

## RENEWABLE ENERGY SOURCES (RES) FOR THE LOCAL DEVELOPMENT AND THE STATE ENERGY SECURITY

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**Abstract.** The limitations in electrical energy consumption in summer 2015 highlighted the need to support alternative energy sources in rural areas. Their use could have been supported throughout the country; however, only rural areas have rich supplies of biomass, the most accessible renewable energy source (uninfluenced by weather conditions). The paper's aim was to analyse major objectives and thematic areas of 60 local development strategies from the Małopolskie and Podkarpackie voivodeships. The assessment was conducted with respect to the strategic goals directed towards the use of renewable energy sources in rural areas. The investigated strategies, prepared by local action groups (LAG), covered the period of 2007–2013. The organizations were also examined in the research regarding their 2014–2020 development plans by means of an online survey. Renewable energy sources (RES) were included in detailed objectives or thematic fields in 50% of the examined 2007–2013 strategies. None of the major objectives of the investigated strategies touched upon renewable energy. Rural areas have the potential to increase their energy security; however, it requires adequate strategy and funds. Financial support for RES investment should be higher in those cases where biomass and flowing waters can be used. The organizations subject to the analysis put too little priority on the use of biomass and its local processing, allocating financial resources to solar thermal collectors and photovoltaics.

**Key words:** energy security, renewable energy sources, local development strategy, local action groups

### INTRODUCTION

The European economy is at the time of withdrawal from fossil fuels (non-renewable sources). It results mostly from the concept of sustainable growth and implementation of the European policies. The use of renewable sources together with proper strategy of their application can become an essential element of economic growth, also at the local level. Renewable energy sources (RES) cover the following resources: water energy, wind energy, solar energy, geothermal energy, bio-fuels, biogases, and biomass (Kieć, 2007). The Polish history shows (Kiedrowski and Korpysz, 2007) that economic activities (mills, lumber mills) were located in the areas with a river or favourable conditions of winds. Due to the development of science one knows that one of the RES types (geothermal energy) lies down below the surface of 80% of the state territory (Kiedrowski and Korpysz, 2007, p. 16). The exploitation of RES requires, however, large capital expenditures and adequate strategies. Strategic decisions at the local level offer numerous alternative options as far as the type of product obtained on the basis of RES is concerned (Sekutowski, 2012).

Devices using renewable energy sources are costly; nevertheless, they are characterized by the following benefits in the context of sustainable growth (Kieć, 2007):

- minimum negative impact on the natural environment;

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- fixed costs per power unit;
- possibility of work within isolated grids (micro-networks) which solves the problem of energy transport and scarcity in the state transmission networks (local networks can be self-sufficient);
- flexibility of using various local sources of energy.

Moreover, one observes the intensification of conflicts in the countries with non-renewable energy sources (Gryniuk, 2010) or the fossil fuel transit countries (Ukraine). Such crises can affect the availability of energy, and its lack can hinder the economic growth and reduce economic indexes. It is hard to imagine any economic activity without electric energy. The summer 2015 limitations in the energy consumption were experienced by companies.

The economic security of Polish families could increase if fees for electric energy paid by a family from a given municipality or powiat would be directed to local economy. An average household in Poland pays approx. PLN 200 monthly for electric energy (Ile..., 2015). For a municipality with 3000 households it gives PLN 600,000 of cash outflow per month. One could easily calculate that keeping a half of such amount in a given municipality could create jobs for 60 people with a salary in the amount of PLN 5000 gross/person. The precondition of job creation is construction of local infrastructure for use of energy from local, renewable energy sources.

In the field of the use of RES, one developed a concept of producing electric energy and heat in some small territory, e.g. within a municipality, to a large extent from renewable energy sources (within micro-networks). A micro-network is a power system covering demand for electric energy for a relatively small area, e.g. a village or a small town (Biczal, 2012). The micro-network can co-operate with the state public power system. The public system sells energy to micro-networks if there is not enough power in them; the other way around, the excess of power goes to the state commercial system.

“A bio-energy village” is the concept of the use of renewable energy sources in rural areas. In such villages one uses biomass from local agriculture and forestry to produce biogas (photovoltaics can be of use here as well) to fully cover the village demand for electricity and heat. The term “bio-energy village” describes the energy dependence from a fresh biological material only, whereas the term “ecovillage” covers more various networks.

Bio-energy villages can be independent from external networks. They are connected to power grids to transfer energy surplus and draw power in case of possible shortages.

An excellent example of using RES in local development is one of the farms from Streitdorf. The house is heated up with a wood-fired boiler, solar thermal collectors provide domestic hot water (DHW) and support heating system, and photovoltaic cells and a wind turbine provide electricity. One also grows sunflowers at the area of 10 ha to produce oil, pressed there and used as fuel for a tractor. It is cheaper than purchasing 10,000 l of fuel oil annually, equal to the sale of wheat from 20 ha. What is needed is 10 ha of land for sunflower crops which will provide fuel for tractors working on the farm (Adamska, 2013).

## PURPOSE AND METHODS OF THE RESEARCH

The paper aimed at conducting an analysis of general and specific objectives of 60 local development strategies from the regions of Małopolskie and Podkarpackie. The assessment was carried out in the context of how the strategic objectives address the growth of use of renewable energy resources in rural areas.

The author analysed 60 local development strategies from the regions of Małopolskie and Podkarpackie. One examined the objectives and thematic areas of the strategies developed for 2007–2013 by local action groups (LAGs). The strategies express pursuits and aspirations of local communities represented by non-governmental organisations, local authorities, and local business. The new strategic documents covering the rural development in 2014–2020 are still in the process of preparation.

Moreover, the author sent an online survey to the investigated organizations; however, the response rate was not satisfactory – only 16 out of 60 organizations responded.

## REFERENCES TO RENEWABLE ENERGY SOURCES (RES) IN LOCAL DEVELOPMENT STRATEGIES (LDS)

The analysis of the LDS’ objectives demonstrates that the use of renewable energy sources appeared in objectives or thematic areas in 19 LAGs from Małopolskie (48.7% out of LAGs in Małopolskie), and 15 out of 21

**Table 1.** Plan of the usage of renewable energy sources (RES) in the major objectives, detailed objectives and thematic areas of the local development strategies 2007–2013

**Tabela 1.** Plan wykorzystania odnawialnych źródeł energii (OZE) w celach ogólnych, szczegółowych i obszarach tematycznych lokalnych strategii rozwoju 2007–2013

Voivodeship Województwo	Number (N) or percent (%) Liczba (L) lub procent (%)	RES in objectives or thematic areas OZE w celach lub obszarze tematycznym			Ecology in objectives or thematic areas Ekologia w celach lub obszarze tematycznym		
		general objective cel ogólny	specific objective cel szczegółowy	thematic areas obszar tematyczny	general objective cel ogólny	specific objective cel szczegółowy	thematic areas obszar tematyczny
Małopolskie	L/N	0	5	14	0	1	21
	%	0	12.8	35.9	0.0	2.6	53.8
Podkarpackie	L/N	0	2	12	0	0	11
	%	0	9.5	57.1	0.0	0.0	52.4
Total Suma	L/N	0	7	26	0	1	32
	%	0	11.7	43.3	0.0	1.7	53.3

Source: own elaboration.

Źródło: opracowanie własne.

local action groups in Podkarpackie (66.6% LAGs). In total, 33 out of 60 local development strategies (LDSs) mentioned the use of RES (55% LAGs).

The use of RES is highlighted in these LAGs which put it in their specific objectives (7 LAGs – Table 1). Basing on the analysis of these specific objectives, it can be concluded that LAGs from Małopolskie put more priority to the use of RES (almost 13% LAGs included RES in their detailed objectives – Table 1); whereas in podkarpackie the importance given to RES is weaker (only 9.5% LAGs included RES in their detailed objectives).

The use of RES was highlighted in the specific objectives of the seven LAGs from the South-East Poland:

- Miechowskie Stowarzyszenie Gmin Jaksa Lokalna Grupa Działania
- LGD PROVENT
- LGD Dunajec-Biała
- Stowarzyszenie LGD „Nad Białą Przemszą”
- Turystyczna Podkowa
- Wadoviana
- Lokalna Grupa Działania Lasovia.

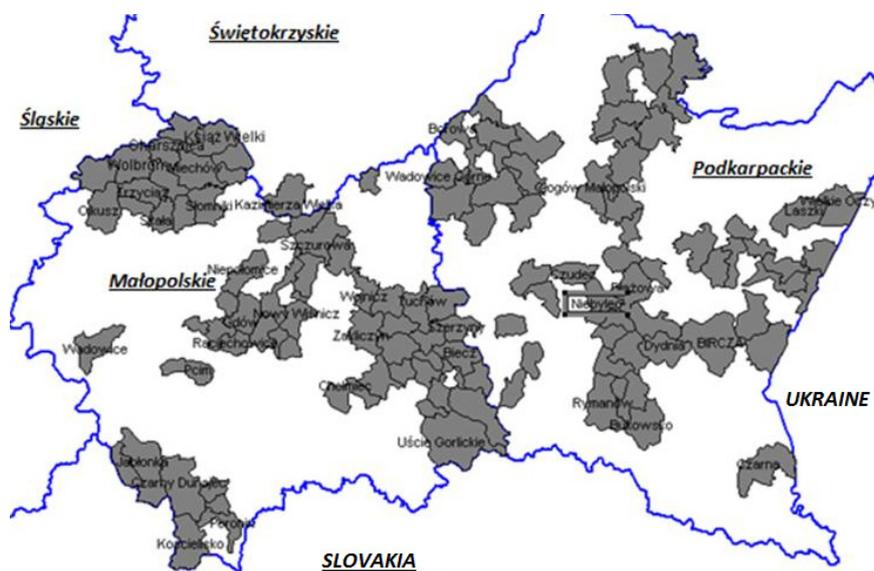
The areas where the use of RES was not included in strategic objectives were marked as blank spots on Fig. 1. These areas require intensification of actions

aimed at increasing the level of knowledge on the use of renewable energy resources.

The operations realized in selected LAGs, which included the use of RES in their objectives, were investigated in further analysis. The examination of the implemented investments could demonstrate the directions of the use of RES in rural areas.

One of the most interesting local action groups with the strategy including renewable energy sources is LGD “Jaksa” in Małopolskie. Its strategy demonstrates that farmers from the LGD area are interested in RES and would like to become independent from the external power suppliers. Moreover, RES is perceived by the local inhabitants as a way of reducing expenditures in household budgets. LGD “Jaksa” also published their magazine titled “Gazetka Energetyczna” where they presented various possibility of using of renewable energy sources for the needs of the inhabitants of the area where the organization operated.

Solar energy in the area of miechowski powiat is planned to be used in the form of solar thermal collectors. However, it was underlined that the wider use of renewable energy sources requires external support in the form of, both, expertise and financial resources (Strategia..., 2016). LGD Jaksa assumed that in 20015



**Fig. 1.** Blank spots – the areas where local development strategies 2007–2013 do not mention the use of renewable energy sources

Source: own elaboration.

**Rys. 1.** „Białe plamy” – obszary, gdzie nie wspomniano w strategiach rozwoju lokalnego (2007–2013) na temat OZE

Źródło: opracowanie własne.

the power obtained from renewable energy source due to the support from LEADER would be equal to 60 000 kWh (Strategia..., 2016) in business or culture facilities.

Another interesting local action group, with reference to renewable energy sources, is LGD Prowent. Their projects related to renewable energy sources concerned:

- workshops, trainings, and study visits related to the area of RES
- purchase of new assembly line/technologies for entrepreneurs using RES
- construction/reconstruction/renovation together with modernization and thermal efficiency improvement of production and service facilities, for the purpose of the production and use of RES, and facilities for cultural purposes
- land development for the production and use of RES
- organization of trade events/fairs/exhibitions concerning ecology and RES
- upward extension, reconstruction, or renovation together with modernization of existing residential buildings with the purchase of technical systems.

One of the operation, LGD PROWENT organized, were workshops for the inhabitants of the municipality Przeclaw concerning renewable energy sources. The agenda covered wind farms, in particular their impact on the life of the municipality, and their benefits (tax revenues for the local budget). One also discussed how they affected the perception of the municipality, in particular, if they built the image of Przeclaw as an investment-friendly eco-municipality.

In the opinion of the members of LGD PROWENT, the use of RES (e.g., solar thermal collectors, biomass-fired boilers) have got positive impact not only on the development of companies, but also increased the performance of such institutions as: municipal culture centres, municipalities, and agro-tourism facilities.

In its Local Development Strategy LGD PROWENT indicated specific objectives related to RES:

- the increase of 1% in the number of companies operating in the area of production or processing of RES until 2015
- the decrease in minimum 7% in the heating costs for facilities subject to thermal efficiency improvement until 2015.

The use of renewable energy sources seems to be the chance to decrease costs of agricultural and non-agricultural business in rural areas. However, one should be worried that due to the low level of rural social capital, it would be single projects, instead of integrated projects covering the entire community.

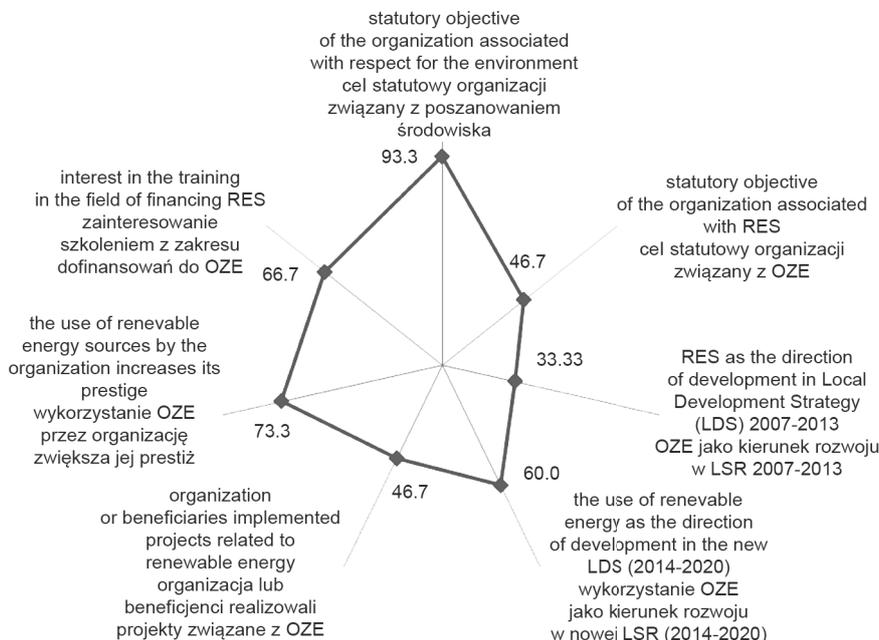
## SURVEY RESULTS

The survey research demonstrates that 60% LAGs included RES as the direction of development in their new strategies (Fig. 2). Only 7% respondents were of the opposite opinion. Every third participant did not have any opinion in the subject.

Every third investigated organization included RES in its strategic development directions 2007–2013. The number is lower than the number of LAGs which statutory objectives are related to the use of innovative solutions based on renewable energy source. In other words, 47% of statutes mention innovation (Fig. 2), whereas

only 33% of organizations included RES in their strategic objectives. This share is limited in comparison to the fact that 93% organizations included taking the environment into consideration. Such situations results from the way LEADER is implemented in Poland. Local action groups may allocate financial resources to the priorities covered by the Rural Development Programme. Although the investigated organizations planned some activities in their statutes, they could not undertake them due to the requirements concerning development priorities fixed in the legal provisions, in particular regulations.

In the survey 47% organizations stated that they or beneficiaries implemented investments related to RES (Fig. 2). In most cases, these investments completed other important objectives, e.g. when a pavement was renovated, one also mounted street lamps with photovoltaic cells (Świebodzin in the municipality of Pleśna). The respondents also indicated other types of devices driven by the solar energy – solar thermal collectors



**Fig. 2.** Renewable energy sources (%) in local development strategies (LSR) and opinions of people associated with local action groups (LGD) (N = 16)

Source: own elaboration on the basis of surveys.

**Rys. 2.** Odnawialne źródła energii (%) w lokalnych strategiach rozwoju (LSR) i w opiniach osób związanych z lokalnymi grupami działania (LGD) (N = 16)

Źródło: opracowanie własne na podstawie badań ankietowych.

and heat pumps (e.g. a school in Nowe Brzesko was equipped in it). Only one investment related to briquette production was mentioned, whereas due to the amount of useable biomass (straw, wood chips, wood) the production of briquette is very desirable in rural areas. The energy stored in briquette or pellet is usually a more reliable heat source than solar energy. So, this source is safer because it can be stored.

Approx. 73% respondents were interested in trainings concerning the possibilities of co-financing of RES energy production for one's own purposes (Fig. 1). Less than 27% investigated LAGs run any public consultations with RES consultants in rural areas under the prepared local development strategy. It seems that the energy security of an area covered by such strategy should be given higher priority among other strategic analysis elements.

## SUMMARY

The economy needs to be changed with respect to the structure of energy sources; it should be adjusted to locally available renewable energy sources. Therefore, the strategic objective of a growth is not only an economic growth (measured, e.g. by the increase in the number of companies). In the local strategic planning it is also important to adopt local economy to current challenges, including the necessity to diversify energy sources.

The analysis of local development strategies demonstrates that only a few LAGs included the use of RES within the territory of their operation in the specific objectives. The survey research shows that RES will be put in strategic objectives in many LAGs with the upcoming update of their local development strategies.

With respect to the European Union policy directions, one should recommend trainings in the use of RES in the strategic management of LAG areas. The training agenda could be as follows:

- types of RES and their potential as energy sources for community
- external funds for financing RES
- devices and their performance
- case studies
- detailed information concerning funding possibilities (for interested participants).

Local development is driven by local specificity. No one knows it better than its inhabitants. However, they are not always aware of RES-related possibilities to boost the local development. An adequate state policy

including local authorities and non-governmental institutions could expand the knowledge of inhabitants on how to use local energy sources. They should be described to provide reliable data to calculate possibilities of production of energy from RES in a given place. When presenting calculations on local meetings, one should indicate benefits for inhabitants, e.g., the lack of odour (due to production of biogas from manure), more beautiful landscape (picking grass for energy production purposes from uncultivated areas), or cleaner air (a local incineration plant with heat distribution instead of uncontrolled incineration of garbage in houses). The benefits related to the use of devices to obtain energy from renewable sources can be translated into profits: economic, ecological, and social. Firstly, the use of RES boots local economy and creates jobs. Secondly, RES reduces greenhouse gas emissions and does not worsen the condition of local natural environment. Thirdly, the use of RES increase the eco-awareness and changes attitudes towards local resources which results in its better use. Improved economic, ecological, and social indicators increase the general security of Polish families.

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## ODNAWIALNE ŹRÓDŁA ENERGII (OZE) W ROZWOJU LOKALNYM I BEZPIECZEŃSTWIE ENERGETYCZNYM KRAJU

**Streszczenie.** Celem artykułu była ocena 60 lokalnych strategii rozwoju z województwa małopolskiego i podkarpackiego pod kątem związku ich celów długofalowych z rozwojem energetyki odnawialnej. Analizowane strategie zostały opracowane w okresie programowania 2007–2013 przez lokalne grupy działania (LGD). Poza analizą dokumentów zastosowano metodę ankietową (CAWI – Computer-Assisted Web Interview), za pomocą której zbadano LGD w zakresie planów rozwoju na lata 2014–2020. Cele związane z rozwojem energetyki odnawialnej zostały uwzględnione w celach szczegółowych lub w jednym z obszarów tematycznych połowy badanych strategii. Kwestia energii odnawialnej nie była ujęta w tytułach celów ogólnych badanych strategii. Obszary wiejskie mogą zwiększyć swoją niezależność energetyczną, wymaga to jednak odpowiedniej polityki względem obszarów wiejskich. Wsparcie finansowe dla inwestycji w energię odnawialną powinno być większe wtedy, gdy istnieje możliwość wykorzystania biomasy i wód płynących na cele energetyczne. Badane organizacje kładą zbyt mały nacisk na wykorzystanie biomasy na cele energetyczne.

**Słowa kluczowe:** bezpieczeństwo energetyczne, energetyka odnawialna, lokalne strategie rozwoju, lokalna grupa działania

Accepted for print – Zaakceptowano do druku: 09.05.2016