

Article

Renewable Energy Plants and Business Models: A New Rural Development Perspective

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Abstract: The paper evaluates the rural development (RD) contribution of local economic activities (LEAs), whether generated or affected by the proximity of renewable energy plants (REPs). The study also informs about LEAs' role as co-players in the fight against climate change. Semi-structured research interviews have been applied to identify LEAs' BM (business model) in Andalusia, Murcia, and Catalonia, autonomous communities of Spain. Most LEAs present a BM based on the RE plant, and others do not, but they still contribute to RD, rural communities' well-being and global sustainability. Results show, first, that certain LEAs, due to their inter-connection with large REPs, can innovate and create a significant number of stable jobs. Second, land leasing to REPs allows for temporary farms' diversification, which is conditioned to its bargaining power. Third, advice on integration RE projects in RD strategies should be provided. Conclusions suggest the need for new governance to favor energy transition coherent with the Sustainable Development Goals (SDGs).

Keywords: renewable energy plants; rural development; business model; energy transition; Sustainable Development Goals; rural community well-being; Agenda 2030; renewable energy landscapes; business model for sustainability; scale economies; climate change



Citation: Prados, M.-J.; Pallarès-Blanch, M.; García-Marín, R.; Valle, C.d. Renewable Energy Plants and Business Models: A New Rural Development Perspective. *Energies* **2021**, *14*, 5438. <https://doi.org/10.3390/en14175438>

Academic Editors: Sergio Ulgiati, Marco Casazza and Pedro L. Lomas

Received: 8 July 2021

Accepted: 27 August 2021

Published: 1 September 2021

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1. Introduction

Renewable energy (RE) plays an essential role in providing sustainable and clean energy necessary to mitigate climate change and to reduce its consequences on the environment, health and social well-being [1]. However, the dissemination of RE is not conflict-free. For example, installing renewables in agriculturally impoverished areas in Italy has resulted in a fall in the price of land, which is seen as a signal of what happens when there is no investment in innovation in agriculture [2].

The siting of renewable energy plants (REPs) mainly affects rural areas and rural communities, which bear the resulting impact without any clear compensation. REPs compete with economic activities linked to agricultural production and tourism activities, often based on the semi-natural landscapes and rural heritage [3]. At the same time, REPs can create positive synergies on the local, social, economic, and entrepreneurial levels [4].

Social sciences research on RE has become essential since the effective transition to RE technologies involves many varied socio-economic, geographic, cultural, and policy factors [5,6]. In addition, the use of qualitative methods has become more prominent in the study of the public acceptance of REs, either through semi-structured interviews that allow the malleability of public opinion to be perceived [7] or exploratory interviews with institutional stakeholders such as informers from the Enerscape Project [8]. It has been proven that public acceptance may vary depending on the RE technology and financial compensation systems for the local population, and on other factors such as local development or job creation [9]. An inclusive and transparent design and place-based planning of

REPs have been proven to benefit social participation and support for the energy transition process [10–14]. Therefore, better explanations during RE implementation contribute to acceptance while also engaging the local people in the energy transition by making them active participants. This can explain the progressive incorporation of rural energy cooperatives and energy communities and the reason why they contribute to reductions in energy dependency and energy cost [15–17].

According to the OECD report for 2012 on “Linking renewable energy to rural development”, RE can contribute the following to RD: “increased employment and operation and maintenance jobs; a revitalization of manufacturing business; local entrepreneurship; innovation and new skills and knowledge in local communities; a transformation to more innovative green industries; new revenues for landowners, farmers, and local authorities (through sale of lands, shares, and municipal development funds paid for by developers)” [18] (p. 2). Thus, the social research into renewable energy landscapes (REL) acceptance should move forward in socio-economic arguments and governance matters, along with other more explored issues, such as the perception of REL. This requires extremely urgent character, given the dire prospects according to the last Intergovernmental Panel on Climate Change report [19] for which it is coherent to force more ambitious objectives to accelerate the energy transition.

Given the multidimensionality of the energy issue and the multifunctionality of rural areas, energy policies should consider making rural development (RD) work in compliance with the 17 Agenda 2030 Sustainable Development Goals (SDGs) [20]. Targets in SDG11—Sustainable communities, include, among others: (i) “supporting positive economic, social, and environmental links between urban, peri-urban, and rural areas by strengthening national and regional development planning” [21]; (ii) “enhancing inclusive and sustainable urbanization and participatory, integrated, and sustainable human settlement planning and management”, and (iii) “strengthening efforts to protect and safeguard the world’s cultural and natural heritage” [21]. In addition, the SDG11’s description section states, “Local and regional governments have a wealth of valuable experience in the ‘localization’ of the 2030 Agenda, where they provide leadership in the mobilization of a wide range of stakeholders, the facilitation of bottom-up and inclusive processes, and the formation of multi-stakeholder partnerships” [21]. In the same way, a shift away from purely theoretical renewable locations and scenarios toward a place-based plan approach has been called for [22–24], consistent with the endogenous, bottom-up, and participatory development paradigm in RD [25]. Recent research has noted a simultaneous deterioration in the effectiveness of achieving the objectives associated with SDGs. The reasons have been linked to actions toward one SDG in any given area having consequences for other SDGs in the same area [1]. Similarly, efforts aimed at one SDG in one place will influence outcomes in others [1]. For this reason, several guides have been developed to facilitate and assess SDG implementation in public and private enterprises [26–28]. Likewise, some research offers guidelines on how to raise social acceptance based on local stakeholders’ participation, for example in the case for onshore wind project development in France [7]. Especially essential is the Green Infrastructure focus implementation in the design of the REPs to make progress in REL acceptance, creating shared value such as the agrophotovoltaic solutions [29].

Consequently, it is imperative to establish sustainable schemes that integrate REPs into the hosting communities seeking a balancing effect among the 17 SDGs. These schemes should be informed on the current central debates on RD: (i) the relevance of inclusivity, despite the difficulty in accomplishing it [25]; (ii) the need to recognize and transform power relations in rural areas [25]; (iii) analytical frameworks such as co-developing bottom-linked governance [30]; and (iv) initiatives based on innovative bottom-up support [31]. Furthermore, REs deployment, as a core instrument to reach global sustainability or at least progressively move toward it, should avoid spatial divisions, particularly rural-urban division [32]. That is not only a question of spatial justice but a crucial point to ensure that

this sustainable path is possible, regarding the environmental threats as a consequence of the depopulation of many rural areas [33].

The studies devoted to investigate employment effects from RE deployment [34] seem to converge in that a well-integrated RE into RD intermediate institutions—such as cooperatives, local governments, and universities—are needed to disseminate reliable information to the rural community and coordinate the engagement of a large number of actors [35,36]. This more favorable regulatory framework for hosting communities should be focused on: (a) enhancing cross-vertical and cross-horizontal institutional collaboration, aimed to overcome traditional sectorialism in policies [36], (b) counterbalancing the top-down private management and the large international companies regime [18,29,36–39], and (b) improving the lack of local governments power to negotiate to increase revenues [18,28,40].

The need to boost a prominent role for local and regional governments in shaping a favorable interplay between RE and RD is often highlighted in the literature, which also states that this interplay should be framed with new governance. The revised literature identifies the main following case studies based on the benefits of REPs's siting in rural areas: (1) the social innovations concerning RE and RD in three rural areas in Italy [41]; (2) the proposal of a quantitative method measure and allocating the energy potential for renewable-based RD in Romania [42]; (3) online opinion surveys applied to local government boards designed to estimate the importance of local benefits originating from RE investments in Hungarian rural settlements [22]; (4) surveys and interviews to explore the perceptions of benefits and challenges of community-based renewables in North Frisia (Germany) [43]; (5) case studies that make paradigmatic examples known, such as the case of the Danish island of Samsø [44], (6) systematic literature analyses of rural sustainable development through RE in Romania [45]; (7) a critical exploration on the synergies and mismatches on the RE and RD conflation in Denmark and Scotland [18], and (8) the opportunities that wind farms can generate for the case of Galicia [40]. These studies, among others, offer valuable recommendations for good practices in RE governance in rural areas, while they also lay the foundations for creating a coherent theoretical body.

However, methods to evaluate the interdependency relationships between RE technologies and rural communities' economies from a RD approach are still in a fledgling state. This is despite its importance for understanding the synergies generated by these economies [18,46]. To address this research gap, the paper evaluates the RD contribution of local economic activities (LEAs) generated for or related to REPs in three Spanish rural areas. The research also informs about the LEAs' role as co-players in the fight against climate change by applying the business model canvas (BMC) framework [47].

Until now, published research on business models (BMs) for RE [48,49] has two main orientations: utility-side [50–52] or customers-side [53]. The most studied subjects are on the renewable resources and technologies; solar PV, biomass, biogas and biofuel, and on RE usage; electricity (energy efficiency), heat (district heating and cooling systems), and sustainable mobility [49]. Other issues are reusable sources such as waste, energy community systems and prosumers [54,55]. For developing countries, research is mainly focused on small scale replicable examples [56] and on social entrepreneurship [57]. However, no example has been found about BM applied to the LEAs resulting from the RE and RD interaction.

The operability of BMs has been addressed in the last years in the so-called business models for sustainability (BMfS), which seek to identify the flows between the created value to the customers, the value captured by the firm, and the value to the natural environment [58]. The Abdelkafi et al. BMfS conceptualization incorporates sustainability as an integral part of the company's value proposition and value creation logic as it gives value to the customer, the natural environment, and society [58]. Evans et al. (2017) [59] proposed that sustainable business models (SBMs) need to be designed from a systemic perspective, including governance, the natural environment, and sustainable value flows among the multiple stakeholders. Marczevska and Kostrzewski propose that the BM approach should adapt to the needs derived from compliance with the SDGs [60]. Consequently, authors

include the SDGs compliance into the analysis of the economic, environmental and social benefits and impacts [61], resulting from the LEAs' interaction with the REPs.

2. Background

Spain has pioneered RE development to comply with the European Union's RE directives. The results have been promising thus far, despite the cutbacks that affected the sector as a consequence of the 2008 economic crisis and the stagnation in the RE development due to the type of regulation and policies during the 2011–2019 governments [62,63]. The RE sector is currently growing due to central government initiatives to increase societal involvement and secure legal guarantees for promoters. Royal Decree-Act 15/2018 of 5th October regulated new types of production and consumption and promoted more active social participation in the RE transition [64]. To date, RE cooperatives have been created, with one case experiencing a tremendous membership growth and territorial spread [63]. Despite the contemporary REs cooperative movement is at an early stage of development in Spain, they steer learning processes and empower their consumer communities and population toward energy sovereignty awareness [37,63,65].

The Integrated National Plan for Energy and Climate 2021–2030 envisages a four-times increase in the percentage of RE use [66]. This will be possible as the result of Spanish energy policy opting for a free competition regime in which electricity generation and supply activities operate in a stable framework for investment in renewables [62,67].

The study areas are located in the south and east regions of the country with a heavy presence of onshore wind and photovoltaic plants and a much smaller number of solar thermal plants. At the north, a hydroelectric power plant, representative of first-generation RE technologies, has also been selected for this research (see Figure 1).

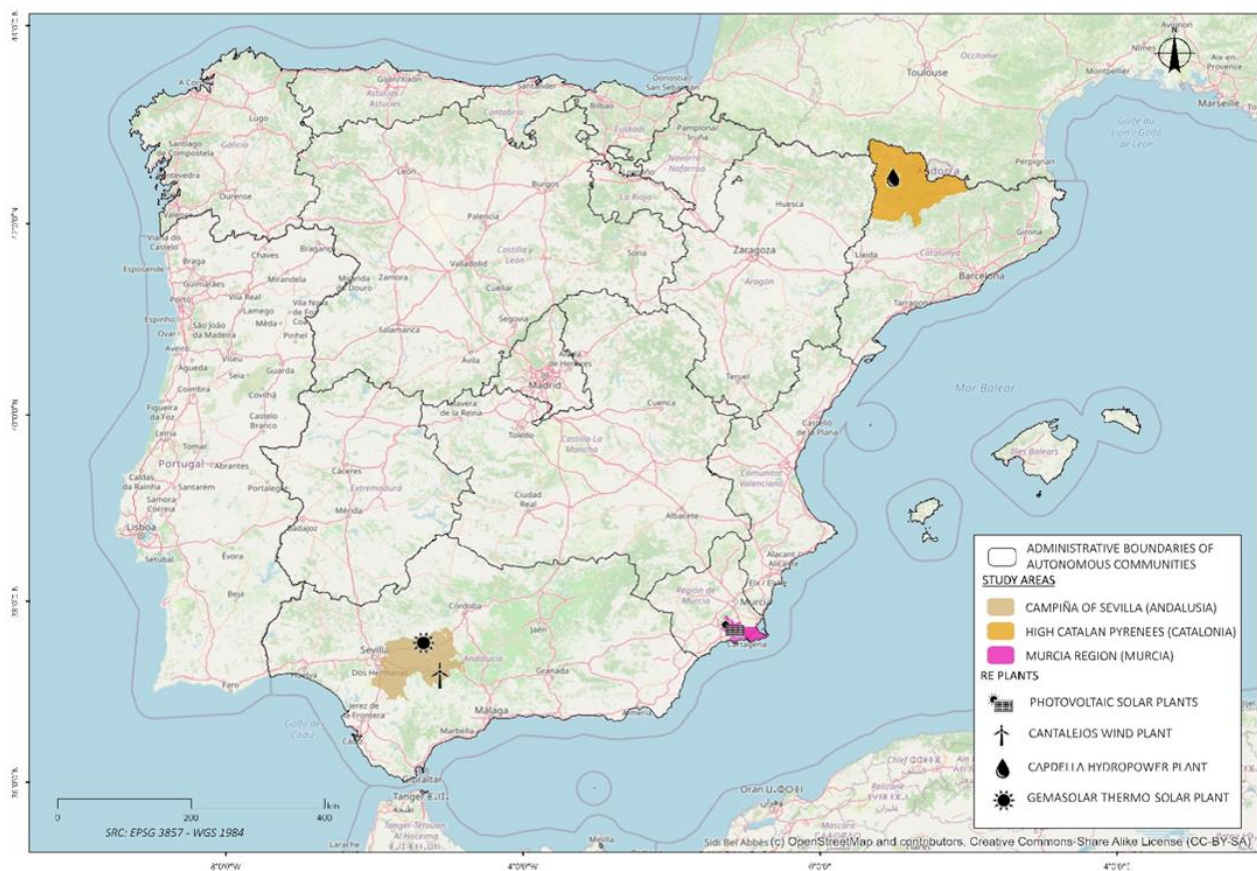


Figure 1. Study areas and renewable energy plants (REPs).

2.1. The “Campiña of Sevilla”

The “Campiña of Sevilla” (CS) is a territorial unit (5000 km²) in the central-western area of Andalusia. The terrain is moderate, with hills between 0 and 600 m in height. Temperatures are mild and rainfall irregular. The soil is fertile and deep, which makes the non-irrigated agriculture the most productive on the Iberian Peninsula [68]. Large estates of cereals, especially barley, have traditionally been the most typical types of farms with olive groves and localized vineyards on the steepest slopes [68]. Economic activity is diversified between agro-industry, mainly based on olive trees for the production of olive oil and value-added table olives, the construction industry (manufacture of materials and logistics for public works), and tourism based on the value of the area’s architectural heritage [69]. The CS’s position in the middle of Andalusia region has led to create agricultural settlements of between 20,000 and 30,000 inhabitants. CS represents the essence of Andalusia; however, it is now faced with the progressive advancement of large-scale REPs and future projects that consolidate wide REL. The first wind projects were rolled out at the beginning of the 21st century with support from a subsidy policy and the backing of large international corporations [37,38,62,63,70], but with the opposition of civil society, which felt that it had not been given due consideration in the planning process. Photovoltaic and solar thermal plants are more recent and, to date, have not been the target of any opposition.

2.2. The Region of Murcia (RM)

The rural areas of the region of Murcia (RM) present dispersed population nuclei of fewer than 1000 inhabitants [71]. There are two models of agricultural economics: irrigated areas with wide expanses of cropland and a broad range of fruit and vegetable produce that is well established in the national and international markets, and non-irrigated areas (mainly cereals, olives, almonds, and carob) run by farms that are much less competitive [71]. The five interviews conducted in RM are located in non-irrigated areas, although they belong to two regions that both have important irrigated areas. The economy of the Mula River area, which is a mixture of traditional fertile market gardens and rough barren karst landscapes, is mainly agriculture-based and underpinned by new technologies, and the Mula Market Gardens Irrigation Modernization Plan [72]. The “Campo de Cartagena” area is a plain that, at the end of the 20th century, the Tagus-Segura water transfer made its agriculture among the most productive and profitable in all Europe [72]. However, the remaining unirrigated areas have experienced a major population exodus due to the offer of employment in tourism in the coastal resorts [72,73] and in industry, mainly in the area of Cartagena, where new petroleum-based chemical industries have been set up since the end of the 20th century [74]. The region’s great potential for solar energy has resulted in numerous areas of unirrigated farmland being turned over to RE generation [75]. The energy sector is thus becoming a first-order resource for the development of the rural environment in the RM thanks to the creation of jobs and improvements to the low incomes of the rural population in low-yield agricultural areas [75].

2.3. The High Catalan Pyrenees-Catalonia (HCP)

The High Catalan Pyrenees (HCP) is the highland region of Catalonia, with a population density of 12.6 and 242.3 inhabitants/km² respectively. The 20th century saw a deep change in the region’s socio-economic structure from a subsistence and self-sufficiency economy to the service sector [76]. The remaining farms in the highlands, such as in the “Vall Fosca” valley, specialize in extensive pasture for meat production, which are progressively converting to organic farming. Nearly half (46.6%) of the HCP area (5775.62 km²) is regulated as a Natural Protected Area. The many seminatural spaces have played a key role in attracting and retaining people for employment in the tourist industry, mainly in ski resorts and their associated second homes [76]. As “Vall Fosca” is not located near the fast access route to the ski resorts, the landscape and the essence of the rural mountains have endured. The failure of a ski resort macroproject [77,78] triggered the creation of specialized BM under the hallmark of sustainable development. The current tourist supply

and cultural assets are also taking advantage of the hydroelectric landscapes, which have been particularly important for the west part of the region since the end of the 19th century, when the power plants were built to address the emerging new stage of Barcelona's industrial development [79].

3. Materials and Methods

3.1. Gathering and Selection of Information

The main primary source of information for this research paper comes from semi-structured research interviews (hereinafter, interviews) that have been designed to elicit quantitative and qualitative data to obtain LEAs' information about (a) geographic features, (b) economic specialization, (c) the financial benefits and losses, (d) customer expectations, (e) new products or services, (f) marketing, (g) success factors, (h) obstacles, (i) institutional environment, (j) policy conditions, (k) individual decisions, (l) environmental impacts, and (m) social benefits. The interviews lasted between around one hour and a half, depending on the amount of information provided by the interviewed. Often, the interview was addressed in two rounds, and on occasion, phone calls had to be made to verify or complete the answers.

The first phase of the selection criteria for this primary research was designed to (a) offer an analytical framework comprising a variety of the most representative RE technologies in Spain: onshore wind, hydroelectric, photovoltaic, and solar thermal (see Table 1); (b) consider areas with large onshore REPs; (c) consider only areas with a pre-existing agricultural use, and (d) include a broad variety of REL together with (e) including different study areas with their own specific RD dynamics.

Table 1. Renewable energy plants (REPs).

Study Areas	RE Plant	RE Technology	Installed Capacity	Area	Year Commissioned
Campaña of Seville, Andalusia (CS)	Cantalejos	Wind On-shore	14.00 MW	66 has.	2009
	Gemasolar	Solar Thermal	19.90 MW	195 has.	2010
Region of Murcia (RM)	Fuente Álamo	Photovoltaic	34.00 MW	84 has.	2008
High Catalan Pyrenees (HCP)	Capdella Hydropower	Hydropower	25.00 MW	6 has.	1914

The Capdella hydroelectric power station is the largest plant of a group of 5 power stations in the Vall Fosca valley in the HCP that operate with water from 30 lakes in an area declared a National Park in 1955 [79]. Although the valley essentially continues to depend on agriculture and livestock after the construction work had concluded, permanent jobs linked to the operation of hydroelectric power stations were created but later lost when the plants were automated in the 1980s [79]. The LEAs studied in HCP comprise: Casa Leonardo ecotourist accommodation, which was established when the plant was being constructed, and the Capdella Hydropower Museum, which is based on the conservation and display of hydroelectric tangible and intangible heritage.

The Cantalejos onshore wind plant in the CS region is in a rural area with agricultural and second residence functions. The LEA related to it is one rural accommodation service Las Viñas.

The Gemasolar solar thermal plant in the CS region. The LEAs related to the solar thermal plant include the Monclova farm (5500 ha in size), which covers a broad set of economic activities, and two SMEs (Fermupe and Ecilimp), which have emerged for the start-up and maintenance of the plant.

The Fuente Álamo photovoltaic plant, in the RM, is located on farms (between 2 and 25 ha) with their land being leased to the energy company for the estimated lifespan of the photovoltaic solar plants. The area's proximity to the ports of Cartagena and Escombreras makes energy transport viable.

All the REPs belong to large corporations that operate on an international scale in many countries and, therefore, have a complex business architecture. The interviews with its representatives offered general technical data on the implementation of REPs and their growth prospects.

The second phase of the selection criteria consisted of identifying the LEAs' cases of study. Here, authors explored the areas where the REPs were located in order to identify LEAs closely related to the plants at both levels, physically and socio-economically, and using the snowballing procedure. For this reason, empirical research also includes interviews with professionals in the RE sector (mainly engineers) and mayors or other local politicians who provided advice and, in certain cases, help for contacting the interviewed stakeholders representing LEAs in the three study areas. The interviews were conducted by the authors to include direct observation as part of the inductive and exploratory process. The authors have fulfilled the selection criteria conditions with 11 case studies. Other case studies were eventually discarded for technical reasons, such as a lack of detailed information in the interviews and the fact that other questionnaires did not contribute any new profiles. Case studies involve six sets of business actors: farmers who own the land where the plants are sited, second residents, hotels and accommodation services, cultural and heritage public services, and SMEs. Table 2 shows the archetypal LEAs used as BM study cases. In the case of second home residents, it is relevant to explain that an owner sold the house during the fieldwork period due to the changes in the landscape as a consequence of the wind plant.

Table 2. Local economic activities (LEAs).

LEAs	No. of Questionnaires	Study Area	Activity	Average No. of Jobs	Average Turnover	RE Use
Farms	1	CS	Monclova	>10	>200,000	Yes
	5	RM	El Malagueño	1	>10,000	No
			Hondo de la Venta			
			La Pinilla			
			Los Charcos			
SME	2	CS	Fermupe	>35	>500,000	No
Tourist and Cultural Services	1	CS	Las Viñas	>2	>5000	Yes
	2	HCP	Casa Leonardo Capdella Hydropower Museum	>3	>500,000	Yes

3.2. Method

The research tool to obtain information on the study cases is the qualitative research technique based on semi-structured research interviews. The interviews were designed containing the BMC scheme [47], considering the triple-layer BMC [61], which adds the environmental and social aspects of a business to the economic facet.

The analysis of the LEAs' business models involved a detailed longitudinal assessment of the information collected from the interviews. First, the interview answers were coded according to the nine BMC building blocks, as proposed by Osterwalder & Pigneur (2010), which are briefly introduced in Table 3. Second, a key conclusion was assigned to each LEAs' BM, according to the 11 categories in the value proposition (see Table 3). The LEAs' BM can be grouped in four out of the 11 categories. Third, the key conclusion or final value proposition of the LEAs' BM was interpreted concerning the RE plant, and on the way that the LEAs contributed to the RD of the area. Fourth, the research results were

analyzed according to the conceptualization provided from the literature revision. The results discussion is two-fold; it is based on the SDGs interplay, and contrasts with the theoretical framework on RE and RD.

Table 3. Business Model Canvas: nine interconnected components.

OFFER	CUSTOMERS	FINANCING
<p>Key resources Assets required (physical, intellectual, human, and financial) to make a BM work</p>	<p>Customer relationship Between LEAs and customer segments (personal assistance; dedicated personal assistance; self-service; automated services; communities, and value co-creation with customers)</p>	<p>Sales Channels LEAs' delivery of products and services to customers</p>
<p>Key activities Main activities. They include problem solving and networking</p>	<p>Customer segments Groups of organizations targeted and served by companies (mass market; niche market; segmented; diversified, and multi-side markets)</p>	<p>Revenue stream Company revenues/profits from customer segment</p>
<p>Key partnership Supplier and partner networks. They include LEAs' relationships to optimize the allocation of resources and activities, risk reduction, and the acquisition of resources and activities to minimize investment by sharing externalities</p>	-	<p>Cost structure Costs entailed in LEAs' activities. Costs can be cost-driven or value-driven depending on product cost or whether the product is exclusive</p>
<p>VALUE PROPOSITION Newness, performance, customization, "getting the job done", design, brand or status, product prices, cost reduction, risk reduction, accessibility, and usability.</p>		
<p>LEAs' product and services bundle that creates value for customer segments.</p>		

4. Results

Different LEAs' value propositions can be identified depending on whether the RE plant is treated as a customer or the customers are from outside the RE sector (see Table 4).

Table 4. Summary of LEAs and their value propositions for the RE sector.

Value Proposition	Accessibility	Customization
Key resources	Flat south-facing lands	Experience of working with public sector
	Extensive unbroken surface area	Quick professional response
Key activities	Diversification through land lease	Adaptation
Key partnerships	None	RE sector networks
Customer segment	RE investment groups	RE sector at international level
Customer relationships	Individual	Individual
Channels	RE investment groups	RE sector networking
		Sale of prototypes
		Leasing of machines and personnel
Revenue streams	Land lease	Consultancy services
Cost structure	Assuming the cost RE plant use of roadways, Access to water and Logistics support	Research and knowledge transfer
Key conclusion	Low price	Performance

4.1. Value Propositions for the RE Sector

4.1.1. Accessibility as Value

The economic activities categorized as accessibility patterns correspond to farms in RM (5 interviews) and CS (1 interview) (see Table 2). Their BMs are underpinned by the availability of suitable land close to the electric grid as the main key resource. The photovoltaic plants in RM are net consumers of solar and surface radiation. These are also requisites for the solar thermal plant in CS. The key resource that all the surveyed farms have available is low-yield land and this is what determines its being leased out for the installation of an RE plant. In one case, “Los Santos” farm in RM, the farm’s land is leased to the photovoltaic plant in its entirety. In the other five interviewed farms, key activities are diversified and there is still ongoing agricultural activity (see Table 2). The REP’s interest in paying at low prices is imposed in the face of the RM farmers’ lack of organizational structures and support networks. In contrast, the CS farm, despite not having any formal key partnerships, starts from a better negotiating position due to the availability of a greater amount of land. This gives the farm the opportunity to conduct further trials with other renewable technologies and obtain a share in the profits from RE.

The customer segment of all RM farms is composed of a single actor (the RE plant), whose loyalty is gained through 25-year leases and the ability to discharge to the grid. The surveyed RM farms accept this commercial relationship as a way to obtain complementary revenue and reduce risks. In the case of the “La Pinilla”, farmland renting at the moment is seen as a proof of concept. The interviews showed that farms’ relationships with customers and the RE plant are individual and changing and that their constraint to negotiate on revenue streams does not allow reducing their cost structure. The shared use of country roads, access to water, and logistics support is an added cost that the farmer-leaser usually assumes.

In summary, the value proposition of these RM farms is the offer of their product at a low price. Farmers obtain a stable income to compensate fluctuations in the price of agricultural produce. In contrast, the large and continuous surface available in the CS state allows operation with different RE companies and RE technologies as a strategy to reduce dependency and risk.

4.1.2. Customization of Products and Services

Customization implies that economic activities generate business in response to specific demands from the RE sector. This is the case of SMEs that have developed alongside and supported the CS solar thermal plant’s construction process (see Table 4). These study cases are rooted in the local economy and accessibility and a quality-cost ratio, having turned the tailoring of products and services to the specific needs of Gemasolar into their main asset. Such is the case of Ecilimp, a company consolidated in the waste recycling and cleaning services sector with a large volume of business. It is also the case of the Fermupe company, which deals in private security for civil construction works but was affected by the fall-out from the economic crisis. These companies’ key resources are underpinned by previous experience of working within the public sector. The professional relationship is initiated either by the companies approaching the RE developers or because they are “headhunted” on account of their experience in the sector. They are family businesses in which dedication, a trust relationship, proximity, and adaptation of the service are the main key resources. In the case of Ecilimp, there are two generations of the family, the second of which has been well-trained; thus, they combine experience and soundness as well as the ability to innovate to address customers’ needs. The Gemasolar RE plant is not the only customer, despite being the largest. These companies’ ability to adapt to REPs has led them to specialize in maintenance services for solar plants in a business that currently extends throughout Spain, Morocco, South Africa, and Israel. There is no doubt that the generation of the customer’s trust creates a form of partnership. They recognize that the customer, the RE plant, is their main ally in maintaining and growing the development of their activity. Ecilimp is currently involved in publicly funded research and transfer

programs to develop more efficient prototypes. This makes the company a leader in the field of innovation for REP's services and thus for rural development at Spanish context. The complementarity and diversification of services developed to cater to the customer's needs ensure the revenue flow. While this consolidates these SMES in the sector, it also triggers the hiring of personnel in the agricultural environment. Training personnel to handle the machines is an important part of these SMEs' cost structures, as is the purchase of new vehicles, adaptation costs for the customization service, and external consulting costs. Meanwhile, SMEs' revenue is fed by the sale of these prototypes, the leasing of machines and personnel, and any consultancy services considered necessary for outsourcing to REPs in several different countries.

4.2. Value Propositions for RD

4.2.1. Diversification

Six farms show the same type of BM, which value proposition oriented to the RE sector is based on accessibility and low cost. The LEAs as farms present a homogeneous BM in respect to RD, which is based on the diversification strategy (see Table 5). However, their specialization differs largely in respect of key resources and key activities. High rates of agricultural diversification emerge on Monclova estate in CS due to its large size, which enables them an agro-industrial processing based on olive oil from its extensive olives groves and dairy products from their livestock. There are also buildings with heritage value on the estate, where a varied roster of tourist services is developed, from accommodation to organizing concerts, brand events, and their renting out for events such as wedding receptions. Apart from the development of the renewables sector, the less productive lands of CS estate are given over to the extraction of aggregates. The CS estate is based on production volume and quality. The societal and family networks of CS estate are another asset that brings influence to bear in the development of its market segments.

Table 5. Summary of economic activities and their value propositions for RD.

Value Proposition	Diversification	Differentiation	Brand/Status	Novelty
Key resources	Large size farm	Site	Rural environment Landscape	Power plant legacy
Key activities	Agribusiness Tourism Extraction of aggregates Ecological agriculture Livestock	Large-scale civil works Urbanization and hydraulic works On-site security Cleaning services Waste management	Tourism experience sector Eco-tourism	Technological tourism Empowerment
Key partnerships	Cooperatives	Local networks SME	Innovation Personal Production/platform network.	Hydro-power plant Local council Universities Network of Science and Technology Museums of Catalonia
Customer segment	Diversified	Firms Public administrations	Tourism experience	Local population Schoolchildren
Customer relationships	High business relationships and scale economies in the large farm	Trust generation	Internet Word of mouth	Local population Co-creation

Table 5. Cont.

Value Proposition	Diversification	Differentiation	Brand/Status	Novelty
Channels	By activity or product	Local Regional National International	Customization	Tourist and heritage networks
Revenue streams	Sale of products	Services provision	Renting houses for tourist services Tourist routes Hospitality Grant from RD LEADER program	Entrance tickets
Cost structure	Wholesale sales	Supplier cost reduction Value-driven services and scale economies	Traditional buildings restoration and maintenance	Facilities for the exhibitions Communication plans and advice
Key conclusion	Diversification	Performance/resilience	Singularity	Legacy/heritage

The farms in RM use their resources, i.e., the land in this case, to diversify their activities on a scale in keeping with their size and characteristics, despite land renting demand for REPs siting being high due to the investors' speculation.

Another example of value-added production combined with land renting to REPs is La Pinilla farm in RM, specializing in organic agriculture. The other RM farms, Los Charcos, Hondo de la Venta, and El Malagueño, produce almonds and livestock, apart from the leasing of land to the photovoltaic plants.

Customer segment and market channels for agricultural produce in RM study cases are both determined by the presence of agricultural cooperatives. Cooperatives play a fundamental role in ensuring that almonds continue to be grown due to scale economies and price regulation. The most dynamic farmers are more proactively involved in the cooperative, while for others, this is the only way to market their products. The cooperative is the only customer in the agricultural production context as RE investment groups are the only marketing channel in the RE sector.

4.2.2. Differentiation

The SMEs' BM presents a value proposition based on differentiation (see Table 5). According to the responses to interviews, the SMEs' growth strategy consists of contacting customers outside CS while contracts with large companies and public administrations are the basis for the model. The activities that the SMEs undertake apart from the RE sector are different in each case. Fermupe offers adaptability to the demands of large-scale civil construction works: on-site security, metal treating, the manufacture of metallic components, and other "special services", i.e., finding solutions to any problem that the contractor requires. Ecilimp offers a portfolio of cleaning services: waste management, the cleaning of health facilities and education centers, road sweeping, gardening, and the monitoring of health networks. Another sector of activity is the execution of civil works, from earthmoving to constructing roads and tracks, to urbanization and water systems. Both are family companies based on self-employment and provide a stable job source in rural communities.

4.2.3. Brand/Status

The human factor is extremely important for the development of these SMEs' activities. Contracts depend on the quality-price ratio of the services offered and risk reduction,

(see Table 5). Rural accommodation in the HCP and CS study areas develops a value proposition based on brand image. The findings for both BMs include price as a main asset but tailoring services to customers' requirements is another important asset that includes maintaining and preserving the rural accommodation building, the related facilities, and the surroundings. Casa Leonardo in HCP was built as an inn to take advantage of the flow of workers who constructed the Capdella Hydroelectric Power Station, although it no longer has any commercial relationship with the power plant. After a period of time closed, the founder's granddaughter rehabilitated the hotel in 2005 through a RD-LEADER program grant. The effects of the power station are basically visual, with the presence of high-voltage towers and noise in the high-voltage network, although not everybody reaches to hear it.

Key resources and activities are based on the landscape and the rural setting's natural and cultural heritage values in both LEAs. Casa Leonardo's services pivot between organized hiking routes to enjoy protected natural spaces and the hospitality offered based around local products and product development, such as hiking routes across the lakes at the bottom of the valley, which include natural lakes and reservoirs. Casa Leonardo also offers sponsorship through voluntary customers' taxes to restore micro-natural spaces in the area. This tourist accommodation makes considerable efforts in the areas of water and electricity supply and waste recycling. These activities reinforce the brand, the customers' loyalty and provide Casa Leonardo an important leadership role in the synergies created around it.

Las Viñas offers rented rural accommodation houses in old wineries, restored three traditional buildings, and by equipping them with water cisterns in a semi-arid environment. It also offers horse trails and mountain bike routes such as a visit to the monumental town of Osuna. Its key partnership is word-of-mouth between customers who seek enchanting accommodation with high quality services. The main revenue comes from renting out rural houses and, second, from offering routes and hospitality services. In the case of Las Viñas, the RE plant is a source of uncertainty for this model, as the presence of windmills has changed the landscape and the birdlife, together with the nuisance that they cause, mainly at night, from the noise of their blades and the flashing lights on top of the turbines

4.2.4. Novelty

The Capdella Hydroelectric Museum has developed a BM based on optimizing the implementation of the power plant in the area. The history of the construction of power plants in HCP, the transformation of the territory, and consequences have forged a legacy in which the local residents are the main stakeholders. This technological tourism also is addressed to instructing visitors as to what the construction of a hydroelectric power plant represented for the area. Thus, the value proposition is rooted in the novelty of this pool of activities.

The key resources are the presence of the plant itself, the technology, the facilities, and the site. Retired power plant workers offering their knowledge as volunteer guides can also be considered a key resource in the Museum. Collaboration with the company that owns the power station is a requirement, but the public partnerships (the network of science and technology museums of Catalonia and universities) are also decisive. and the routes on offer, such as, for example, the route that uses the old cable car built to transport materials during the construction of the power station and which at the current time provides access to the Aiguestortes i Estany Sant Maurici National Park. The customer relationships are upward between the local community who, through the local government, promoted the museum and the electricity company that guarantees its existence by ceding its offices and allows visitation of the installations. Downward, the customer relationships are toward the region and visitors from elsewhere. The use of the infrastructure is included in the energy company's representation expenses as "good practice". The Capdella Hydroelectric Museum is an example and a model of the heritagization and promotion of a hydroelectric landscape, with an especially active local community, a local council committed to the

project, and a history that interweaves the hydroelectric legacy with Vall Fosca's cultural and natural heritage.

5. Discussion

BMs created in relation to REPs lead to the identification of two different LEA's value propositions oriented toward the RE sector: land leasing and SMEs offering maintenance services to REPs. In turn, analyzing the interaction of the different BMs with their socioeconomic environment evidences three main contributions to the RD, acting on rural diversification, on rural firms' resilience, and on rural representation. These contributions are informed with the reviewed literature and are summarized below.

5.1. Rural Diversification

The farms' value proposition is *accessibility* to available siting requirements for REPs. Farmers own the land; however, the lack of partnerships and cooperation organizations prevents them from starting from a strong position to negotiate conditions with the REPs' developers, both with respect to the leasing conditions and the maintenance costs of shared infrastructure [43,44,65]. These LEAs base themselves on offering a low-cost product as an added value that enables them to obtain stable and reliable revenue, which contrasts with the fluctuations in the price of agricultural produce and a long-term agreement. When the farms have the opportunity to continue their agricultural activity due to its profitability and have the required human resources, land leasing is a complementary revenue. It can be concluded that, if these farmer-owners act under the umbrella of a possible association or as a collective of leasers of land to REPs' developers, they will increase their bargaining power [65]. Operating with a lobby would not only help to obtain higher leasing revenues but also to share advice and information between farms. This will allow farmers to lower the costs of their advisory services, and in an optimal scenario, enter into a partnership with the RE plant. Empowering farmer-owners is not only important to obtain higher revenues and a better quality of personal and family life but also essential for the farms' economic viability, which is vital for the farm's continuity and therefore for RD [2,22,43,44]. Thus, it can be argued that the economic sustainability of the farms is necessary to comply with SDG11 [21], and by extension, SDG3—Well-being [1,20] and SDG10—Reduced Inequalities [20].

5.2. Rural Firms' Resilience

Another BM identified is LEAs related to REPs, which consists of SMEs oriented toward the customization of their value proposition. This relies on having specific professional experience and the capacity to adapt and innovate the business by research and knowledge transfer for the design and sale of specific technology for the services that they provide to the REPs. SMEs' managers drive the value proposition through RE sector networks, their main channels, indicating the collaborative approach's relevant role in their BM [4,34,36,50,51]. In this case, the key conclusion is performance as they offer greater added value to the plant in comparison with farms. Hence, the second type of benefit for RD is the possibility to consolidate LEAs as firms whose value propositions are based on differentiation through the maximum possible specialization and innovation of their services. This contribution to RD is the resilience presented by innovation and family-based businesses, key in SDG9—Innovation [20]. In this case, the benefits for RD are clearly the economic sustainability of the business itself, the creation of new jobs, and driving business growth [22,23,34,36], which are central issues in SDG8—Decent work and Economic Growth [20]. The benefits go beyond this, as REPs empower the SMEs in the territory and introduce them into the global renewables economic sector due to their tailoring of services and specialized key prototypes [22,23,35]. These reinforce SDG7—Clean Energy, and by extension SDG13—Climate Action [20].

5.3. Rural Representations: Threats and Opportunities

With the analyzed rural accommodation, LEAs develop their value proposition based on brand image. Key resources and activities are supported by the landscape and the natural and cultural heritage values of the rural setting, whether founded on the ecological capital of the area that the accommodation is in or based on its cultural heritage. Results show that the creation of synergies through partnerships with other accommodation businesses is crucial for the sustainability of these BMs. Thus, cooperation and partnerships are essential for the contribution of this sector to RD because its uniqueness diversifies the tourist offer [41]. In contrast, when the opportunity for partnerships to achieve scale economies or develop new tourist products does not exist, the lack of a position of strength adds to the negative or non-integrated impact of REPs [8,36], and consequently restricts SDG7—Clean Energy, and by extension SDG13—Climate Action [20].

A fourth type of BM arising from the study is novelty-based, as in the case of the museum that capitalizes the RE plant by offering hydroelectric heritage interpretation services. Due to, first, the support from institutions and local associations, and later, from a museum network and from universities, it has been possible to valorize heritage that was not only at risk of falling into disrepair, but which was also an unexploited asset [41,45]. These collaborations have created synergies that reinforce the study area's tourist specialization, which is crucial for a region with population densities under 12 people/km². With this cultural facility, the Vall Fosca valley approaches the protection of the world's cultural and natural heritage included in SDG11 [21].

Given the exploratory nature of this paper and the incipient research on interdependency relationships between LEAs and the RE sector in the energy transition process, future research lines should focus on new actors, other geographical areas and other technologies such as biomass, geothermal and offshore wind energy. This study demonstrates that the low carbon economy challenge and the fight against global climate change must be underpinned by global benefits while not losing sight of any disruptions caused on the local scale [16,24,30,42–44]. It is therefore essential for RE companies to become aware of the structures and circumstances of the areas in which they operate instead of considering them as non-places [2,8,15,31–33].

6. Conclusions

A new analytical pattern has been introduced to evaluate specific LEAs' value propositions regarding their relation to REPs to determine their contribution to RD and their role as co-players in the fight against global climate change. First, a BM framework has been applied to analyze LEAs' interrelation with the nearby RE plant and to explore how the LEAs' BM contribute to RD in three different rural areas in Spain. Second, the results have been related to the SDGs' influence to assess the RE effects alignment to global sustainability. Although the number of case studies is limited as an exploratory work, this research has enabled to identify the following main issues:

First, economic benefits from the REPs can be found in two different BM: the SMEs' performance and resilience and farms' diversification. While the SMEs provide a considerable number of jobs as a clear and direct benefit toward RD, farms' diversification presents not such clear advantages regarding the absence of collaborative organizations to provide them a stronger position to negotiate the conditions of the land leasing. In addition, insufficient innovation in the agricultural produce in most of the smaller farms threatens the continuation of the farms' activity for future generations.

Second, concerning environmental benefits, results show that while tourist and cultural services and the larger farm are RE consumers, the SMEs and smaller farms are not. The reasons argued were time trouble, logistic difficulties in installing RE self-generation systems, and insufficient advice on aid policies. In this sense, the smaller farms and the SMEs did not seem to take an active role against climate change, although they provided essential resources and services for the REPs. REPs' little involvement in the spread of RE consumption is also notable. Conversely, environmental harms from the wind plant [80] can

threaten the value proposition based on rural–natural settings brand, and apply sustainable practices such as RE consumption, water-saving measures, and restoring cultural heritage. It seems reasonable that planning instruments will have to guarantee the compatibility of these pre-existing activities in such cases. Otherwise, these activities unintentionally become disruptive elements in the energy transition process. Thus, they may be compensated by, for example, (a) indemnifying for losses of property or business activity; (b) by offering co-ownership shares, (c) ensuring RE supply to local consumers with discounts for the most affected; (d) by deploying sociocultural and well-being services, (e) informing beforehand about the impacts and the mitigation measures, and (f) creating a fund for preliminary investigations.

Third, social benefits were found in the case of the patrimonial legacy of the hydropower plant. The economic legacy allowed the third generation to create a new ecotourist service with permanent jobs that keep skilled people to the region. Restoring the material heritage and taking the immaterial legacy of the RE plant as interpretative discourse empowered the local community and provided a new cultural and tourist product. These BMs show that to take advantage of REs sitting is possible with a proactive role as an entrepreneur or as a community's project. Public support such as LEADER-RD grants and partnerships among local government, cultural networks, and universities have been essential. Fourth, RE policies from the current Spanish government envisage a remarkable growth of REs, mainly in rural areas, where they often have lasting demographic losses and lack of economic opportunities. Therefore, REs installation can represent real opportunities to generate economic development in these areas. However, research results and reviewed literature indicate that top-down policies mismatch a proper integration of REs into the hosting communities, threatening equal opportunities. Consequently, an increase in the number of splits between territories and between sectors of the population can be foreseen and then an increasing opposition. Although the new regulation considers consumers' involvement in its discourse, little mention is addressed to rural areas as subjects. In addition, the inaccessibility of the giant companies that are currently the primary owners of REs does not provide the openness to participate in collaborative processes to enhance RD strategies. Although the current RE development plan contains socioeconomic and public participation rhetoric, their prospects are focused on RE private companies and leave the RD issue and the environmental impacts on the already existing regulations. In this respect, the new promotion of RE installation for self-consumption, whether individual or shared, can be a positive advancement. According to the literature revision, local partnerships provide a more active role to local communities and include those less empowered stakeholders in this more than likely significant transformation of many rural areas' landscapes. RE decentralization should also be accompanied by a more effective local government's leadership, although they often lack the needed economic and human resources to develop integrative projects. Therefore, as the reviewed literature states, specific intermediate institutions must intervene to create the synergies and provide technical information with participatory processes. In this sense, the triple-layer BM approach has proven to be one suitable tool. These conclusions suggest the need for new governance for RE production favoring the energy transition coherent with SDGs.

Author Contributions: Conceptualization, M.-J.P., M.P.-B. and R.G.-M.; Data curation, M.-J.P. and M.P.-B.; Formal analysis, M.-J.P., M.P.-B. and R.G.-M.; Funding acquisition, M.-J.P.; Investigation, M.-J.P., M.P.-B., R.G.-M. and C.d.V.; Methodology, M.-J.P. and M.P.-B.; Project administration, M.-J.P. and C.d.V.; Resources, M.-J.P. and M.P.-B.; Supervision, M.-J.P. and M.P.-B.; Visualization, C.d.V.; Writing—original draft, M.-J.P.; M.P.-B., R.G.-M. and C.d.V.; Writing—review & editing, M.-J.P. and M.P.-B. All authors have read and agreed to the published version of the manuscript.

Funding: FEDER/*Spanish Ministry of Science and Innovation*—Research National Agency/_Project Ref CSO2017-84986-R.

Data Availability Statement: The data are not publicly available due to ethical restrictions.

Acknowledgments: The authors would like to thank Jose Miguel Díaz Borrego and Alba Ruiz Diez for supporting the implementation of the present research with the tabulation and processing of semi-structured research interviews. Special thanks to Alba Ruiz Diez for authoring the Figures.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

BM, business model; BMfS, business model for sustainability; CS, Campiña of Sevilla; HCP, High Catalan Pyrenees; LEAs, local economic activities; RE, renewable Energy; REPs, renewable energy plants; RD, rural development; RM, Murcia Region; SBMs, sustainable business models; SDGs, Sustainable Development Goals SMEs, small medium enterprises.

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