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Building a Common Support Framework in Differing Realities—Conditions for Renewable Energy Communities in Germany and Bulgaria

Deyana Spasova [1,*] and Sibylle Braungardt [2]

[1] Ecologic Institute, Pfalzburger Str. 43/44, 10717 Berlin, Germany
[2] Öko-Institut e.V., Merzhauser Str. 173, 79100 Freiburg, Germany; S.Braungardt@oeko.de
* Correspondence: deyana.spasova@ecologic.eu

Abstract: The revised EU Renewable Energy Directive first introduced renewable energy communities into the EU policy framework and requires Member States to implement a support framework for them. Given the broad scientific evidence showing the benefits of community energy for a just energy transition, a successful implementation across all Member States is essential. However, the preconditions for developing support frameworks differ largely between EU nations, as some countries have long-term experiences with supporting renewable energy communities (i.e., Germany and Denmark), while in other Member States, renewable energy communities are notably non-existent (i.e., Eastern European nations). With the purpose of providing scientific evidence to support the development of a policy framework for renewable energy communities in Eastern European Member States, this article compares key factors for the development of such communities in Bulgaria and Germany, combining a literature review with expert interviews to collect primary information on Bulgaria. A country analysis puts these factors into the contexts of both countries, while a cross-country comparison demonstrates that there are significant gaps in the support framework of Bulgaria, although these gaps are, to a lesser extent, also present in Germany. We discuss these shortcomings, derive policy recommendations and identify further research needs.

Keywords: renewable energy communities; energy transition; Bulgaria; Germany; community energy; EU

Citation: Spasova, D.; Braungardt, S. Building a Common Support Framework in Differing Realities—Conditions for Renewable Energy Communities in Germany and Bulgaria. *Energies* **2021**, *14*, 4693. https://doi.org/10.3390/en14154693

Academic Editors: Abu-Siada Ahmed and David Borge-Diez

Received: 17 June 2021
Accepted: 27 July 2021
Published: 2 August 2021

1. Introduction

The EU Renewable Energy Directive (RED II) (Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources. L 328/82. OJ L 328, 21.12.2018, pp. 82–209) acknowledges the importance of renewable energy communities (RECs) for the decarbonization of the European energy system. The directive provides a definition for RECs and introduces Article 22 with the aim of supporting their deployment. With the transposition of Article 22 into national law, EU Member States were required to introduce a legal definition and an enabling framework for RECs by the end of June 2021.

The recognition of RECs as legal entities in the EU is important for several reasons. Research has continuously discussed the significance of RECs for the carbon-neutrality transition of Europe, as they have been found to not only empower energy consumers, but also reduce greenhouse gas emissions [1–4], play a role in the increase of the acceptance of renewable energy sources (RES) and positively influence people's awareness of green energy [5–10]. Nevertheless, the literature also discusses negative aspects of RECs, such as a lack of inclusion and social justice, since the overwhelming majority of participants are white, middle-aged men with high incomes [11,12].

In the EU, while some Member States such as Denmark and Germany have extensive experience with community energy, other countries, and in particular, the post-socialist

states of Eastern Europe, have barely dealt with the concept and some of them currently have no known RECs [13]. It is important to point out that "community energy" is a phrase, synonymous to a range of terminologies, used to describe, "locally led, collectively owned, and managed energy projects" [14] (p. 2). Thus, in this paper, "community energy" will be regarded as a synonym of RECs, although in practice it may also encompass other forms of joint energy initiatives.

The literature dealing with RECs in Europe is also mainly focused on Northern and Western Europe, with Denmark, Germany, the UK and Scotland, Belgium and the Netherlands receiving the most interest. There is limited coverage of Eastern European Member States in previous research regarding RECs.

In view of the transposition of the requirements for a support framework for RECs under RED II, Eastern European countries face a twofold challenge. On the one hand, having limited experience with RECs, their starting position is far more challenging than it is for Member States with long-term experience. On the other hand, due to the lack of research on RECs covering Eastern European Member States, the information base for creating support frameworks under the specific conditions of these countries is weak. Reference [15] considers that there is need for change in established support frameworks for RECs in the EU in order for national strategies to be successful.

This paper addresses these challenges by providing a comparison of key factors influencing the development of RECs between Germany, as a country with long-term experience, and Bulgaria, where community energy is practically non-existent and where little previous research on the topic has been conducted. The aim of this paper is to provide scientific insight for improved support and policy frameworks for the deployment of RECs in Eastern European Member States, and in particular Bulgaria, by drawing from the experience of a leader in community energy—Germany.

Selection of Case Study Countries

Previous studies focus mainly on Western European countries, and a large number of them focus solely on Germany. Exploration of information about local energy initiatives in Eastern Europe proved that their development is limited to non-existent, as are data on the topic in this region. Therefore, this paper addresses the research gap, provides a more comprehensive picture of the reasons for the generally hindered development of community energy in post-socialist European countries and explores the differences in the facilitators for RECs in Western and Eastern Europe. Bulgaria was selected as a case study country in its quality as a representative of Eastern European nations, the study of which, in relation to RECs, is inadequate.

The analysis consists of an examination of facilitators for the development of RECs in Germany and Bulgaria and a comparison between the two countries. The methodological approach combines a review of scientific articles, reports, gray literature and online materials with semi-structured expert interviews.

The article is structured as follows. First, the materials and methods used in the research are covered, including the main methodological steps undertaken and a tabular summary of the five expert interviews. Afterwards, an exploration of the factors influencing the development of RECs, based on a review of previous studies, as well as case study analyses of Germany and Bulgaria, are presented. Following these, a cross-country comparison and a discussion are presented. Lastly, the article concludes with policy recommendations and an identification of further research needs.

2. Materials and Methods

Main Steps

The approach undertaken for this research includes the following: (1) a literature review with the aim to gather information about facilitators for community energy, as well as the current development of RECs in Germany and Bulgaria; (2) the collection of primary

data through five expert interviews to fill the gaps in the literature; and (3) a cross-country comparison of Germany and Bulgaria.

Firstly, a review of existing literature with a focus on facilitators for the development of RECs was carried out, through which several factors determinant for the success of community energy initiatives were deducted. The examined literature covers studies published in books, journal articles, reports and gray literature and internet documents. Web of Science (Web of Science searches include "renewable energy communit *", "energy communit *", "renewable energy cooperative *", "energy cooperativ*" and "community energy"), Elsevier and Google Scholar were the most frequently consulted databases.

Following the line of work of previous studies such as [2,16,17], the review aims at identifying common determinants for the success or failure of RECs. Following the identification of these factors in the literature, they were classified according to the area in which they influence the development of RECs and were organized into three main categories. The Economic factors category includes elements such as disposable income, wealth and household welfare. Regulatory, financial, local-level support and governmental guidance were deducted as features of the Legislative framework factor. Lastly, the Social factors category comprises components such as public acceptance, trust and historical developments.

For the case of Bulgaria, expert interviews were conducted to gather additional information, as the review of the literature was not sufficient for an exhaustive study on the current state and development patterns of community energy in the country, and major research gaps exist.

Five experts on community energy in Bulgaria were interviewed. In order for the expert interviews to be conducted, an interview questionnaire was created. This was done to achieve a more thorough analysis of conditions in the country—to gather further information about the factors deducted from the literature, so that additional facilitators were determined and more insight about the country's development of community energy was acquired.

The semi-structured interviews addressed the following core topics: (1) examples of RECs in Bulgaria, (2) drivers and barriers for Bulgarian consumers to create an REC and (3) recommendations for supporting RECs in Bulgaria.

Interviewees were identified through online research of:

- EU projects, dealing with community energy or RECs, which Bulgaria takes part in;
- Environmentally focused non-governmental organizations (NGOs) in Bulgaria and, in particular, those focused on community energy or those with experience in related topics;
- Experts who have contributed to the implementation of renewable-energy-related EU and Bulgarian projects or who have experience with renewable infrastructure and planning;
- Existing literature on community energy in Eastern Europe and Bulgaria and its authors.

The area, level and relevancy of expertise concerning the aim of this paper were the factors that were mostly considered during the process of selecting the interviewees. The interviews were conducted between March and July 2020—four of them over the phone and one via Microsoft Teams.

Table 1 gives a summarized view of the interviewees.

Table 1. An overview of the expert interviews, conducted as part of the country analysis of Bulgaria.

	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4	Interviewee 5
Occupation	Coordinator of the "Public funds for sustainable development" campaign as part of the Energy and Climate team of the "Za Zemyata" (For the Earth Bulgaria) (NGO)	Chair of the EPF Euro Perspectives Foundation (NGO)	Architect, energy efficiency and RES consultant and re-searcher (Bulgarian Academy of Science)	BREEAM/LEED/PHS Sustainability Energy Consultant in the Institute of Mechanics Center for Energy Efficiency (NGO)	Campaign coordinator "Energy Solutions", Greenpeace Bulgaria (NGO)
Relevancy for research	Research and activism experience and participation in small-scale RE and clean heat projects	First-hand experience with RECs, due to work for the COALESCCE project, aimed at creating community energy pro-jects in Bulgaria	Experience with renewables, district heating and community energy, and participation in European projects such as Horizon 2020; first-hand experience with administrative burdens for installing RE technologies	Experience with the utilization of various RES and technologies in small-scale and municipal projects	Experience working for an NGO on the topics of communal energy, co-operatives, decentralization and energy poverty

3. Results

3.1. Driving Factors for RECs

3.1.1. Economic Factors

RECs are predominant in Northwestern European countries with high disposable incomes, as both purchasing power and an adequate social capital are necessary for investing in a community energy initiative [18]. Accordingly, lower disposable income and wealth negatively affect community initiatives [11], and countries in Southern and Eastern Europe, where citizen welfare is less developed, have a smaller number of RECs [18]. Citizens of more developed countries are also more enthusiastic investors in local energy projects [19], as higher incomes provide for a higher investment culture with respect to environmental issues and wealthier countries experience greater levels of environmental concern amongst their populations [20]. In comparison to high-income households, it is also more unlikely for low-income households to upgrade old energy systems, for example their heating [21].

The amount of household welfare has also been found to be determinant for the willingness to install small-scale renewable energy (RE) generators [19], and people who decide to install such technologies are wealthier than average [22]. High costs for RE installations and the need for wealthy investors have also been found to be a barrier for community energy [1].

3.1.2. Legislative Framework

A lack of supporting policies and incentives on a national level and governmental preference for distributed generation schemes have been pointed out as reasons for an insufficient energy transition progress and a meagre number of RECs in various countries [17,23,24]. Regulatory and financial support is one of the most crucial factors for the success of community energy [5]. Financial support schemes are one of the largest drivers for RECs, as schemes, independent of common market prices, allow for small-scale projects to take part in the energy system [8]. In a case study of RECs in the Netherlands, the authors of [3] found that existing financial support from local and national governmental institutions is a motivator for people to invest in an REC. The most successful countries in deploying RECs in Europe also have prominent support frameworks, such as the Community and Renewable Energy Scheme (CARES) in Scotland and the Renewable Energy Act (EEG) in Germany.

Governmental guidance during the planning stages of an REC is an important service for the realization of activities such as financing and operating. Guidance may include written reports and booklets, online guides, databases and toolkits, as well as technical

support schemes such as training programs for professionals or workshops for citizens [25]. Moreover, the authors of [26] found that substantial prior knowledge and skills including technological know-how and risk management expertise are a prerequisite for the success of community energy projects. More knowledge of management and other skills, necessary for the success of an REC, are possible to achieve with support from the government and other institutions [24].

Support on a local level also has a strong impact on the development of RECs, and municipalities are seen as not only an important driver for energy decentralization [14], but also as communities with an impact on the energy transition [27]. As the activities of most RECs are region-bound and consumer participation remains at a local level, promotion of community energy initiatives by local authorities has been found to be essential [5]. Promotion through well-known people such as the mayor or semipublic actors, as well as in local newspapers or municipal webpages, has been found to have a positive impact on the development of RECs [28,29].

A solid legislative framework for renewable energy self-consumption is also a determinant driver for community energy and the importance of guaranteed access to the grid has been recognized by the EU and in particular in the RED II [30]. However, as current grids are largely centralized, it is vital for changes in the permit processes for installations and grid access to be undertaken, in order for renewables' self-consumers to have an influence on the energy transition without restrictions or unnecessary burdens.

3.1.3. Social Factors

Support on a political level is important for an REC to succeed; however, the backing of the public is equally crucial [8]. Social acceptance of and trust in RES and community energy projects are factors necessary for the successful development of RECs, as citizen-led green energy initiatives require sufficient amounts of willingness for public participation in order to exist in the first place [19]. Trust or distrust in national and local governments, in different institutional stakeholders and the community itself are also found to influence the success of RECs. Mistrust and distrust (if directed to the State, monopolists or joint consumers in general) have been found to both push community energy projects forward [31] and jeopardize their introduction as an innovation [32]. Historical events, conflicting political governance and lack of trust in energy suppliers are all factors affecting public trust in governmental authorities regarding energy [30].

A country's historical development and its history of community energy also play a role in the success of RECs. For example, researchers have argued that Eastern European countries have an underdeveloped cooperative model due to the concept's association with socialism [7]. RECs are also more established in Western than in Eastern Germany, possibly because of detrimental associations with forced collectivization under the socialist rule in the latter [11].

3.2. Country Analysis

3.2.1. Germany

Germany is among the European countries with the highest number of RECs, as studies have reported an approximate 1747 citizen-led energy initiatives [33].

In Germany, the so-called "citizen energy communities" (Bürgerenergiegesellschaften) are provided with a legislative definition in the country's Renewable Energy Sources Act (EEG). The EEG, aimed at encouraging renewable electricity through a feed-in tariff, came into force in the year 2000 and has since been amended several times. The most current version replaces feed-in tariffs with an auction system for most renewable technologies. Notable for community energy in Germany was the 2004 amendment of the EEG, which updated the funding rates and strengthened the legal position of local electricity network operators. Figure 1 provides an overview of the German electricity mix, beginning in 2004, which shows that the development of wind and solar PV was directly driven by the EEG, consequently creating favorable conditions for RECs.

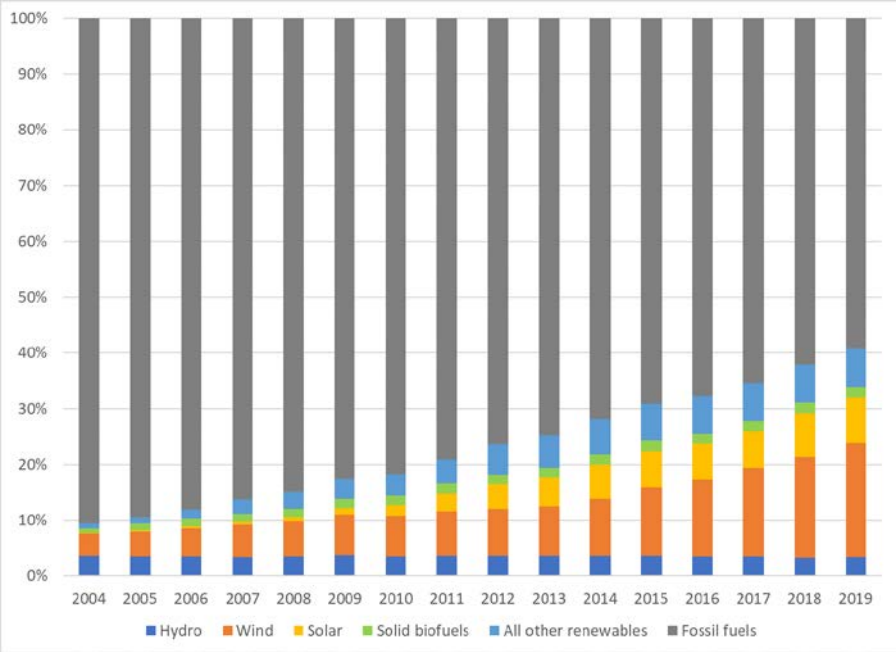

Figure 1. Electricity mix of Germany. Based on Eurostat shares data.

RECs in Germany can be found under various legal forms, including energy cooperatives (eingetragene Genossenschaften—eG) and closed-end funds (Limited Liability Company & Company Limited Partnership—GmbH & Co. KG) [34]. Information about RECs, their number, their features and their development in the country is abundant and can be found in journal articles, books, official reports, online websites and databases.

Economic Factors

As the Member State with the second highest gross disposable income per capita, Germany has an enabling economic environment for investments in RECs. In 2019, private persons and farmers owned 40.4% of the installed RE capacity in the country [35]. However, although Germany's highly developed economy is a predisposition for the deployment of RECs, its internal regional economic inequality is a hindering factor. The lower disposable income and wealth in Eastern Germany are factors, which specifically affect the development of RECs negatively and RECs hardly exist in some regions in the East [11]. In 2019, the gross domestic product (GDP) per capita and the gross annual income of Eastern Germany were still noticeably lower than these of Western Germany, while the unemployment rate was higher [36].

Legislative Framework

Germany provides various support options for the development of community energy initiatives, including fair treatment of end-users and multiple funding schemes. Financial support for RECs is attainable in multiple forms, including incentives, compensations, low-interest loans, grants and subsidies, and is available through a variety of schemes, most notably the EEG, the KfW Renewable Energy Program Premium, the National Climate Protection Initiative (NKI), the Market Incentive Program (MAP) and the Energy Tax Act (EnergieStG).

The large number of RECs in Germany has resulted in administrative processes being largely standardized and without unreasonable delays [37]. The length and complexity of the permitting processes for connecting small-scale RE installations in Germany are comparable to other European countries such as the Netherlands and the UK [38]. Moreover, no permit is necessary for rooftop PV installations, mini combined heat and power (CHP) and heat pumps [8]. Procedural and technical guidelines about the establishment of RECs

are found predominantly in publicly produced documents and texts, including brochures, reports, handbooks and online databases.

Social Factors

The long tradition in citizen participation in the energy transition of Germany dates back to early 20th century electricity cooperatives [11,39], one of which—the Elektrizitäts-Genossenschaft Röthenbach (EGR)—was founded in 1918 and is still active today.

Generally, community energy in Germany has been influenced by four main historical events.

Firstly, the 1970s oil crisis resulted in the construction of the first wind turbines and the initial establishment of wind cooperatives [40]. Additionally, a boom was experienced in the so-called "drying cooperatives" (Trocknungsgenossenschaften), where agricultural products were dried out, as well as in energy communities, based around heat generation plants [39,41].

Second, the development of RECs in Germany has been positively influenced by the energy market liberalization, as the process opened up the market for a wider range of participation, including small energy suppliers, stimulated competition and bottom-up initiatives, and also granted people the freedom to invest in decentralized energy [42–44].

The events in Chernobyl and Fukushima also propelled the establishment of RECs [40]. An example is the town of Schönau in Southern Germany, which gained nation-wide attention after its citizens decided to become entirely independent from nuclear power by establishing a town-wide REC, which has since been transformed into one of the largest green electricity providers in the country [45]. An antinuclear cause united both officials and the German public after the 2011 Fukushima disaster, and the country saw a boom in community energy projects, as its Energiewende concept endorsed the decentralization of RE [8]. The Kaufunger Wald renewable electricity and heat community in Central Germany, established in 2012, is an example of a green energy cooperative created as a response to the events in Fukushima [46].

Germans have an overall positive attitude towards RECs, and trust has been found to be the most determinant factor in their willingness to participate [47]. The German public tends to associate RECs with "civic engagement, participation, and empowerment in energy matters" [11] (p. 68). Deep-rooted clean energy movements, together with a tradition of creating cooperative models to accomplish change locally, have also been important determinants for the development of community energy initiatives in Germany [8].

3.2.2. Bulgaria

Bulgaria has a considerable potential for almost all types of renewable energy [48–50] and the overall share of energy from renewable sources for 2019 was 21.6% [51]. A recent driver for RE deployment in the country is the growing environmental concern of citizens, apparent from the increase in movements and demonstrations for green issues and the establishment of new NGOs [52]. The main legislative framework for RE in Bulgaria constitutes the Act on Renewable Energy Sources from 2011, which promotes the development of green energy [53]; however, there is no legislative definition of RECs in the country. However, the concepts of "obshtnosti za vuzobnovyaema energiya" ("renewable energy communities") or "mestni energiyni obshtnosti" ("local energy communities") have been introduced in official documents, such as the country's National Climate and Energy Plan and the National Development Program Bulgaria 2030. There are currently no known RECs in Bulgaria based on their description in Art. 22 of the RED II [13,54]. However, initiatives similar to RECs have been established in recent years. These include a community-owned PV installation on the rooftop of a 117-unit apartment complex in the capital Sofia, as well as municipal RE projects in the municipality of Straldzha in Southeastern Bulgaria and in the city of Burgas [55].

Small-scale RE projects are not communal, but rather are private investment initiatives implemented in hotels, office buildings, luxury apartments, kindergartens, schools,

administrative buildings, hospitals and farms (Interviewee 2; Interviewee 4). Information about RECs is scarce and predominantly published by NGOs and includes both original and foreign content. In 2020, Greenpeace Bulgaria published the first legal analysis of RECs and the possibilities for their development in Bulgaria.

Generally, solar power in Bulgaria is represented by large-scale photovoltaic (PV) plants, which were put into operation in 2012, when a feed-in tariff (FiT) scheme, regulated by the Energy and Water Regulatory Commission (EWRG) for both large- and small-scale PV systems, was present. However, as the value of the FiT in the following years remained close to the value of the energy for final buyers, new PV capacities were not stimulated (Figure 2).

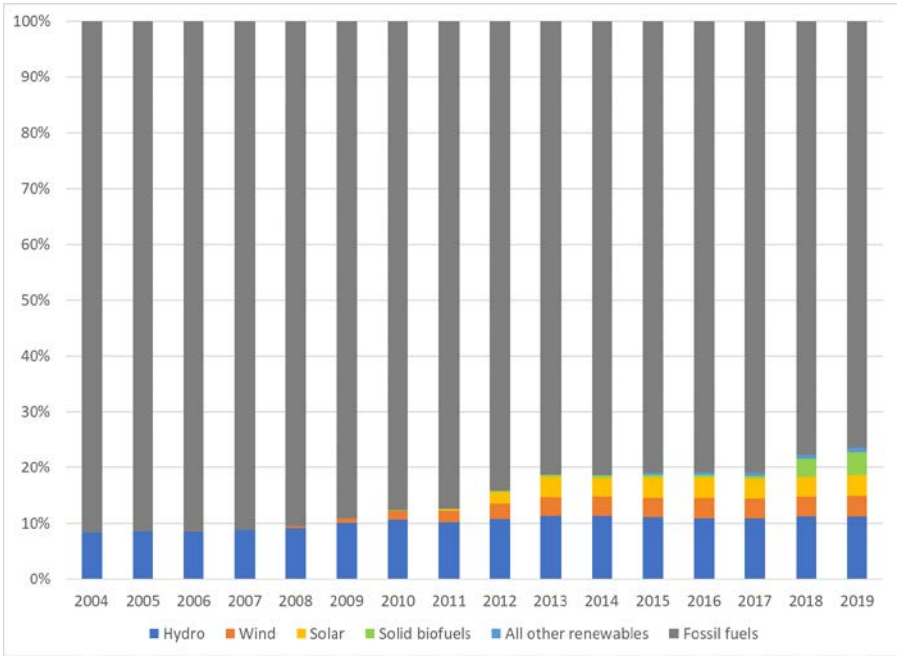

Figure 2. Electricity mix of Bulgaria. Based on Eurostat shares data.

Other barriers for the development of RECs in Bulgaria, named by interviewees, are a shortage of engineers (due to demotivation caused by low-paid engineering jobs) and a lack of sufficient knowledge and expertise among architects and technicians "on every level" (Interviewee 2; Interviewee 4).

Economic Factors

Bulgaria has the lowest gross disposable income of households in the EU, the smallest average and minimum wages, the highest income inequality rates, the lowest Human Development Index and Social Progress Index figures and the largest percentage of people living below the poverty line [56,57]. Bulgaria also suffers from high amounts of energy poverty, even though electricity prices have steadily remained the lowest in the EU, while natural gas prices in the country have continuously grown [58]. In 2017, 36.5% of Bulgarian households reported their inability to properly heat their homes and 31% admitted to struggling to pay their energy bills [38]—a result of the high levels of general poverty, the lowest GDP in the EU and low energy-efficiency rates [32]. All triggers for energy poverty—"low income, high energy prices and poor quality buildings"—are present in Bulgaria [59] (p. 39).

Legislative Framework

Currently, there are no specific targets and policies to support RECs in Bulgaria. The country's National Energy and Climate Plan (NECP) acknowledges the need for an enabling framework for RECs but does not propose definite measures for it [60]. According

to Interviewee 2, the lack of specific measures for the development of RECs in Bulgaria's NECP is a barrier for their success, as it suggests that politicians do not regard the concept as important.

While there are currently no known RECs in Bulgaria and no financial support framework aimed directly at their development, there are still support schemes, which could be steered towards community energy initiatives. For example, in the heating and cooling sector, residential building owners or inhabitants could take advantage of financial grants for improvements of energy efficiency provided by the Bulgarian Energy Efficiency Fund [53]. Moreover, all producers of energy from renewable sources with an installed capacity of more than 1 MW are supported by premiums, and preferential prices are offered for new PV projects at an installed capacity of up to 30 KW. Such producers must conclude agreements with the Electricity System Security Fund (EUSF), which, until recently, collected 5% of the monthly revenues of producers and importers of electricity in the country. However, green projects, put into operation from 1 January 2021 onwards, will not pay the fee to the EUSF—a decision aimed at enlarging the capacity of the RE sector. Additionally, as of 1 July 2021, all RE producers with an installed capacity of 500 KW or more will have to sell their energy on the free market.

All five interviewees identified administrative barriers, including large amounts of paperwork, complexity of processes, time-consuming procedures, poor management, tough procedures for basic installations and it being generally difficult to understand administrative processes for the common consumer. In a review of the administrative procedures necessary for installing small-scale renewable electricity generators in Bulgaria, the authors of [38] (p. 40) found that "enormous legal administrative challenges" follow prosumers throughout the process, even if the installation is a simple PV roof system for personal use. The administrative matters needed to connect to an alternative energy network were deemed "literally impossible for the common person" by Interviewee 3 who had first-hand experience with the administrative procedure for installing solar panels for own consumption. The process in Bulgaria also takes significantly longer than in other European countries, such as Germany, Italy, the Netherlands and the UK. A Bulgarian household needs about 20–25 weeks and 170 h to install a single RE system, followed by an equally complex operation of the facility and trading with the final supplier, which in many cases is part of the same company, which owns the network operator [38].

Social Factors

The differences in the political systems of Western and Eastern Europe throughout most of the 20th century resulted in Bulgaria and other countries behind the Iron Curtain experiencing historic events connected to the energy sector differently than countries in Western Europe. For instance, due to Bulgaria being a socialist state (1946–1989) and therefore having an entirely centralized, public service energy supply during these years, events such as the 1973 oil crisis and the Chernobyl disaster did not result in significant societal outcries or energy sector changes. Bulgaria is still one of two countries in the EU in which the energy market is not fully liberalized, alongside Malta [61].

Moreover, the Bulgarian nation and its trust in communal energy has been affected by happenings in the energy sector, which are non-existent in Western Europe. Such include the so-called "electricity schedule" (three hours daily with and three without electricity) in the 1980s, gas crises and the transition from a socialist state to a democratic one. Due to the past socialist regime in the country, energy supply "was initially, and still is, largely considered by the large majority of people in the country a public service to be provided by the State at the lowest possible price with no concern about the impacts on public finance or the environment and on people's health" [32] (p. 36). According to Interviewee 5, the heat supply system of the country, built during the regime and centrally connected to entire neighborhoods, has been taken for granted by the past two or three generations, as people who lived during times of socialism have the system embedded in their "code", and the desire for entrepreneurship, the need for diversity, choosing the best option for oneself

and making informed decisions is not predominant. The interviewee also suggested that Bulgarians see the central heating system as a type of comfort. Moreover, Soviet-style standardized apartment blocks and complexes dominate urban Bulgarian neighborhoods, connected to the main grid. Convincing the inhabitants of a multi-household apartment building to establish an REC, separate their resources and control the project poses an issue (Interviewee 1). Apartment owners refusing to give their consent for the installation of RE rooftop systems, due to lack of awareness and inherent distrust, has been pointed out by the Burgas Municipality as one of the main obstacles for carrying out municipality-led RE projects [55]. Meanwhile, a survey found that 70% of heating and domestic hot water boiling in districts with multi-household apartment buildings in all medium and big cities in Bulgaria could be provided by solar district heating [62].

The socialist regime has also left a mark in Eastern Europeans' understanding of the terms "community energy" and "cooperative", as they are often associated with the word "communism" [63,64]. Interviewee 5 stated that the phrase "communal energy" is purposefully avoided in their NGO's publications to elude misconceptions.

4. Cross-Country Comparison and Discussion

The cross-country comparison between Germany and Bulgaria demonstrates the fundamental differences between the two countries with respect to the factors that determine the development of RECs. Table 2 provides a summarized depiction of the factors, which positively or negatively affect this development. The information in the table indicates that while Germany's case exhibits several motivators for the development of RECs, Bulgaria's case has none.

Firstly, the overview of RECs in the two countries determined Germany's generally enabling environment for community energy initiatives, due to the existence of an official legislative definition of RECs (although not identical to the one in the RED II). Sufficient information about RECs is available in multiple sources and there exists a variety of financing methods for a community energy project. These favorable conditions in Germany have also resulted in the number of RECs being amongst the highest in Europe. However, a barrier for community energy initiatives in Germany is the limited technological know-how of their members, as well as the lack of management and finance experts. On the other hand, the general environment for the development of RECs in Bulgaria is rather unfavorable. Information about RECs and their establishment is insufficient. Currently, there are no known approaches for financing community energy initiatives and there are no known RECs in the country. Comparable to Germany, the lack of experts and technical knowledge is a barrier for local energy initiatives in Bulgaria.

The economic factors in the two countries differ largely. The gross disposable income of households in Germany is the second highest in the EU, while it is the lowest in Bulgaria. However, there are other relevant factors that hinder the progress of community energy in both countries—Germany's regional economic inequality between the western and eastern parts, as well as Bulgaria's status as the poorest country in the EU and the large percentage of energy poverty among its inhabitants.

Regulatory and technical support for RECs in both Germany and Bulgaria carries both motivator and barrier elements. For instance, while Germany's NECP provides practical measures to support the development of RECs, it ignores initiatives focused on heating. The Bulgarian NECP proposes no definite targets for RECs in general, as it does not provide any measures for creating an enabling framework for them. Procedural and technical guidelines about creating an REC are found in publicly produced German documents and texts.

Table 2. A summary of the cross-country comparison of determinants for RECs between Germany and Bulgaria.

	Germany	Bulgaria
Overview		
Sources of information on RECs	Comprehensive information available; journal articles, books, reports, websites and other online databases	Information insufficient; Online materials, predominantly published by NGOs
Approximate number of RECs	More than 1000	No known RECs
Knowledge and expertise	Limited technological know-how; lack of management and finance experts	Lack of experts and technical know-how
Economic factors		
Gross disposable income of households and other relevant factors	*Gross disposable income of households:* Second highest in the EU; Internal regional economic inequality (Western vs. Eastern Germany)	*Gross disposable income of households:* Lowest in the EU Poorest country in the EU—smallest average and minimum wages, highest income inequality rates, lowest Human Development Index and Social Progress Index figures and largest percentage of people living below the poverty line; Large percentages of energy poverty
Legislative framework		
Legislative definition of RECs	Existing legislative definition for "citizen energy communities" although not identical to the one in the RED II; Various legal forms of RECs	No existing legislative definition of RECs in Bulgaria; Concept introduced in NECP and the National Development Program Bulgaria 2030—not legislation
Regulatory framework for RECs	NECP provides support for the development of RECs; No specific targets and policies for RECs for heating	NECP acknowledges the need for an enabling framework but does not propose definite measures for it; No specific targets and policies for RECs in general and for heating
Financial support for RECs	Several support schemes open for community energy projects	No financial support framework aimed directly at RECs, although there are other financial support schemes one could take advantage of
Technical support and guidance	Procedural and technical guidelines found in publicly produced documents and texts; Technical support schemes for renewable heat such as training of craftsmen	No official procedural and technical guidelines; Technical support schemes for small-scale RE systems
Complexity and duration of permitting processes	Procedures differ from state to state and accordingly to the size of the installation; Highly standardized permitting procedures without large delays	Administrative difficulties for installations and connecting to an alternative energy network; Process takes significantly longer than in other EU countries, including Germany
Social factors		
History and development of RECs	Long history of anti-nuclear movements. community energy and citizen participation in the energy transition, influenced by the main events, outlined by the literature	No history of RECs, per se, mainly due to the country being a socialist state while the historical events, which influenced the development of community energy in Europe, were taking place
Trust in and acceptance of community energy initiatives	An overall positive attitude towards RECs; Long history of community energy contributes to the widespread acceptance of RECs	Distrust in community energy; "Community energy" and "cooperative" associated with communism

Germany's multiple financial support schemes for RECs foster the needed conditions for community energy to thrive and put Germany among the EU Member States with the most stable support systems for local energy initiatives. Moreover, Germany's support framework for community energy creates a thorough, nation-wide positive environment for the development of RECs, contrasting the undefined financial support framework of Bulgaria.

Lastly, Germany's long history of community energy, which ultimately leads to a positive attitude towards, trust in and acceptance of RECs, is a motivator for the further development of the concept in the country. The nation's long-standing experience with anti-nuclear movements and citizen participation in the process of creating and using energy, entangled with the four main historical events and the political narratives throughout the past century, provides for a generally favorable environment for the development of RECs. Bulgaria's case is a polar opposite. The lack of history of RECs, the socialist past of the country and the deriving "information blackouts" imposed by the ruling party at the time, have all contributed to distrust in community energy and negative connotations.

5. Conclusions

The research deduced the most important factors for the development of RECs from the literature. Together with the findings from five expert interviews, these factors were put into context for a country analysis of Germany and Bulgaria, concluding with a cross-country comparison, in which these factors were identified as motivators or barriers for the progress of community energy initiatives in the two countries.

Results show that the support framework for RECs in Germany is significantly more developed than in Bulgaria, where it is virtually non-existent. On the one hand, Germany's long history of community energy and the country's political circumstances in the last century have created a positive attitude towards and trust in alternative ways of creating and managing energy amongst Germans. Together with the strong governmental support framework for RECs, including a noteworthy financial support system, Germany's community energy initiatives are able to thrive and are regarded as some of the most developed in Europe. Another factor, which contributes to the country's success in the field of communal energy is the economic situation of the country, although its regional economic inequality is seen as a barrier for the progress of RECs in the eastern parts.

On the other hand, Bulgaria has a severely underdeveloped support framework for RECs and community energy. Results show that in Bulgaria, the barriers are mainly focused around the insufficient governmental assistance and its manifestation in the form of regulatory, financial and technical support.

The comparison of the two countries shows that, while the implementation of the requirements of the RED II for supporting RECs requires minor efforts in Germany, significant changes are required in Bulgaria. In view of the lack of a legislative and support framework for RECs, the challenging economic conditions and the lack of trust in community-based approaches, the analysis for Bulgaria illustrates a significant need for action.

In order to enable Eastern European Member States to successfully implement the requirements or RED II regarding the deployment of RECs, support is needed on various levels:

- The implementation of legislative frameworks that enable the creation of RECs is a necessary precondition for their development. In order to facilitate the development of targeted frameworks that are adapted to the conditions of the countries, it would be highly beneficial to assess the experiences from other countries with regard to their transferability to the specific conditions of Eastern European nations.
- Moreover, transposing the RED II into the legislation of EU nations is not enough—an internal coordination of transparent national policies is also necessary. Essential for the success of RECs in Bulgaria is a more straightforward regulatory framework, including a clear legal definition of RECs, as well as greater liberalization efforts and a strengthened role of citizens.

- Financial support is essential for the deployment of RECs. In order to also provide financial support for RECs in countries with low financial means, the development of RECs in Member States, which are currently lagging behind, should be a priority for EU-level funds. Additionally, as disposable income in Eastern European countries, as in the case of Bulgaria, is oftentimes insufficient for households to finance RE installations, the existence of loans and grants for private consumers is vital for the development of RECs.
- Certain historical events and developments in Eastern Europe have an implication on social factors connected to community energy, such as trust in and acceptance of the cooperative model. As the model oftentimes carries a negative connotation in post-socialist states, it would be beneficial for a more tailored method of creating awareness about the benefits of community energy to be developed and implemented on both the EU level and national levels.

The research further showed the considerable imbalance between RECs in Western European countries, which are covered broadly in the literature and RECs in Eastern European counties, which have received only marginal interest. In order to support the development of RECs in Eastern European counties, it is essential to deepen the understanding of drivers and barriers and to adapt successful strategies to the context of these countries.

Author Contributions: Conceptualization, D.S. and S.B.; methodology, D.S. and S.B.; validation, D.S. and S.B.; formal analysis, D.S.; investigation, D.S. and S.B.; writing—original draft preparation, D.S.; writing—review and editing, S.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: The authors would like to thank G. Kondarev, V. Andonova, M. Rashevski, P. Kamburov and B. Balinov for their invaluable input.

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

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