS NOVA: Action no. 01

It is a big organizational challenge, and there is virtually no influence on society.

- II. Action to promote energy efficiency: Action no. 02.

It is an organizational challenge and has a very large social impact.

- III. Activities to support decision-making and fundraising by local governments: Actions 03 and 04.

They are burdened with large technical and organizational difficulties and have no visible social impact.

- IV. Activities related to the establishment and conduct of the financial schemes supporting residents in improving energy efficiency: Actions 05-07.

Very high technical and organizational difficulties, but having a huge social impact.

- V. Activities of local governments for energy efficiency: Actions 08-11.

Activities with very different levels of difficulty, organizationally should not be difficult (except street lighting activity no. 11) and having a large social impact.

- VI. Activities of companies for energy efficiency: Actions 12-15.

Very different levels of technical difficulties and moderate social impact.

Prerequisites for implementing the plan

To implement most of the measures stipulated in the Energy Efficiency Plan two elements are required:

- management structure (Energy Efficiency Centre)
- financing from various external sources.

Only for launch activities 1 - 2 sufficient management structure is Energy Competence Centre, which is the result of VIS NOVA project.

The procedure for the creation of a management structure for the implementation of the Plan is described in Chapter 19 and the proposed schedule in the form of a Gantt chart is set out in Chapter 20.

Mitigation of low emission

Reducing the energy demand - the main objective of this Plan for Energy Efficiency - bring the additional effect of reducing the emissions of carbon dioxide and other gases and particulates produced by combustion of fuels. The calculation of the estimated 2022 CO_2 emissions was made assuming the implementation of PEE. The calculation of the reduction due to investment scenarios refer to the activities in the field of thermo retrofitting, modernization of heating systems and the installation of RES.

The reduction of CO_2 emission depends on scenario, so on:

- few optimistic scenarios – 6 540 Mg reductions
- medium optimistic scenario – 19 625 Mg reductions
- very optimistic scenario – 32 710 Mg reductions

In addition, one can expect a reduction of energy demand and CO_2 emission reductions due to the implementation of the remaining tasks - advisory support for local governments and businesses.

Recommendations

According to "The law on local self-government" communes should satisfy the collective needs of the community in the area of the electricity, heat and gas supply. These tasks require interaction with the actors involved in the production and distribution of fuels and energy. The scope of cooperation should be specified in the "Guidelines to plan the supply of heat, electricity and gas fuels" – a document requested by The Energy Law. Only a few municipalities in the county complied with this obligation - hence there is a lack of a certain output data for energy management planning. Therefore, it is considered that the development of such "Guidelines ..." by all communes should be the first step to rationalize energy management in the County. The next step should be the development and implementation of programmes aimed to reduce energy consumption (and therefore reduction of low emission) such as SEAP or low emission programme. Such writen programmes are crucial for applying for external aid in the implementation of investment projects as the range of investment needs significantly exceed the financial capacity of both local authorities and inhabitants of the Gorlice Region

When preparing an application for external support it is essential to have good, updated knowledge on the needs of each user group. Therefore, the creation and regular updating of local databases and implementation of an efficient system of information flow among various stakeholders is of extreme importance.

The implementation of PEE requires awareness raising of the inhabitants of the region in the field of energy efficiency - the development the system of information and promotion plays a key role in the initial phase of the PEE and important role in the later stages.

As a basic factor conditioning the positive effect of the implementation of PEE, is cooperation between local governments in the Gorlice Region. The joint action at the regional level increases the chance for external support and minimizes the costs of the project management. It also integrates the local communities.

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