Renewable and Sustainable Energy Reviews 150 (2021) 111419

Contents lists available at ScienceDirect

Renewable and Sustainable Energy Reviews

journal homepage: www.elsevier.com/locate/rser

Can rural stakeholders drive the low-carbon transition? Analysis of climate-related activities planned in local development strategies in Poland

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ARTICLE INFO

Keywords:
Rural Development Programme
Area-based partnerships
Local development strategies
Renewable energy
Mitigating climate change
Europeanisation of climate policy
Poland

ABSTRACT

In the postulated efforts to limit adverse climate change (CC), increasing attention is paid to the development of distributed renewable energy (RE) that meets the needs of local communities on the spot. This article analyses the objectives, planned actions and performance indicators related to CC and RE, defined by national and local stakeholders in: (1) the national Rural Development Programme (RDP) 2014–2020 in Poland and (2) in the bottom-up Local Development Strategies (LDS) financed from RDP and using a Community-Led Local Development approach. The content analysis method was used. We found that the strategy documents considered, created in the years 2014–2015, paid relatively little attention to local actions related to CC and RE. Some educational activities related to adaptation and mitigation of CC were planned in 66% of LDS, while investment support for RE was planned only in 9% of the LDS. Traditional goals such as supporting local businesses and farmers, local cultural heritage and the development of human and social capital were seen as more important. The results of the analysis suggest a relatively low level of interest from rural-policy actors in Poland in implementing the climate-friendly objectives of the Europe 2020 strategy. This article contributes to understanding why Poland failed to meet the European 2020 RE development goals. These issues are discussed in the context of national and continental climate policy and problems of transformation to post-carbon society.

1. Introduction

The effects of rapid climate change (CC) due to anthropogenic greenhouse gas emissions are already being felt everywhere on Earth and are expected to increase as the climate warms further [1]. Despite the much-celebrated Paris agreement, efforts led by governments across the globe to reduce dependence on fossil fuels and transition to a low-carbon economy fall a long way short of what is needed [2]. However, while the struggle to persuade world leaders to take meaningful action must continue, attention should also be paid to the role of local communities in implementing the clean energy transition from the bottom-up [3,4].

In local activities related to CC, two approaches can be observed: adapting to current and anticipated changes, and attempts to prevent or mitigate these changes [5,6]. Adaptation to changes have typically local (regional) features, depending on the climate and geographical location of human settlements. In turn, counteracting and mitigating changes is a global challenge, related to attempts to reduce greenhouse gas emissions to the atmosphere. In this case, the main emphasis is on limiting or not burning fossil energy sources [1]. This can now be achieved by increasing energy efficiency and the use of emission-free renewable energy (RE). Therefore, in this article we focus on those activities of local communities that contribute to the transformation towards a post-carbon society [7]. These activities include, among others, investments in dispersed and community RE.

In Europe, flagship policies like Climate Action 2030 and the recently announced "European Green Deal" attempt to address the problem [8]. Reduction of greenhouse gas emissions was also one of the most important goals of the European Union (EU) "Europe 2020" strategy [9]. Shifting to a low-carbon economy requires substantial financial support [10], which in some European countries, like Poland or Czechia, is mainly provided through EU policy rather than from the output of autonomous national policy debate [11–13]. In this sense, a range of

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https://doi.org/10.1016/j.rser.2021.111419
Received 22 October 2020; Received in revised form 30 May 2021; Accepted 23 June 2021
Available online 14 July 2021

List of abbreviations

CC	Climate change
CLLD	Community-Led Local Development
CRE	Community Renewable Energy
DRE	Dispersed Renewable Energy
EU	European Union
EAFRD	European Agricultural Fund for Rural Development
ERDF	European Regional Development Fund
ESF	European Social Fund
FiTs	Feed-in tariffs
LAG	Local Action Group
LDS	Local Development Strategy
RE	Renewable Energy
RDP	Rural Development Programme
RO	Research objectives
ROP	Regional Operational Programme
SRD	Strategy for Responsible Development

policy mechanisms and instruments exist to promote the continued expansion of RE and decarbonisation of different sectors of the economy in line with European cohesion policy goals [14,15]. The EU's insistence on policy coherence for socio-economic development – with special attention to be given to environmental issues and RE – is often referred to as a process of "Europeanisation" [16,17]. Some EU policy instruments have good potential to facilitate sustainability transformations at the local level. One of these is the Community-Led Local Development approach (CLLD, formerly "LEADER[1] Axis" and "LEADER" Community Initiatives) [18]. It provides support to "mobilise and involve local communities and organisations to contribute to achieving the Europe 2020 Strategy goals of smart, sustainable and inclusive growth, fostering territorial cohesion and reaching specific policy objectives" [19]. In CLLD, area-based community partnerships are created, called "Local Action Groups" (LAGs). They prepare Local Development Strategies (LDS) and receive funds for their implementation [20]. They can be an additional tool for achieving European climate action targets at local level.

These goals are especially important in the post-socialist countries of Central and Eastern Europe, which are socio-economically disadvantaged compared to the European average. Several, like Poland, Czechia and Bulgaria, are also heavily dependent on solid fossil fuels, particularly coal and lignite [21]. In the case of Poland (subject of this study) the challenges associated with the development of RE are greater than elsewhere in Europe, since the country's dependence on fossil fuels is among the highest in the EU, mainly thanks to coal from indigenous sources [22,23]. Many rural areas in Poland suffer problems of relatively low community income, marginalisation and fuel poverty, with inefficient energy systems, high costs of transmission to lower population density areas and weak energy services [24,25]. This results in the selection of older technologies, the cheapest in terms of investment, most often based on burning coal or wood [26].

Rural development bottom-up activities undertaken under the CLLD approach are intended to address exactly these kinds of structural inequalities. However, it gives local communities the opportunity to prioritise their own goals and activities, causing the dilemma of choosing between local and supra-local aims [17,27]. Until now, no detailed review of RE development through LAGs actions has been undertaken for any European country. Partial information on this topic can be found only in general analyses of the objectives and activities of partnerships [18,27]. There is evidence that resource efficiency promotion and the shift towards a low-carbon, climate-resilient economy has been undervalued in some LAGs [28,29]. Given the slow pace of national level climate mitigation policy both in Poland and in several other European countries [30], systematic consideration of the potential of these bottom-up mechanisms to achieve EU climate and energy goals is therefore long overdue.

In this paper, we address this research gap through a detailed review and analysis of the extent to which the issues of mitigating climate change and the development of RE have been included in the Rural Development Programme (RDP) 2014–2020 and Local Development Strategies (LDS) created by rural LAGs in Poland. To this end, we pose a broad research question - are the European Union's efforts to invest in low-carbon economy reflected in the EU-funded development strategies of local rural stakeholders? To answer this, we define four specific research objectives (ROs):

- RO1: To provide an overview of the policy context around climate mitigation (focusing on Europe and Poland) and the importance of small scale and local carbon mitigation efforts to local stakeholders engaged in LAGs.
- RO2: To review in depth the content of the RDP and LDS aimed at rural development in Poland, and analyse activities and planned initiatives they include, focusing on the issues of preventing and adapting to climate change and the development of RE at the local level.
- RO3: To discuss the possible reasons for rural societies' apparently low level of interest in developing RE at the local level through the CLLD programme.
- RO4: To present a series of recommendations to help change this attitude both in Poland and in other countries with carbon-intensive economies.

Our paper is structured as follows. First (Section 2: Research background, RO1) we offer some introductory background on dispersed (decentralised) and community RE support policy, with particular emphasis on programs supporting local initiatives undertaken by local communities, individuals and small entrepreneurs in Europe and Poland. Next we describe the methods and materials we use to analyse RDP and LDS in Poland (Section 3: Materials and methods). Subsequently, we analyse the content of RDP, and LDS aimed at rural development (Section 4: Results, RO2). Next, we discuss our findings in depth (Section 5; Discussion, RO3), and present recommendations for addressing the low level of interest at the local scale (Section 6; Conclusions, RO4).

The outcomes of our paper can be useful for policymakers preparing future programmes supporting community-based actions related to distributed RE development in rural areas.

2. Research background

2.1. Community RE development

To the present day, RE expansion in many countries around the world has mostly been large-scale and centralised. It was a consequence of the earlier "power station and national grid" model of centralised generation and supply by one or a handful of large incumbent utilities. However, for RE to fulfil its potential, and eventually replace fossil fuels entirely, much greater decentralisation of power systems is needed [31]. This enables both to reduce waste, e.g. from curtailment and losses in transmission, and to enhance system resilience, e.g. by reducing the need for massive "on-off" baseload power capacity by consuming energy closer to its source [32]. Examples might include energy clusters or energy cooperatives providing independent or semi-independent dispersed installations producing energy from biomass, biogas, wind,

[1] LEADER is an acronym in French: "Liaison Entre Actions de Développement de l'Économie Rurale" – meaning "Links between actions for the development of the rural economy".

solar radiation, and, where geologically feasible, from geothermal sources [33,34]. Dispersed RE (DRE) can play a significant role in remote rural areas of developing countries, where large numbers of people lack access to electricity or suffer from power shortages [35].

The 21st century has seen a significant rise in Community RE (CRE) [4]. This concept covers local stakeholder participation and shared interest in RE initiatives or ownership; however there is no single commonly agreed definition [36]. In these kinds of initiatives, community organisations, social entrepreneurs and/or citizens participate in the energy transition by investing in, producing, selling and distributing RE. CRE is not an exclusively European phenomenon. In Africa, local CRE projects are often related to lack of energy networks in remote areas [37]. Such projects have largely been initiated by international NGOs, governments, educational and religious institutions adressing problems of local poverty and lack of technical and financial infrastructure [38]. In Latin America, RE co-operatives are playing a significant role in the electrification of rural areas [35]. In Asia there are growing examples of community-based projects utilizing solar, biomass and hydro as sources of power generation, for instance in India [39] and Indonesia [40]. In China, there is some flexibility around energy policy at the local level, leading to citizen-led initiatives like solar power crowdfunding schemes [41]. In Australia, CRE was supported through a feed-in tariff, to reduce both supply costs and environmental damage from traditional diesel generation [42].

Notwithstanding the previously cited experiences in the Global South, technologically advanced dispersed and community RE projects are relatively expensive, so their development is the most significant and best-supported in wealthier countries like the United States, Japan and in Western Europe [43,44]. CRE projects are beginning to play an important role in the United States and Canada, where a wide variety of different incentives to develop RE are in place, including PACE (Property Assessed Clean Energy) financing, rebate programs and technical assistance [43]. In the European Union (EU), RE development is widely supported and promoted through a range of policy mechanisms and instruments. It is not centralised, and Member States often design their own approaches to achieving EU RE policy goals [30].

The dominant support instruments in European countries are feed-in tariffs (FiTs) which offer long-term contracts to RE producers, typically based on the cost of energy generation of each RE technology [45,46]. Some countries (e.g. Sweden) have attained high rates of RE expansion through green certification schemes [45]. In addition to these essential support mechanisms, successful RE expansion across the EU has been attributed to a wide range of additional factors, including EU directives on electricity [47], the national regulatory environment and institutional policy context [48,49], Public-Private Partnerships as drivers of RE projects [50], and cross-sector links between RE stakeholders in sub-national regions [51].

Increasing decentralisation is likely to require much greater involvement of small-scale and local RE initiatives. However, co-operatives and community organisations, responsible for most of the early development of wind energy in pioneer countries like Denmark, Germany and Sweden, have become increasingly marginalised. Co-operatives were needed initially mostly because support schemes like FiTs were not yet in place, and banks would not lend to what they considered to be risky projects [4]. When RE became acceptable to mainstream investors, economies of scale emerged and cooperatives' share of the market declined (see e.g. Ref. [52]). There is no doubt that the enormous increase in installed capacity since the early days of RE is largely due to its adoption by mainstream energy providers, resulting in consolidation, economies of scale and cheaper energy to the consumer. However, the centralised RE development model that has emerged risks excluding many of the energy (social) innovations that are necessary for an efficient decentralised system. Policymakers therefore need to tread a careful path between encouraging large-scale RE expansion, as for example in the case of the UK's offshore wind energy sector (developed by big multinational power companies) and protecting small scale RE innovation, which is abundantly in evidence across Europe in a wide range of very diverse community energy projects [4]. While the first of these objectives seems assured, the second is more uncertain. European policymakers' enthusiasm for "letting the market decide", while at the same time ensuring that it remains structured in favour of larger companies, would seem to bode ill for the future of small-scale initiatives. Krug and di Nucci [53] note "an increasing tension between the quest for more direct financial participation of local communities and the growing market orientation and reliance on competitive support mechanisms". However, the growing awareness of the problem within the EU means that some progress is being made. Large companies, for example, are now routinely excluded from FiTs in many countries, with the result that smaller installations are significantly more often supported with FiTs than larger ones, independently of the type of technology [54]. FiTs are thus able to provide a lifeline for small-scale initiatives, something which has been a significant factor, for example, in the enormous community energy boom in Scotland, UK [55]. The importance of protecting innovation "niches" is also increasingly recognized in EU policy circles, as can be seen from the European green deal [8]. At the same time, the fallout from the financial crisis of 2007–8 may have made policymakers more mindful of the activities of major utilities, who put up prices in several countries as citizens' incomes declined, provoking widespread perceptions of unfairness [56]. Requirements have been gradually introduced by many European states to facilitate the participation of local communities in RE projects [57]. In the Wallonia region of Belgium, for example, just under 50% of investment capital of any new wind farm development must come, in equal proportion, from citizens and municipalities [58]. Proposals for compulsory citizen participation in new developments have been under discussion in Scotland [55]. However, early negotiations suggest that citizen-developer partnerships would need to be carefully regulated to ensure that citizen investors are fairly treated, and not just used symbolically to secure planning approval. Citizen participation is also known to be a major factor in securing public acceptance of RE schemes [59,60] which have often met fierce opposition from local communities [61,62], including in Poland [63,64].

In this sense, European-level policy, and the actions of member states, is beginning to shift away from a one-size fits all approach to RE development in which large, vertically-integrated utilities were expected to meet ambitious expansion targets and permitted to maintain their oligopoly power. A range of new policy papers, tools and directives are emerging (e.g. "Clean energy for all Europeans" [65]; the "European Green Deal" [66]) which aim to facilitate a more diversified model of ownership capable of managing the enormous structural transformation required to decentralise energy production and supply and decarbonise European economies. Local-level action funded through EU schemes, especially if effectively coordinated at the local government level, has great potential to increase RE capacity and drive innovation from the bottom-up. In heavily fossil-dependent economies, which also face significant rural development challenges, the opportunities are particularly strong.

2.2. RE policy in Poland

Poland has no significant tradition of CRE, because in the socialist period (1945–1989) central state ownership dominated in all significant sectors of the economy for political and ideological reasons [67]. Despite the collapse of the socialist system and the introduction of a market economy, the monopoly of state-owned companies still prevails in the energy sector [68]. Producers can sell energy only through the monopolistic state transmission grid or use it separately for their own needs [69].

In Poland, the efforts to develop RE, save energy and adapt to climate change were largely the result of EU pressure and support [15,21]. Nearly 15% of Poland's total EU budget for 2014–2020 was allocated to mitigation and adaptation to climate change. RE was poorly developed

when Poland became an EU member in 2004, reaching only 6,9% in gross final consumption of energy (Fig. 1) [29,70,71]. National RE development plans were initially limited mainly to hydroelectric schemes that were a source of conflict with environmental organisations [64,72]. According to Directive 2009/28/EU, Poland was to reach a 15% share of RE in gross final energy consumption by 2020. As a result the "National action plan in the field of energy from renewable sources", adopted in 2010, assumed the achievement of a 15.5% share of RE in gross final energy consumption in 2020. The data available (May 2021) indicate, however, that this goal was not achieved on time (near 12.6% share of RE in 2019) [71,73].

The percentage share of RE in gross final consumption of energy increased between 2007 and 2015, mainly due to investments in wind farms and solid biofuels [74]. The National Fund for Environmental Protection and Water Management supported more than 58,000 solar micro-installations in the years 2010–2014 [75], but these accounted for a negligible share of total energy production (Fig. 2). For local households, the "Prosumer" programme supporting the installation of decentralised RE was established in 2014 [75].

However, after the elections were won by right-wing parties in November 2015, RE development was put on hold until 2019. Almost no action was undertaken for the continuation of the previously prepared RE policy [23,76]. Following numerous conflicts regarding the location of wind farms in Poland, in 2016, a law was passed prohibiting their construction at a distance equal to 10 times their height from residential areas, and taxes on wind farms were raised [64]. On the other hand, in 2016 the central government began to support energy clusters based on local RE in areas of 1 poviat (county) or 5 neighbouring municipalities, with the possible participation of local governments and other local stakeholders [33,77]. However, by 2017, there were still only around 60 registered RE clusters and 12 RE cooperatives in Poland [78].

Central government, together with state power companies which dominate the energy market, continued to focus on coal energy and coal mining. In 2019 the total share of lignite and hard coal in electricity production in Poland was around 74% - the highest share in the EU [79]. The national Strategy for Responsible Development 2017–2020 (SRD), adopted in 2017, envisages maintaining a dominant share of coal and gas in energy production based on large energy installations, with RE playing only a very small role. In the SRD, only 3 projects related to RE were planned: geothermal and hydro-energy, energy clusters, and energy cooperatives [80,81]. This policy resulted in a decrease of the percentage share of RE in gross final consumption of energy between 2015 and 2018.

Local prosumer energy development and energy saving initiatives (for instance, thermo-modernisation of buildings) were mainly fostered by the Regional Operational Programmes 2014–2020 (prepared before 2015), supported by the European Regional Development Fund (ERDF) and national funds. It was implemented by 16 regional governments and by the National Fund for Environmental Protection and Water Management. Regional governments allocated almost 10% of their funds to support local governments in developing RE and mitigating climate change [6]. This investment supported RE generation and distribution as well as energy efficiency and intelligent energy management within public infrastructure (including public buildings and the housing sector). The design and scope of the instruments was determined by the regional governments themselves [75,82,83]. Consequently the number of micro-installations in Poland increased from about 9000 to 36,000, and their capacity from 63 MW to 236 MW, in 2015–2018 [84].

As a result of pressure from the European Commission and the threat of not achieving the 15% share of RE in 2020 in Poland, from 2019 support for RE – mainly solar energy – was gradually restored. In July 2019 a national program for households called "My electric current" was proposed for photovoltaic installations. Plans to build offshore wind farms in the Baltic have also appeared. However, since the local development strategies analysed (programming period 2014–2020) were prepared in 2014–2015 in the light of policy at that time, these recent policy developments could not be considered by our analysis.

For a strongly fossil fuel-dependent country like Poland to successfully transform to a post-carbon or low-carbon society [7], in which fossil fuels are used to a very small extent, requires not only large-scale investment, but also changes in culture-related local habits of the inhabitants [85]. In rural construction, cheap, traditional coal-fired heating and wood-fired fireplaces have traditionally been preferred, the source of so-called low emissions [86]. Due to these heat sources, Poland had the highest level of air pollution with benzo(a)pyrene (first place) and dust PM 2.5 (fourth place) in the EU in 2017 [87]. However, actions aimed at the elimination of coal as heating fuel met with opposition from the strong mining lobby of the trade unions and in practice, coal mining in Poland has been covertly subsidized for many years [23].

In new constructions in suburban areas gas is often used. Modern heating methods (heat pumps, recuperators etc.) are seldom chosen due to the high investment costs. In poorer areas, the low level of income of individual households presents a significant barrier to the uptake of such modern devices. The thermo-modernisation of older buildings, which do not meet modern thermal requirements (typical in remote rural areas), presents technical issues and residents may be unable to meet upfront (capital) costs. Additionally, the diffusion of technical innovation in remote rural areas is likely to be slower than in richer suburban regions [88,89].

At a national level, there was evident political unwillingness to strongly commit to rapid decarbonisation of Poland's economy, which is partly ideological and partly due to successful regime resistance from incumbent state-owned utilities and the coal industry [23]. The Rural

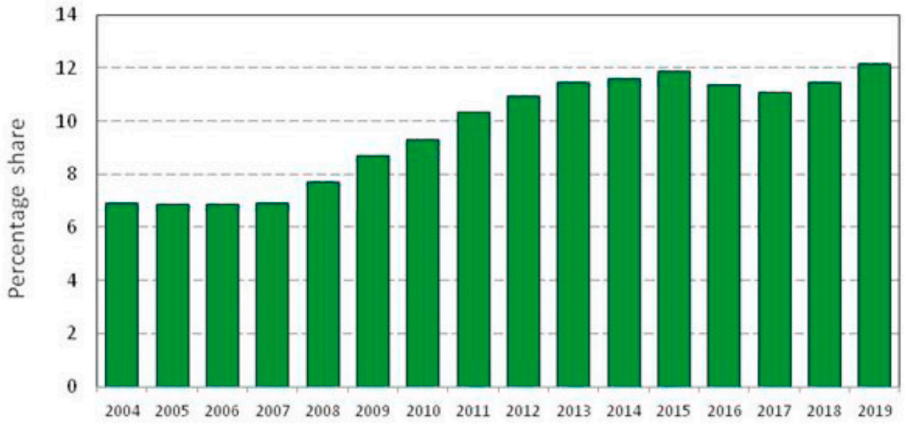

Fig. 1. Percentage share of RE in gross final consumption of energy in Poland, 2004–2019. Source: own work based on [71].

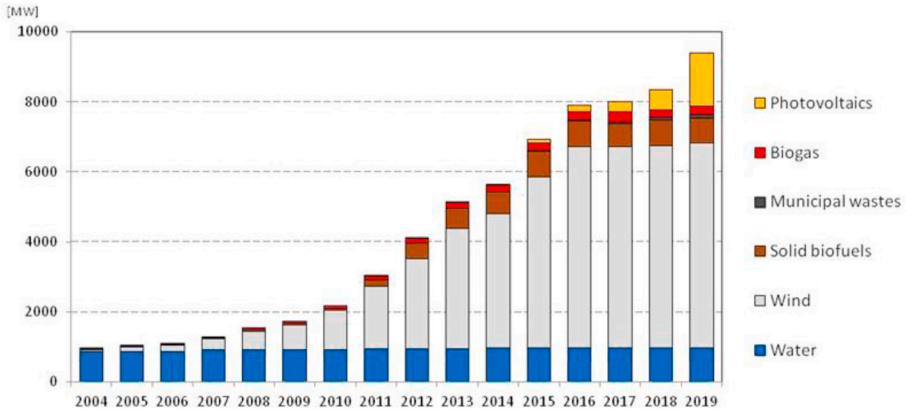

Fig. 2. Capacities of RE installations in Poland, 2004–2019 (MW, electricity only). Source: own work based on Statistics Poland [70].

Development Programme, which uses the CLLD approach, offers local stakeholders (both local governments, entrepreneurs, farmers and residents) the necessary flexibility to develop their own specific strategies of RE development. To illuminate the extent to which this potential has been realized in local development strategies so far completed, is the goal of the analysis described in the following sections.

3. Materials and methods

The main sources for this analysis, a detailed examination of climate-related activities in rural area-based partnerships, are the documents of the Rural Development Programme (RDP) 2014–2020 (hereafter "the programming period") in Poland and Local Development Strategies (LDS) of Local Action Groups (LAGs) aimed at general rural development, financed by RDP. LAGs are cross-sectoral partnerships of local communities aimed at local development operating in rural areas [90], and (since 2014) in urban areas [91]. In Poland, most existing LAGs were created around 2005, after joining the EU in 2004 [92]. They are legally registered as associations of individual persons and formal entities, and must include representatives from the social or third sector (local communities and NGOs), the private sector (i.e. entrepreneurs) and the public sector (local government and its dependencies, e.g. cultural or social centres). During the programming period, rural LAGs in Poland comprised areas of minimum 2 neighbouring municipalities, inhabited by a total of 30,000–150,000 inhabitants. LAGs must first prepare LDS, which are then funded from EU sources. Subsequently, LAGs organize small grant competitions for local entities to implement local activities (called "operations" in the programme) in line with the objectives of their strategy [93]. Since LAG strategies are required to contain detailed descriptions of the process of participation (consultation method, working meetings and other activities), they offer a rich source for analysis of local stakeholder preferences [94,95]. In this study, we use them to determine the approximate level of importance given by local stakeholders in rural areas to climate change and RE-related activities, in comparison with other development goals.

Fig. 3. LAGs analysed in the paper (293 units), aimed at integrated rural development and operating in the EU Programming Period 2014–2020 in Poland. Source: Own work based on data from Ministry of Agriculture and Rural Development, Warsaw, Poland.

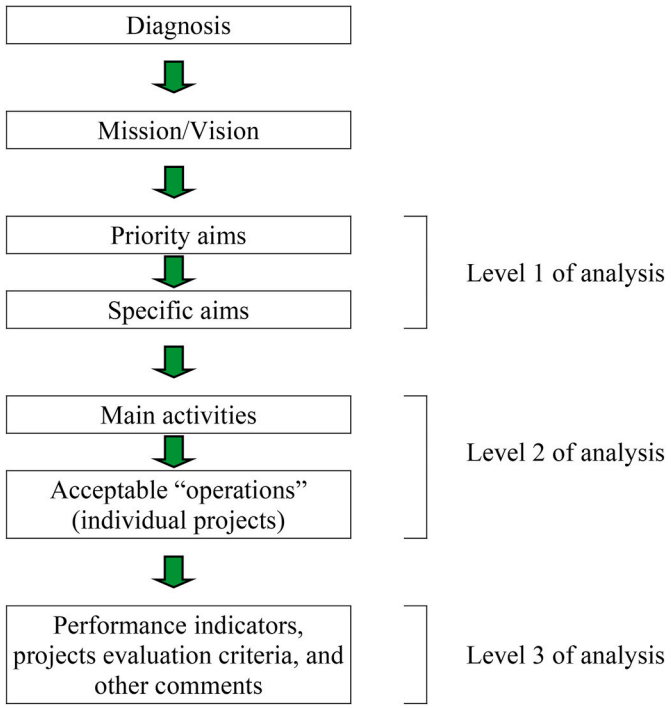

Fig. 4. The typical structure of LDS and the levels of content analysis. Source: Own work.

Table 1
The original assumptions of LDS content analysis (with coding).

No.	The scope of strategy content analysis	Mitigating or adapting to CC		RE development	
		Education	Investment	Education	Investment
1.	Is mentioned in the aims?	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)
2.	Is mentioned in planned activities?	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)
3.	Is mentioned in performance indicators and other descriptions?	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)	YES (1)/NO (0)
4.	Is issue taken into consideration in strategy?	Logical sum of items 1–3 with "OR" operation: (1) or (0)		Logical sum of items 1–3 with "OR" operation: (1) or (0)	
5.	Number of planned activities	Number	Number	Number	Number
6.	Planned budget	Number	Number	Number	Number
7.	Other descriptions and comments of the strategy's authors	Qualitative data		Qualitative data	

Source: Own work.

Our study analysed all 292 rural LAGs supported by the RDP in Poland and one supported by regional funds (but with similar aims), for the programming period 2014–2020 (Fig. 3). We did not study 7 urban LAGs aimed at social issues or 24 fisheries LAGs, specialised mainly in the fishing economy. Urban and Fisheries LAGs are funded by other programmes with different goals impacting local actions and different organisational rules. They are therefore analysed separately in the literature [91,96]. Beyond these specific exceptions, the conducted study includes the entire statistical population of rural LAGs financed from the RDP in Poland, hence there is no need to calculate or estimate representativeness or any other statistic relevant to population samples. It cannot be considered a European sample, due to the diversity of the policies and cultures of EU countries, but as a case study.

The analysis was undertaken as follows. First, we downloaded the LDS of the 293 LAGs targeted for analysis from their respective websites. Due to programme demands they have a relatively similar structure (Fig. 4) [97]. Next we analysed these documents using the content analysis method [98], searching for records of actions to mitigate or adapt to CC or to develop RE on three levels: 1) in aims; 2) in planned activities; 3) in performance indicators (outcome, result or impact indicators), projects evaluation criteria and other comments (Table 1). Based on these analyses, we obtained numerical data specifying the number or percentage of strategies that included a specific issue. When summing up separate categories, we used the "OR" sums (logical operation). So we considered that the strategy took into account the issues of climate or RE when it was mentioned in the objectives or in the tasks or in the result/output indicators. Performance indicators in strategies contain very diverse content (usually planned number of projects, the number of people involved, etc.). Tasks related to RE were usually not separated, therefore it was not possible to calculate numerical indicators such as planned capacity or number of installations for all analysed LDS.

The research did not include interviews with LAG management boards, because the focus of the study is on historical documents created in 2014–2015, not on their current social perception or on assessment of results (the LAG projects specified in the strategies we analysed had not been completed at the time of writing). Analyses of documents ("social artefacts" – [99]) are a commonly used, recognized research method in social and political studies [100–102]. Analysis of the final results of the implementation of the projects and their perception by local communities would be a worthwhile topic for future study.

4. Results

4.1. The analysis of RE policy in RDP 2014–2020 supporting LAGs actions

The first part of our analysis focussed on the national Rural Development Programme (RDP) for 2014–2020 financed from EAFRD [103]. This programme supports the LAGs analysed in this work who are required to pursue the goals set out in the RDP. We found that the RDP does not allocate special resources for the development of RE, they are only an acceptable range of activities for the implementation of certain priorities. Among other provisions, the document refers to support for "production levels of energy from renewable sources: wind, biomass and biogas, as well as solar and geothermal energy and water in the production process" (p. 788), as part of the development of farms. However, the document refers to the "inefficiency of the energy system, in which obsolete power transmission lines do not guarantee a consistent supply for individual recipients and make the development of small power plants (including RE) difficult" (p. 38), and states that the countryside is characterised by a "low level of availability and price affordability for innovative energy solutions, especially RE" (p. 38). Clearly, therefore, the document considers RE to be a minor component of efforts towards rural development. Energy saving, both in terms of electric and thermal energy (e.g. issues related to thermal modernisation of structures from the 20th century and older, a majority of which does not comply with contemporary thermal insulation standards), which could play a significant role in climate mitigation, is especially undervalued in the RDP document. One example is the complete lack of suggested actions aimed at "improving the efficiency of using energy in agriculture and food processing" (p. 759). The document ignores the relation between the 12 indicated needs of Polish rural areas and aims 5a-d of the EU 1305/2013 regulation, which involve "resource efficiency and supporting the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors" and provides no practical support for the execution of such activities, as is apparent from the need-aim relations table (pp. 77–79). Finally, the document focuses mainly on electricity production for farmers' needs, and makes almost no reference to other kinds of RE, like solar water heating in summer, or the use of heat pumps (including recuperators) as a substitute for fossil fuels.

4.2. The analysis of LDS

Among the LDS studied, the most important goals listed were related to entrepreneurship and employment support, development of human and social capital, and development of social, recreational and tourist infrastructure. Support for activities related to environmental protection and development of ecological infrastructure (including RE) was mentioned as the separate, main purpose in only 19% of the organisations surveyed (Fig. 5).

The issues of climate change mitigation or adaptation were included in the main or specific objectives in 19.8% of the strategies (Fig. 6), but were not usually formulated as separate goals. On the other hand, specific measures taking these issues into account appeared in 30.7% of the analysed documents, and were present as performance indicators (or in descriptions) in 52% of strategies. The logical sum of strategies referring to these issues (in targets, actions or performance indicators) reached 66%. Education and training around climate mitigation or adaptation was planned in 34% of strategies, often only as an unspecified part of other bigger projects. Climate-related measures accounted for only around 2.6% of the total budget for all LAGs (about 20.4 million of 774 million EUR); however, these data are very approximate, because many strategies do not give the amounts allocated to these issues, because they are only components of other, larger undertakings. Where planned,

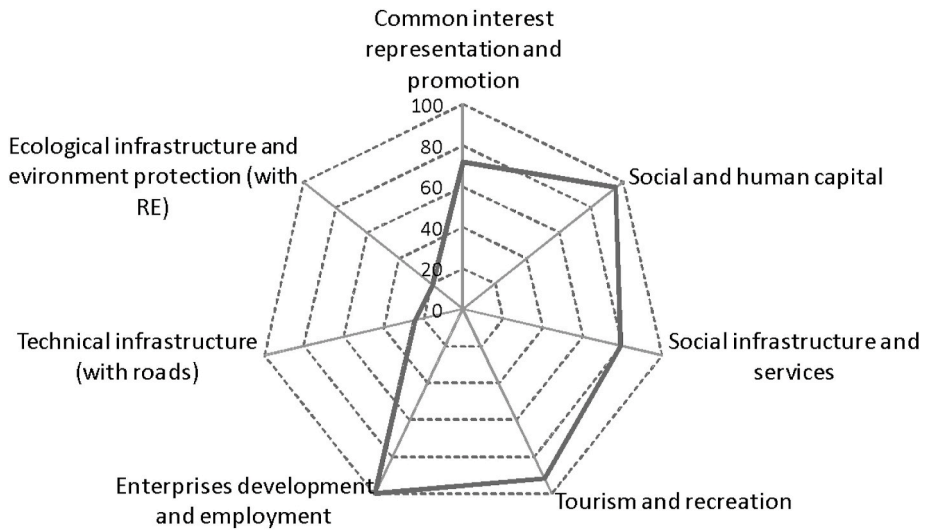

Fig. 5. The percentage of strategies referring to a given issue in the priority aims (EU Programming Period 2014–2020; N = 293 LAGs).
Source: Own work.

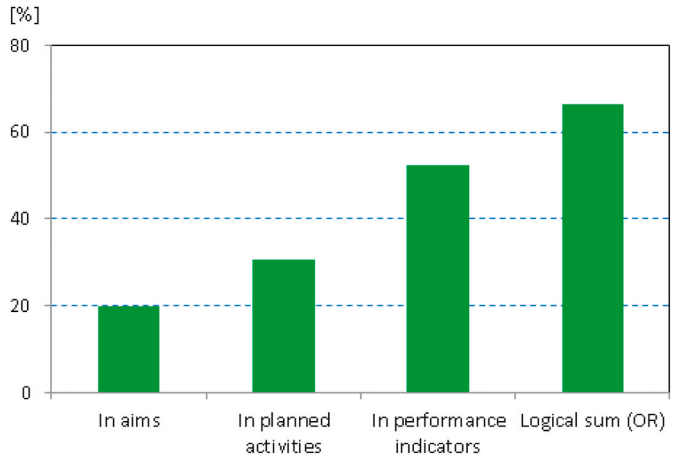

Fig. 6. The percentage share of strategies referring to adapting or mitigating climate change in the aims, in activities, in performance indicators and logical sum of strategies (with "OR" operation).
Source: Own work.

climate-related measures were most often associated with training as a part of the development of human capital and sustainable entrepreneurship.

These data suggest that the issues analysed were clearly not seen as important by local stakeholders involved in strategy development. For example, in the LAG "Ziemia Łowicka" in local social consultations, in which 180 people took part, the development of RE was indicated as an important development direction by only 12% of respondents (13th place out of 17 research categories). The development of agriculture and agricultural and food processing (42%) as well as jobs from outside of the domain of agriculture (39%) were considered by local inhabitants to be the most important. The authors of another strategy supported the view that local actions have little impact on the climate, as stated in the document: "The LAG has little impact on climatic phenomena due to their global nature. A series of actions aimed at promotion and raising awareness will be undertaken in this respect, especially involving the indication of activities which impact the climate (e.g. excessive use of automobiles, needless use of electrical energy). In this context it is also important to stress the role of forests in absorbing carbon dioxide (impacting the greenhouse effect), especially through promoting their responsible preservation and sustainable development" (the "Między Prosną a Wartą" LAG). Often, certain actions were artificially categorised as related to climate protection, with the sole purpose of indicating the strategy's compatibility with RDP aims. One LAG, for example, considered the delineation of cycling tourist routes and construction of sports fields as activities related to climate protection (the "Kraina wokół Lublina" LAG), with another including a tourist cycling rally for local inhabitants in the same category (the "Region Kozła" LAG).

With regard to RE, few actions were planned in the strategies (Fig. 7). Around 13% of LAGs planned "soft projects" (training on this subject for residents), but only 8.5% of LAGs planned "hard projects" (investment in RE installations) – in total, 17% of strategies taking this issue into consideration. For these types of measures only around 0.8% of the total LAGs budget was allocated (about 6 million from 774 million EUR). No community energy initiatives, e.g. RE cooperatives or clusters, were planned.

For comparison, the issues of cultural and historical heritage protection appeared as the main objectives or in activities in 80% of the analysed strategies, so "traditional" aims were much more important for local stakeholders. Some of the LAGs decided that RE installations have no significant impact on the development of the areas included in the strategy, as documented in one of them: "(…) the participatory and transparent procedure used by the Workgroup (…) does not involve the

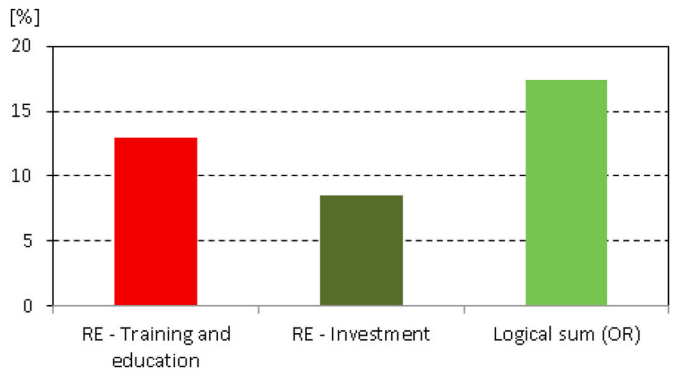

Fig. 7. The percentage of strategies planning operations referring to RE (training and education, and investment) and logical sum of strategies taking into consideration educational actions or investment (with "OR" operation).
Source: Own work.

possibility of supporting solar and geothermal energy projects due to the insignificant impact of single, private projects on the LAG area. RE may be installed by e.g. entrepreneurs, as part of their business projects subsidized in aim II" (the "Podbabiogórze" LAG).

In 54% of the strategies, the authors expressed the opinion that local communities are characterised by low ecological awareness (usually using a SWOT analysis, in the area's weaknesses). For example, authors of the "Zielony Wierzchołek Śląska" LAG strategy expressed the opinion that: "with regard to environmental issues, the respondents of the original survey study have evaluated the quality of water used in households as the most important – 4.23, 2nd place from among 30 issues, 'air quality' – 3.80 (5th place) and 'quality of the environment in general' – 3.50 (9th place). The relatively high estimates in the study (…) for [the quality of] air and water [previously evaluated as bad in a diagnosis of the current state, based on data from public institutions involved in environmental research], may be indicative of the low level of ecological awareness among local inhabitants" (the "Zielony Wierzchołek Śląska" LAG).

5. Discussion

Despite the government's vociferous support for the coal industry, national energy policy in Poland has recently become more supportive of decarbonisation and climate mitigation activities [73]. However, changes are slower than in the leading European countries [30]. Nevertheless, as Akadiri et al. [104] have demonstrated, the exploitation of RE in the EU countries is a reliable pathway toward environmental pollution mitigation and consequently, achieving sustainable development goals by the year 2030. RE consumption and carbon emission mitigation is very much achievable in the EU, and should also be adopted by all countries as an effective global policy. However, local conditions, especially in rural and peripheral areas, can differ from the national average [26,77,105].

Support for prosumerism and community RE in Poland between 2010 and 2018 was relatively weak in comparison with Western and even other Central European countries leading in RE development [3,30,44]. The apparent low-level of interest in RE initiatives by local level stakeholders could be seen in light of the weak top-down support measures within Poland and post-socialist scepticism of local cooperative initiatives [106,107]. However, post-socialist Czechia, which has similar physical and geographical conditions, and traditions of using coal in the power industry, has supported the development of RE to a greater extent [108,109]. The European comparisons show that in Poland, initiatives related to RE seem to be established mainly by the business sector or local authorities, with little engagement of individual citizens, compared to Western EU countries [4]. According to Snarski [110] local authorities in Poland considered RE to be much less important than the development of traditional infrastructure (roads, sewage system). This author's findings, that the Polish RDP 2014–20 took into account RE only to a relatively small extent, less even than in the previous programme (2007–2013), support our results. This apparent neglect of rural areas in RE policy planning is not of course an exclusively European or Polish problem. For instance, in China, Wu [111] has noted that comprehensive rural energy policy is lacking, most rural energy policies are problem-oriented and unpredictable, and the regional heterogeneity of rural residents' willingness and interests are not adequately considered in rural energy policies. Other authors find relatively low interest in RE among local residents in South Korea [112] and in remote communities in Australia [42]. Almost 100% of the urban and rural population in Poland have access to electricity grid [113], so it cannot be compared to the developing countries of Latin America or Africa where large areas lack such infrastructure.

In Polish rural areas, the source of local thermal energy is primarily wood burning (considered in statistics as RE, but having a negative impact on air quality), coal or, more rarely, gas [86]. This is probably to a large extent due to cost, with wood and hard coal being the cheapest currently available option. However, considering that biomass (not only wood) is recognized as RE, as Scarlat et al. [114] have observed, rural areas are suitable locations for the use of biomass energy thereby shortening supply chains for biomass feedstock and helping reduce negative environmental effects of energy transition. Soloviy et al. make similar recommendations for rural areas of neighbouring Ukraine [115].

The high cost of modern RE installations was considered a significant barrier to their development in rural households and farms in Poland. However, administrative and technical difficulties in connecting small RE installations (including prosumers) to the national power grid in Poland were also important problems [69,86]. The central government has favoured large-scale electricity providers, who burn garbage and biomass in coal-fired plants, but with the provision of appropriate exhaust gas filtering systems [23].

Analysis of LDS prepared by local stakeholders (commonly the most active local elites) with the participation of local communities, shows that at the time of their creation in the years 2014–2015, the issues of RE development and mitigating climate change were not significant for the authors of these documents. In 44% of LAGs, such issues did not appear at all in the objectives and planned activities, although all strategies talk about their compliance with these types of objectives, as this was a requirement of supporting programmes. Both the strategies' objectives and their planned activities routinely underestimated the impact of local-scale climate-related actions like RE, energy efficiency, or thermomodernisation, on global climate. Moreover, they seemed mostly unaware of, or uninterested in, the entrepreneurship potential of small scale initiatives like RE cooperatives or clusters, despite recent attempts to promote these initiatives at the national scale [33,106]. Analysis of the RDP suggests that the lack of emphasis on climate mitigation and adaptation, or environmental issues in general in this document is likely to have been reflected to some extent in the individual plans.

Our analysis suggests a relatively low level of ecological awareness in rural society. In this sense, our findings support those of Skrzyńska [116] who argued that RE and climate change issues belonged to the "information gaps" of Polish society. When the most active local stakeholders were preparing bottom-up strategies themselves, goals related to mitigating climate change and RE development appeared relatively rarely. Traditional actions such as the development of entrepreneurship, the development of social and human capital or protection of local cultural heritage were much more popular. The relatively low significance of environmental protection (related to fossil sources of energy) stated in the LDS coincides with the results of social research in 2014, which found that only 8% of the society considered these to be issues in which Poland "has the most problems to solve" [117], though a more recent study suggested that environmental awareness had improved somewhat by 2018 [118]. Between 2012 and 2014, the percentage of Polish citizens who planned to take measures to increase energy efficiency or who wanted to spend more on clean energy also declined [117,118]. Thus, in the period preceding the creation of the studied strategies, trends in the field of social attitudes towards individual investments in energy saving and RE were not positive.

The low importance of CC and RE is not only due to lack of awareness, because in the same study 86% and 81% of respondents respectively stated that they know about these issues. However, respondents did lack knowledge about emissions from local heating stoves, believing (incorrectly) that large industrial plants (including power plants) and urban transport were responsible for air pollution, not their old heating stoves [117,118]. Probably this widespread, but incorrect, impression was one of the reasons for the low interest in RE in local strategies. On the other hand, about 48% of respondents considered that the use of modern RE can help to improve air quality.

Social research in the Lower Silesia region in Poland indicates that the most important supporters of RE are farmers and private firm owners [119]. These groups have relatively low representation in LAG decision bodies, which tend to be dominated by local government and local NGOs focusing on social issues and communal infrastructure [120]. This could

have had an impact on the goals of the analysed strategies.

Comparing environmental awareness of Polish citizens and householders from richer European countries, we find that local communities in Austria, Germany, Italy and Switzerland are willing to pay a slight price premium on their monthly costs if regional electricity is offered on a local energy market [121,122]. This may suggest an understanding of interconnections between environment and energy. However, to overcome barriers of social acceptance of new technologies and to increase their use, operators of RE facilities can provide jobs and organize local events to increase acceptability and embeddedness in rural communities. This is already happening in Poland and Czechia. This aspect is especially important considering site-specificity and local socio-cultural contexts with rural communities often being more traditional and less open to new solutions than urban dwellers [123]. Social acceptance may increase if RE can be shown to directly benefit local communities financially, as in the case of community wind farms in Scotland, UK [124]. To achieve this aim, a local resource tax that benefits the entire community might be more successful than individual financial participation models like shares or bonds [125]. Trans-European studies found that the most relevant reason for resistance to RE installations (in this case wind turbines) in Northern, Western and Southern Europe were related to impacts on landscape, whereas in Central and Eastern Europe lack of trust and lack of social justice were ranked as the highest concerns [126]. These results highlight the markedly different social attitudes still prevailing in those states that joined the EU after 2004. This shows that even in a decentralised system, local actors cannot always be relied upon to drive RE development.

This study has sought to understand to what extent climate goals can be achieved through ordinary existing bottom-up rural development procedures. Since we find that the uptake of climate-related activities in such processes is limited, attention might be turned to what could be done to "radicalise" LAG schemes so that coalitions of local actors are more strongly incentivized to develop RE. One obvious possibility relates to the national energy clusters scheme mentioned earlier [33]. Given the emphasis in CLLD programmes of boosting the local economy, the fact that energy clusters do not feature in any of the LAG plans seems like a major missed opportunity. One answer would be to link the RDP and the clusters initiative directly, e.g. by designating a certain percentage of RDP funds to local energy clusters, by direct creation of "energy LAGs" to execute clusters projects, by appointing a liaison officer to ensure that local development actors are aware of the clusters initiative, among other things.

Our study has been critical both of the Polish government's unwillingness to address the climate problem, and of what we have interpreted as local rural development actors' lack of interest in RE or climate issues generally. Yet criticism might also be directed at European policymakers, who seem to have overlooked the fact that long-running flagship programmes like the LEADER initiative hardly support community RE development. In this sense, a key objective for European policymakers should be to ensure that climate action, which is now front and centre of EU policy, is properly and fully integrated into general programme planning and execution in Europe's rural areas.

6. Conclusions

In our research, we found a relatively low level of "Europeanisation" of local stakeholders in rural Poland in terms of EU climate and energy policy goals. Even though CLLD programmes primarily target social goals, evidence from elsewhere in Europe suggests that small-scale and local RE initiatives can and do play a significant role in multifunctional rural development [4,36,124]. Yet our analysis of 293 LAGs' strategies, covering almost the whole territory of Poland clearly shows that local stakeholders, when formulating independent strategies, did not consider activities related to adaptation and mitigation of CC as particularly important, and even neglected issues related to energy saving, despites its potential financial benefits to low-income rural communities. We confirmed the hypothesis that in the years 2014–2015 local stakeholders were not interested in intensively supporting RE in rural areas. They perceived other goals related to the development of entrepreneurship, local social infrastructure, tourism and recreation as much more important. Since democratic governments must often adapt to the prevailing interests of voters, this may also partly explain national policymakers' rather low level of interest in this topic.

In the first place, changing the attitude of local communities to RE in order to take appropriate action on climate change is clearly an important priority. This would seem to require an intensive public education campaign. According to a social survey from 2014, citizens' main source of information is television (72% of respondents, especially the elderly) and the Internet (42%) [117]. Unfortunately, public television in Poland is strongly influenced by the ruling authorities, who have so far projected a strongly pro-fossil energy message, due to their close ties with the powerful coal lobby. In this context, one approach might be to emphasise the importance of RE through arguments that highlight its local value, rather than stressing environmental issues, e.g. the role of distributed RE in reducing dependence on centralised energy production, and asserting local control over pricing and supply.

Local RE support programs may also be of great importance, including those supporting the replacement of individual solid fuel boilers with modern energy sources such as heat pumps or recuperation. However, these are expensive investments that require buildings to meet certain standards for thermal insulation. Old buildings in rural areas are thus often not suitable for these kinds for installations without significant expenditure on thermo-modernisation, which was almost omitted from the strategies we analysed.

Additional legal structures and instruments to support small-scale and local RE are also required. For example, prior to 2019, prosuming was available to individuals but not to small businesses. This is probably due to the monopoly power of state-owned energy enterprises, whose boards are appointed by national politicians under pressure from trade unions. As a result, the central government has hitherto mainly focused on increasing energy production (whose sales generate profit for state enterprises) and not on energy efficiency and energy self-sufficiency of consumers (which is contrary to the interests of monopolistic state producers). In our opinion, as a result of these dependencies, there is no significant political will to strengthen the position of small RE producers, who would create unwelcome competition and technical problems for the state energy industry. In turn, local rural communities lack the resources to invest in new RE technologies on their own, especially given the low level of public acceptance of RE in traditional rural areas.

Our study highlights some opportunities for future work. Urban and Fisheries LAGs, which are not funded by the RDP, and have a different structures and objectives, might merit separate examination. A further worthwhile direction for future work would be to engage key LAG stakeholders in participatory evaluation of outcomes of the projects whose strategy documents we have analysed in this piece.

Credit author statement

Marek Furmankiewicz: conceptualisation, methodology, investigation, validation, formal analysis, data curation, writing – original draft, writing – review & editing, visualization, supervision, funding acquisition. Richard J. Hewitt: writing – original draft, writing – review & editing. Jan K. Kazak: writing – original draft, visualization, writing – review & editing, funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This research was co-financed within the framework of the project No. 2019/33/B/HS4/00176 (OPUS 17) by the National Science Centre, Poland and under the Leading Research Groups support project from the subsidy increased for the period 2020–2025 in the amount of 2% of the subsidy referred to Art. 387 (3) of the Law of July 20, 2018 on Higher Education and Science, obtained in 2019. Richard J Hewitt gratefully acknowledges support provided by the Spanish Ministry of Science, Innovation, and Universities (TERRYER project, Ref CS02017-84986), and by the European Union under Programme H2020-EU.1.3.2, MSCA–IF–2019 (INTRANCES Project, Ref 886050).

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