

POTENTIAL OF USING RENEWABLE ENERGY SOURCES AND PLANS FOR FUTURE IN ECOLOGICAL FARMS IN FARMERS' OPINIONS*

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Summary. The paper presents the research results in one hundred ecological farms which hold a certificate, located in Southern Poland. The objective of the paper was to assess potential of use of renewable energy sources and plans for future on the example of the selected ecological farms. The assessment herein was carried out based on the opinion of the owners of the researched farms. As much as 93% of respondents claimed that they are interested in this issue, and 72% expressed their opinion that they plan to use renewable energy sources in future, especially if the country will grant additional subsidies. In the farmers' opinions solar collectors are the most popular renewable energy carriers, which are considered the most promising. 56% of the respondents agreed that this is the best solution. While 8% of the respondents expressed their interest in using both, a solar collector as well as a heat pump and 4% was for using a solar collector and a wind power station. The fact that 57% of respondents plan to develop their farm and plan future investments is very advantageous (inter alia related to the use of RES in their farms).

Key words: ecological farms, renewable energy sources, farmers' opinions

Introduction

Ecological farming becomes a tool which is the most frequently used around the world for fighting for maintaining proper condition of natural environment and preventing global warming. It is due to strict production methods, excluding agricultural chemical substances, the use of natural environmental resources, striving to organic matter recycle and improvement of soil fertility with natural means and traditional methods [Pilarski et al. 2003].

Ecological farming is a specific form of farming and production thus it is strictly related to ecological farming. Ecological production means using production methods according to

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the rules set forth in the regulation of the Council (WR) no 834/2007 on all production, preparation and distribution stages. The objective of the ecological farming, both of agricultural production, food processing, distribution as well as consumption is to maintain and reinforce a healthy nature of ecosystems and organisms. Nowadays, ecological production constitutes an alternative for traditional farms. However, ecological farming business requires the increase in awareness as well as knowledge of agricultural producers [Kowalski et al. 2012].

Development of ecological farming is a consequence of changes which take place not only in the agricultural and food complex but also in economic, social and ecological sphere. Since, it corresponds to general changes which result from exhausting possibilities of agricultural development based on production methods, that have been used so far, which infringe the balance on many plains [Łuczko-Bakuła 2007].

Dynamic development of ecological farming in Poland, after EU accession in 2004 gave rise to the need of carrying out research and analysis concerning the agriculture department. Getting information on production and economic situation of ecological farms and their competitiveness has become crucial, especially because the number of agricultural producers interested in the production of ecological methods raises [Kowalska 2010].

Along with development of ecological farming in Poland, interest in renewable energy sources and possibilities of their use not only in traditional farms but also in ecological farms raises.

We may expect a further increase in using energy from renewable sources in the following years. It results from advantages of using them both for local societies – increasing the level of energy safety, forming new work places, promoting regional development as well as ecological advantages, mainly limitation of carbon dioxide emission [Jastrzębska 2007; Toruński 2010].

Therefore, assessment of farmers' interest and possibilities of using renewable energy sources in the opinion of farmers, who run such farms, should be one of directions of research which is carried out in ecological farms.

Objective, scope and methodology of work

The objective of the paper was to assess the possibilities of use of renewable energy sources and plans for future on the example of the selected ecological farms. This assessment was carried out based on the opinion of the owners of the researched ecological farms. The scope of the study covered research carried out in 100 ecological farms with certificate, located in Southern Poland. The following municipalities participated in the research: Charsznica, Gdów, Gołęza, Iwanowice, Jerzmanowice, Kocmyrzów-Luborzycza, Krempna, Krynica Zdrój, Liszki, Michałowice, Miechów, Niepołomice, Nowe Brzesko, Olkusz, Przegonia, Radziszów, Skała, Słaboszów, Słomniki, Uście Gorlickie, Wieliczka, Wielka Wieś, Wolbrom, Zabierzów, Zabierzów Bocheński, Zielonki.

The study was carried out within the development subsidy No 12-0165-10 "Innovative impact of technology and management IT support on efficiency of production in ecological farms". The collected information was obtained on the basis of a guided survey carried out with the farm owner.

Division of the researched ecological farms into area groups and land use was presented in table 1.

Table 1. Division of the researched farms into groups and the land use

Tabela 1. Podział badanych gospodarstw na grupy i użytkowanie ziemi

Farm groups	Farm area groups [ha AL]	Number of farms in the group	Area of arable land [ha farm ⁻¹] (average values)				
			Arable land	Permanent grassland	Orchards and plantations	Remaining plantations	Agricultural land
I	up to 3.00	17	1.27	0.36	0.49	-	2.12
II	3.01 to 5.01	14	2.35	0.5	1.00	-	3.85
III	5.01 to 7.00	16	3.89	1.32	0.48	-	5.69
IV	7.01 to 10.00	16	3.44	4.24	0.82	-	8.50
V	10.01 to 15.00	14	5.82	6.16	0.49	0.09	12.57
VI	15.01 to 20.00	8	7.44	10.47	0.1	-	18.01
VII	20.01 to 40.00	9	6.39	18.06	1.46	-	25.90
VIII	Above 40.00	6	22.20	30.68	0.44	-	53.32
Total		100	5.03	6.20	0.66	0.01	11.90

Source: author's own study

Area of arable land for the researched population was at the average of 11.90 ha. Within arable land, permanent grassland included 6.20 ha which constituted 52.3% of the total. Agricultural land covered 5.03 ha (42%). While, orchards and perennial plantations were only 0.66 ha and constitute a marginal share in the structure of arable land (5.7%).

Results of the research

It was assumed at the beginning of the field research that respondents would be open for the issue of renewable energy sources. When questioned whether their farms use renewable energy sources, 71% of them answered 'yes', indicating wood as a basic carrier of energy (table 2). However, this answer cannot be qualified as innovative activity in the discussed issue. Presently, combustion of wood in farms in rural areas in traditional kitchen furnaces is popular and the most frequently it results from its availability.

A very small rate of the questioned farm owners indicated other carriers, i.e. solar energy (collectors) – 3% and 2% biogas. Therefore, one may conclude that activities of farms concerning the use of renewable energy are not intensive, however, they prognosticate development, since as much as 93% of the researched claimed that they are interested in this issue and 72% expressed their opinion that in future they plan to use renewable energy sources (table 3).

Table 2. Using renewable energy sources in ecological farms [%]

Tabela 2. Wykorzystywanie w gospodarstwach ekologicznych odnawialnych źródeł energii [%]

Farm groups	Are renewable energy sources used in a farm							No
	Yes	including a carrier type					Wind power station	
		Wood	Biogas	Solar energy collectors	Heat pumps	Photovoltaic links		
I	70.6	70.6	-	-	-	-	-	29.4
II	71.4	57.1	14.3	7.1	-	-	-	28.6
III	56.3	56.3	-	6.3	-	-	-	43.8
IV	75.0	75.0	-	-	-	-	-	25.0
V	78.6	78.6	-	-	-	-	-	21.4
VI	62.5	62.5	-	-	-	-	-	37.5
VII	77.8	77.8	-	11.1	-	-	-	22.2
VIII	83.3	83.3	-	-	-	-	-	16.7
Total	71.0	69.0	2.0	3.0	-	-	-	29.0

Source: author's own study

Table 3. Plans of farms concerning future use of RES [%]

Tabela 3. Plany gospodarstw w zakresie przyszłościowego wykorzystania OZE [%]

Farm groups	Is the farm owner interested in introducing RES		The owner plans to use RES in future
	Yes	No	
I	88.2	11.8	76.5
II	92.9	7.1	57.1
III	87.5	12.5	75.0
IV	100.0	-	81.3
V	92.9	7.1	71.4
VI	87.5	12.5	87.5
VII	100.0	-	55.6
VIII	100.0	-	66.7
Total	93.0	7.0	72.0

Source: author's own study

It should be emphasised that in three isolated area groups (group V, VII and VIII – farms of the biggest areas) all respondents expressed their interest in introducing renewable energy sources in future in their farms.

Types of renewable energy sources which were given by respondents as promising, used in the researched ecological farms were presented in table 4. Solar collectors were the most popular energy carrier. 56% of the respondents agreed that this was the best solution. While 8% expressed interest in using both solar collector as well as a heat pump. Remaining solutions (a heat pump, solar collector and wind power plant, solar collector and hydro-power plant, solar collector and biogas and biomass) were not so interesting for the respondents.

Table 4. Planned type of RES for use in future [%]

Tabela 4. Planowany rodzaj OZE do wykorzystania w przyszłości [%]

Farm groups	Planned type of RES for use in future						
	Solar collector	Solar collector, heat pump	Heat pump	Solar collector, wind power plant	Solar collector, hydropower plant	Solar collector, biogas	Biomass (wood)
I	70.6	-	5.9	-	-	-	-
II	28.6	14.3	-	-	7.1	-	7.1
III	56.3	6.3	-	12.5	-	-	-
IV	62.5	12.5	-	6.3	-	-	-
V	64.3	-	-	-	-	7.1	-
VI	62.5	12.5	-	12.5	-	-	-
VII	55.6	-	-	-	-	-	-
VIII	33.3	33.3	-	-	-	-	-
Total	56.0	8.0	1.0	4.0	1.0	1.0	1.0

Source: author's own study

Running agricultural activity as other forms of enterprise requires strategic planning, due to which carrying out a production, which is potentially developmental and allows obtaining parity income, is possible. Therefore, information concerning respondents' plans on the future of ecological farms were among source data found in the researched farms. The prepared questionnaire included the following question:

- whether the farmers plan to maintain the present state,
- development and investments,
- production decrease,
- liquidation of an ecological farm.

The obtained results prove that 37% of the questioned want to maintain the present state of their farms (table 5). When assessing a population of farmers in the area groups system, their highest number was reported in the group of the smallest farms – as much as 58.8%.

Table 5. Future plans of ecological farms [%]

Tabela 5. Przyszłościowe plany gospodarstw ekologicznych [%]

Farm groups	Plans of ecological farms [%]			
	maintaining the present state	development and investments	decrease in production	liquidation
I	58.8	29.4	11.8	-
II	35.7	57.1	7.1	-
III	43.8	50.0	6.3	-
IV	43.8	56.3	-	-
V	35.7	57.1	7.1	-
VI	12.5	87.5	-	-
VII	11.1	77.8	11.1	-
VIII	16.7	83.3	-	-
Total	37.0	57.0	6.0	-

Source: author's own study

The biggest farms (group VII and VIII) were characterised by low values of the assessed index. It was within the range 11.1% to 16.7%.

When assessing future plans of the researched ecological farms, the fact that 57% of respondents plan to develop their farm along with investments should be considered as advantageous. It is especially important that among the examined, farmers from the biggest area groups (above 15 ha) in 78% plan to develop their farms and to introduce investments. The fact that only 6% of the respondents plan to decrease production should also be noted down. While no owner has declared liquidation of his farm.

Statements and conclusions

1. Among one hundred of ecological farms included in the research, 71% of owners asked whether they use renewable energy sources in their farms answered 'yes'. However, they indicated wood as the main energy carrier. Therefore, this answer cannot be qualified as an innovative activity in the discussed issue related to the use of widely understood renewable energy sources. Presently, combustion of wood in farms in rural areas in traditional kitchen furnaces is popular and the most frequently it results from its availability.
2. On the basis of the obtained research results, one may conclude that activities of ecological farms concerning the use of renewable energy are not intense but they prognosticate development. As much as 93% of respondents claimed that they are interested in this issue, and 72% expressed their opinion that they plan to use renewable energy sources in future, especially if the country will grant additional subsidies.
3. In the farmers' opinions, solar collectors are the most popular renewable energy carriers, which are considered as the most promising in the researched ecological farms. 56% of the respondents agreed that this was the best solution. While 8% of the respondents expressed their interest in using both a solar collector as well as a heat pump and 4% was for using a solar collector and a wind power station.
4. The fact that 57% of respondents plan to develop their farm and plan future investments is very advantageous (inter alia related to the use of RES in their farms). Only 6% of the questioned have plans related to decrease in production. While, no owner has declared liquidation of his farm.

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MOŻLIWOŚCI WYKORZYSTANIA ODNAWIALNYCH ŹRÓDEŁ ENERGII I PRZYSZŁOŚCIOWE PLANY W GOSPODARSTWACH EKOLOGICZNYCH W OPINII ROLNIKÓW

Streszczenie. W pracy przedstawiono wyniki badań w stu gospodarstwach ekologicznych z certyfikatem, położonych na terenie Polski południowej. Celem pracy była ocena możliwości wykorzystania odnawialnych źródeł energii oraz planów przyszłościowych na przykładzie wybranych gospodarstw ekologicznych. Oceny tej dokonano w oparciu o opinię właścicieli badanych gospodarstw. Aż 93% respondentów twierdziło, że są zainteresowani tą problematyką, a 72% wyraziło opinię, że w przyszłości planuje wykorzystywać odnawialne źródła energii, zwłaszcza jeśli będą dodatkowe dotacje ze strony państwa. W opinii rolników, najbardziej popularnym nośnikiem energii odnawialnej, który przyszłościowo jest brany pod uwagę do wykorzystania w gospodarstwach, były kolektory słoneczne. Za takim rozwiązaniem opowiedziało się 56% badanych. Z kolei 8% wyraziło zainteresowanie wykorzystaniem zarówno kolektora słonecznego, jak i pompy ciepła, a 4% opowiedziało się za wykorzystaniem kolektora słonecznego i siłowni wiatrowej. Za bardzo korzystny należy uznać fakt, że aż 57% respondentów planuje rozwój swojego gospodarstwa i przewiduje przyszłościowe inwestycje (m.in. związane z wykorzystaniem OZE w swoim gospodarstwie).

Słowa kluczowe: gospodarstwo ekologiczne, odnawialne źródła energii, opinia rolników

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