



Advancing Renewable
Energy Communities

Deliverable 2.3

SYNTHESIS REPORT OF CASE- STUDIES ON DRIVERS AND BARRIERS IN 5 SELECTED TARGET REGIONS

Date: 29.03.2022

Version: V2



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 953040. The sole responsibility for the content of this document lies with the COME RES project and does not necessarily reflect the opinion of the European Union.

www.com-res.eu

WP:		Name of the WP:	
Dissemination level:	Public	Due delivery date:	28.02.2022
Type	Report	Actual delivery date:	
Lead beneficiary:	CICERO – Center for International Climate Research		
Contributing beneficiaries:			
Authors:	Lead authors: Karina Standal, Stine Aakre and Merethe Dotterud Leiren Contributing authors: Irene Alonso, Isabel Azevedo, Maria Rosaria Di Nucci, Michael Krug, Ivars Kudrenickis, Pouyan Maleki-Dizaji, Ryszard Wnuk		

Document history				
Version	Submitted for review by	Date	Reviewed/approved by	Date
V0	Karina Standal, CICERO	21.03.2022	Mikkel Vindegg, CICERO	23.03.2022
V1	Karina Standal, CICERO	24.03.2022	Lucas Schwarz, FUB	25.03.2022
V2	Karina Standal, CICERO	28.03.2022	Rosaria Di Nucci, FUB	29.03.2022

About COME RES

COME RES - Community Energy for the uptake of renewables in the electricity sector aims at connecting long term visions with short-term actions to facilitate the market uptake of renewable energy sources (RES) in the electricity sector. Specifically, the project focuses on advancing renewable energy communities (RECs) as per the EU's recast Renewable Energy Directive (REDII). COME RES takes a multi and transdisciplinary approach to support the development of RECs in nine European countries: Belgium, Germany, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, and Spain.

COME RES covers diverse socio-technical systems including community PV, wind (onshore), storage and integrated community solutions. The project has a specific focus on a number of target regions in these countries, where community energy has the potential to be further developed and model regions where community energy is in a more advanced stage of development. COME RES analyses political, administrative, legal, socioeconomic, spatial and environmental characteristics, and the reasons for the slow deployment of RECs in selected target regions. COME RES synchronises project activities with the transposition and implementation of the Clean Energy for all Europeans Package (adopted in 2019) and its provisions for RECs in policy labs. Policy lessons with validity across Europe will be drawn and recommendations proposed.

Abstract

This deliverable provides an analysis of the barriers and drivers for the establishment of renewable community energy, particularly Renewable Energy Communities as defined in the EU Renewable Energy Directive recast. The analysis considers the regional, environmental, legal and social contexts of five selected target regions: Balearic and Canary Islands (Spain), Latvia, Norte (Portugal), Norway and Warmian-Masurian (Poland). These target regions were selected based on a low deployment of renewable community energy. The analysis addresses a diversity of technologies and rationalities such as energy security (island communities), tourism, farming, as well as social motivations and behavioural aspects relevant for promoting renewable community energy. Our findings in this deliverable are drawn from focus groups as well as individual interviews with potential REC actors (citizens, local authorities, and SMEs). This method enables qualitative and detailed understanding of the participants' role or involvement in the establishment of RECs, including which technologies they are interested in, their social motivations for engaging in RECs, organisational structure, how they try to promote RECs, who they cooperate with and what they perceive as key impediments for the establishment and running of RECs.

Abbreviations

CEC	Citizen Energy Communities (IEMD, Article 2(11))
IEMD	EU Internal Electricity Market Directive
EEA/EFTA	European Economic Area/ European Free Trade Association
EV	Electric Vehicle
REC	Renewable Energy Communities (RED II, Article 2(16))
RED II	EU recast Renewable Energy Directive
RES	Renewable Energy Resources
SDGs	UN Sustainable Development Goals
SME	Small and Medium Enterprises
SECAP	Sustainable Energy and Climate Action Plans

CONTENTS

About COME RES.....	2
Abstract.....	3
Abbreviations	3
1. Introduction	6
1.1. Existing research and knowledge needs.....	7
1.2. Objectives and research question.....	7
2. Conceptualisation and methods.....	9
2.1. A common framework approach for analysing drivers and barriers.....	11
2.2. Environmental aspects	13
2.3. Economic aspects.....	13
2.4. Social aspects	14
2.5. Legal and regulatory frameworks.....	15
2.6. Network and organisational aspects	15
2.7. Data collection	16
2.8. Research participants	17
2.9. Other background material	18
2.10. Ethical aspects	18
3. Results and findings	19
3.1. Environmental aspects	19
3.2. Economic aspects.....	21
3.2.1. Cost benefits.....	21
3.2.2. Lack of business models.....	22
3.3. Social aspects	25
3.3.1. Social and community benefits.....	25
3.3.2. Social and community acceptance.....	28
3.4. Legal and regulatory frameworks.....	30
3.4.1. Lack of clear legal definitions for RECs.....	30
3.4.2. Rights of RECs and unpredictable policy frameworks	31
3.5. Network and organisational aspects	32
4. Summary of findings.....	34
References.....	37
Appendix	40

TABLES

Table 1 Selected COME RES target regions and technologies	8
Table 2 Identified main categories of drivers and barriers.....	12
Table 3 Overview of research participants.....	17
Table 4 Overview of research participants.....	40

FIGURES

Figure 1: A common framework for analysing potential barriers and drivers for the establishment of RECs in the COME RES target regions	11
--	----

1. Introduction

In recent years, EU climate and energy policy has increasingly focused on citizens in the energy transition to a low-carbon society; for example, the EU Renewable Energy Directive recast (2018/2001/EU) (RED II) contains specific provisions to enable citizens to take an active role in community-based renewable (RES) energy projects. The assumption is that RES community energy can play an important role in the transition to low-carbon society by increasing the share of renewables in the energy mix (Laes et al. 2021). Community energy can also provide flexibility through balancing electricity supply and demand at the local level (Olivier, Marulli, and Fonteneau, 2017; Parag and Sovacool 2016). Flexibility is an increasing challenge in power systems as the electrification of society (especially the transport sector) and a rising share of variable renewables (wind and solar) are changing supply and demand. The literature on social acceptance of renewable energy finds that local ownership and local benefits are important dimensions for social acceptance as it enables trust and influence over processes (Leiren et al., 2020; Linnerud et al., 2018, Wirth, Gislason and Seidl 2018). Community energy thus provides potential for a bottom-up transformation of national electricity systems (Seyfang et al. 2014; Schleicher-Tappeser, 2012). Further, energy transformation also requires a focus on empowering consumers to shift from passive consumption to active engagement (Coy et al. 2021). Studies find that citizens who are engaged in energy production are more concerned with reducing their electricity consumption (Inderberg et al. 2020; Standal, Talevi and Westskog 2019, Koirala et al. 2018).

The concept of RES community energy includes many characteristics (see Section 2 for more detail). The main focus of this Deliverable is Renewable Energy Communities (RECs) as defined in RED II or RES community energy that share the same value principles of benefits, proximity and grassroots ownership. In RED II, RECs are understood as grassroots innovations initiated by citizens, Small and Medium Enterprises (SMEs) or local governments. RED II operates with a stringent definition of RECs that aligns well with increasing social acceptance of renewable energy technologies and bottom-up transformation. In line with the Directive, RECs should be autonomous and controlled by shareholders or members close to the renewable energy projects they promote. Their primary purpose is to provide environmental, economic or social benefits for their members and the localities where they operate, rather than financial profit.

Despite the advantages of increasing RECs in local and national power systems, the previous COME RES study 'D2.1 Assessment report on technical, legal, institutional and policy conditions' (Standal et al. 2021) reveals that the starting conditions for RECs are difficult. The transposition and implementation process of RED II is going slowly in several countries and vague legal definitions of RECs, cumbersome regulatory requirements and lack of appropriate support schemes are highlighted as challenging. Further, several regions and countries experience that policymakers, local authorities and citizens are not embracing RECs due to a mixture of lack of policy targets, resistance to RES technologies (mainly onshore wind), scepticism towards cooperative structures, lack of public attention to the benefits of REC for the power supply-demand system and the local community (Standal et al. 2021).

1.1. Existing research and knowledge needs

The literature on community and decentralised energy systems has mainly focused on technical and managerial issues of decentralised energy systems and integration into the centralised grid supply (Olivier, Marulli, and Fonteneau, 2017; Parag and Sovacool 2016) or market acceptability (Braunholtz-Speight, Sharmina and Manderson 2020; Curtin, McInerney and Gallachóir 2017; Juntunen, 2014). But there is also a literature that explores drivers and barriers for community energy (Tricarico 2021; Braunholtz-Speight, Sharmina and Manderson 2020; Wirth, Gislason and Seidl 2018; Koirala et al. 2018; Koirala et al. 2016; Diaz-Chavez 2012). Among the key dimensions revealed in this literature is the lack of socio-political acceptance, meaning that community energy is impeded by political and structural barriers set by regulations (Wirth, Gislason and Seidl 2018). Several studies also reveal that certain local preconditions in terms of competences, assets and capabilities are required to mobilise individuals to be engaged in development of community energy (Tricarico 2021; Diaz-Chavez 2012). Lack of time was also emphasised as an impediment for citizens to engage with community energy (Lazoroska, Palm and Bergek 2021; Koirala et al. 2018; Diaz-Chavez 2012). The key drivers found in the literature points to socio-cultural and normative aspects. Most studies find that the main motivations were environmental and climate commitments (Horstink et al. 2020; Kamin et al. 2020; Bauwens 2016; Kalkbrenner and Roosen 2016; Koirala et al. 2018; Seyfang et al. 2013), local benefits, and community-building (Tricarico 2021; Soeiro and Dias 2020; Diaz-Chavez 2012). Studies also point to financial motivations and economic incentives as important enablers (Braunholtz-Speight, Sharmina and Manderson 2020).

Considering the importance of engaging grassroots actors, existing literature on drivers and barriers to community energy has several limitations. Most studies focus on single case-study contexts, making generalisations difficult. Further, they employ methods that have limitations in capturing the ‘voice’ of the actors (through qualitative and more participatory research) as well as more complex mechanisms for understanding what drives decisions (Coy et al. 2021). This also has implications for justice dimensions as the studies (often survey-based) are grounded in researchers and policymakers pre-conceived terms of drivers and barriers. As an example, dimensions concerning gender are seldom addressed. Only a few studies explore justice dimensions and social inclusion in relation to community energy (Standal and Fenstra 2022; Hanke, Guyet and Fenstra 2021; Lazoroska, Palm and Bergek 2021; Hanke and Lowitzsch 2020; Fraune, 2015). Justice and social inclusion have fundamental implications for effective representation of the wider local communities in citizen initiatives, which is key in terms of community energy’s role as a grassroots energy transformation.

1.2. Objectives and research question

This study aims to contribute with qualitative understanding of drivers and barriers to RES community energy, with a particular focus on RECs as defined in RED II (see Box 1). This study investigates the following research question: How do relevant actors perceive drivers and barriers to establishing and successfully running RECs? The aim is to gain qualitative understanding of how potential REC shareholders/members and relevant stakeholders in society see the main motivations, possibilities, challenges and obstacles to starting up and managing a successful REC, considering regional, environmental, legal and social contexts. Further, the study explicitly covers a diversity of technologies

and rationalities such as energy security (island communities), tourism and farming. We draw our findings from the perspectives of potential or existing REC members/shareholders: Citizens, local authorities and SMEs (see also Box 1). Further, our analysis is focused on five target regions across Europe (see Table 1) allowing for both generalisability and in-depth knowledge. The selection of target regions is based on covering geographical diversity (in Europe) and a focus on regions with low REC deployment rates. An overview of target regions is found in Table 1 below.

Table 1 Selected COME RES target regions and technologies

Country	Target regions	Technological focus
Latvia	Due to the small size of the country, and the lack of RECs, Latvia as a whole is as a target region	PV, onshore wind
Norway	Due to the size of the country and lack of RECs, Norway as a whole is a target region	Hydro, onshore wind, PV, integrated solutions
Poland	Warmian-Masurian	PV
Portugal	Norte	PV, integrated solutions
Spain	Balearic and Canary Islands	PV

2. Conceptualisation and methods

This section provides an overview of conceptualisation and methods used in this Deliverable to analyse the drivers and barriers for the establishment of RECs in the selected target regions. The definitions of community energy are diverse, but key characteristics are: RES, production and consumption in close proximity, and community benefits (e.g., community-building and sustainable behavioural change) (Brummer 2018). Further, the concept is associated with grassroots energy transformation, excluding participation of big companies or national level government agencies (Standal and Feenstra 2022; Brummer 2018; Seyfang et al. 2014). In line with RED II, this analysis focuses on community energy in the form of REC in terms of ownership structures and legal framework. For a more complete definition of REC see Box1 below.

BOX 1: RENEWABLE ENERGY COMMUNITIES (REC) AND ENABLING FRAMEWORK IN THE EU RED II

RED II defines a REC as a legal entity which, in agreement with applicable national laws, is based on open and voluntary participation. RECs should be autonomous and effectively controlled by shareholders or members located in the proximity of the RES project owned and developed by the REC. According to article 2(16)(b) and (c) of RED II, the shareholders or members of a REC could be natural persons, SMEs or local authorities, including municipalities. According to RED II, Article 2(16), the primary purpose of RECs should be to provide environmental, economic or social community benefits for its shareholders or members, or for the local area where they operate, rather than financial profits. RECs are then characterised primarily through open, voluntary participation of natural persons, local authorities or SMEs, local ownership and control, and orientation towards community benefits. RECs can – to a certain extent – be regarded as a subset of the concept Citizen Energy Communities (CECs) defined in the EU Internal Electricity Market Directive (IEMD).

Article 22(4) requires that Member States provide an enabling framework to promote and facilitate the development of RECs. Member States are as a minimum required to ensure:

- (a) Removal of unjustified regulatory and administrative barriers to renewable energy communities
- (b) Renewable energy communities that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities
- (c) Relevant distribution system operators cooperate with renewable energy communities to facilitate energy transfers within renewable energy communities
- (d) Renewable energy communities are subject to fair, proportionate and transparent procedures
- (e) Renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators, or as other market participants
- (f) Participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households
- (g) Tools to facilitate access to finance and information are available
- (h) Regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly
- (i) Rules to secure the equal and non-discriminatory treatment of consumers that participate in the renewable energy community are in place

2.1. A common framework approach for analysing drivers and barriers

To allow for comparison across regions, this study applied an indicative framework approach to identify internal and external factors that may potentially act as drivers and barriers for the establishment of RECs, considering the regional, environmental, legal and social contexts in the respective target regions (see Figure 1). The indicative framework of factors was developed based on a literature review on community energy (relevant to the European context), as well as key findings from COME RES’ ‘D2.1 Assessment report on technical, legal, institutional and policy conditions’ (Standal et al. 2021), which identified RED II implementation gaps for enabling frameworks to facilitate the development of RECs. Further, the indicative framework was based on drivers and barriers identified in consultations with stakeholders through regular meetings and workshops. A core dimension of the COME RES project is consultation with stakeholders that have interest or concern about RECs or RES community energy, such as national and local policymakers and authorities, civil society organisations, business sector, associations or innovation agencies.

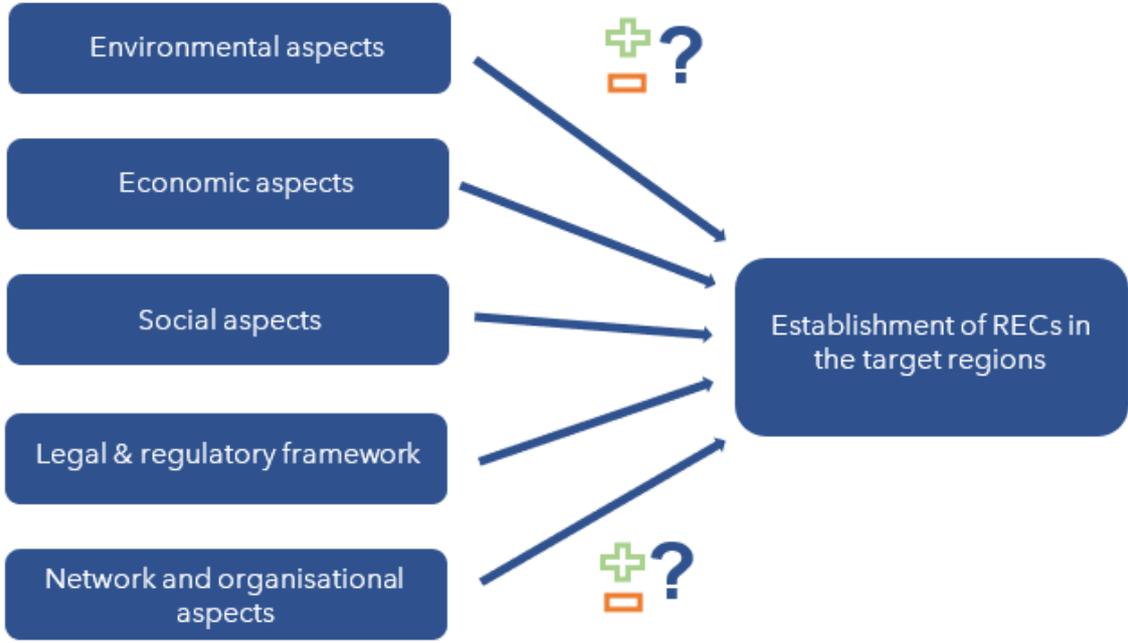


Figure 1: A common framework for analysing potential barriers and drivers for the establishment of RECs in the COME RES target regions

As shown in Figure 1, this Deliverable explores how environmental, economic, social, and organisational aspects as well as legal frameworks act as drivers and/or barriers for engaging in RECs. Further, we analyse whether these aspects differ across the different groups of potential actors (citizens, SMEs and local authorities) involved in setting up RECs and whether there are differences in the emphasis of each type of aspect across the selected target regions. Although there is a distinction between benefits and

drivers, perceived or anticipated benefits are often a key driver of RES community energy initiatives (e.g. Busch et al. 2019). There may also be important barriers related to the environmental, economic and social dimensions that hinder the establishment of RECs, including a lack of financing opportunities, and issues related to the social acceptance of RES and RECs. Such potential barriers are also explored in this deliverable. Given the lack of experience with RES community energy in the selected target regions, the category ‘organisational and cooperation aspects’ cover questions such as how RES community energy initiatives are established and developed at the local level, including drivers and barriers related to organisation and decision-making, cooperation and competence.

In the operationalisation of the indicative framework and identified main categories, we developed a list of factors that can shape the establishment of RECs in the target regions in more detail as shown in Table 2.

Table 2 Identified main categories of drivers and barriers

Factors	Topic areas
Environmental impacts	Effect on local environment Use of resources, including land Impact on greenhouse gas emissions
Attitudes	Motivations for a green shift Environmental attitudes
Economic impacts	Economic burdens/benefits Spillover effects on the neighbourhood
Financial aspects	Access to credit and financial opportunities
Market/financial incentives	Support schemes and financial incentives Market aspects (flexibility markets, grid tariffs, electricity prices).
Social and cultural aspects	Acceptance of RECs as a way of organising energy initiatives and acceptance of RES (and its impacts) Gender and marginalisation issues National or local discourses on RECs and RES (policy sector, Social media, media) Energy poverty
Impacts on society	Distributional justice (distribution of burdens and benefits) Social benefits
RED II transposition and harmonisation	Legal definitions of RECs and other RES community energy models Implementation gaps concerning enabling frameworks

Regulations	Regulations concerning licensing, planning and environment laws Regulations concerning the power system (individual metering, consumer rights, distribution and sharing of produced electricity)
Organisational aspects	Organisation and management
Cooperation and network	Selection of cooperation partners, need for network
Knowledge and competence	Knowledge/competence in local authorities Knowledge/competence among service providers
Political-administrative, authorities	Deliberation and decision making Procedural fairness (formal/informal participation and consultation) Information Transparency Trust in actors and processes Actor constellations

Below, we briefly describe the main categories and background in the literature and previous COME RES deliverables on community energy.

2.2. Environmental aspects

Examples of environmental benefits from RES community energy initiatives include the increased production of RES and reduced greenhouse gas emissions. A motivation to contribute to producing such environmental benefits has been found in the literature to be a driver for the willingness to engage in RES community energy initiatives (Tricario 2021; Horstink et al. 2020; Kamin et al. 2020; Bauwens 2016; Kalkbrenner and Roosen 2016; Koirala et al. 2018; Seyfang et al. 2013). At the same time, the literature on community acceptance of RES projects suggests that concerns with the possible negative impacts on nature from RES development, including nature protection concerns, may constitute a barrier to RES projects being developed (Leiren et al. 2020; Linnerud et al. 2018; Wirth, Gislason and Seidl 218).

2.3. Economic aspects

The literature finds that economic benefits represent a driver for the willingness to participate in RES community energy initiatives (Bomberg and McEwen 2012; Haggett et al. 2013; Kamin et al. 2020; Koirala et al. 2018; Seyfang et al. 2013). Economic benefits from engaging in REC initiatives could include a return on investment in renewable energy (e.g. Bauwens 2016; Kamin et al. 2020; Walker 2008) or reduced energy-related expenditures (e.g. Bauwens 2016; Kamin et al. 2020; Ruggiero et al. 2022; Walker 2008) for members or shareholders or the community where the RES project is located (e.g. Brummer 2018; Haf and Parkhill 2017; Haggett and Aitken 2015; Kamin et al. 2020; Ruggiero et al. 2022).

COME RES Deliverable 2.2 Assessment report of potentials for RES community energy in the target regions' (Laes et al. 2021) found that access to favourable financing options (e.g. public funding, low

interest rate loans) may be a driver to promote citizens' participation in REC initiatives in the COME RES target regions (Laes et al. 2021). A lack of financial resources is identified as a barrier to participation in RES community initiatives (Hanke and Lowitzsch 2020; Koirala et al. 2018; Palm 2021a; Ruggiero et al. 2022). In their study of collective prosumers in nine EU member states, Horstink et al. (2020) find that access to finance, subsidies and grants is both a critical driver and a barrier to the establishment of collective prosumer initiatives, depending on its availability. Hanke and Lowitzsch (2020) note that RES community energy projects, especially during the initial phases struggle to get access to credit, and thus rely on raising sufficient equity from its members. High upfront equity requirements represent a barrier to participation, especially for vulnerable groups (ibid.). Financial barriers to the establishment of, and participation in, RES community energy projects could be overcome by public funding, subsidies and dedicated support (Curtin, McInerney and Gallachóir 2017; Hanke and Lowitzsch 2020; Palm 2021a; Ruggiero et al. 2022; Walker 2008; Wierling et al. 2018). Market aspects such as volatile electricity prices (Ruggiero et al. 2022) and the emergence of flexibility markets, new grid tariffs may also represent a barrier or driver to the establishment of RES community energy initiatives, depending on the local market context.

2.4. Social aspects

The literature on RES community energy finds that while economic and environmental benefits were the most common motivations for, social and cultural benefits represent a potential driver (Haf and Parkhill 2017; Seyfang et al. 2013). Kamin et al. (2020) find that some of the most important perceived values of being a RES community energy member were social benefits such as communal way of living, community membership and identity. Renewable based community energy is highlighted as grassroots energy transformation as it enables local ownership, community benefits and trust (Soira and Dias 2020; Brummer 2018; Cowell and Devine-Wright 2018; Linnerud et al. 2018; Bauwens 2016). However, the issue of social acceptance and trust is not well understood and explored in the RES community energy literature. For instance, some studies find that a general distrust and lack of interest in collective forms of ownership, which can be traced back to historical background and local socialist heritage, constitute a significant social barrier (Ruggiero et al. 2022; Standal et al. 2021). Further, social acceptance is entangled in people's perception of different renewables (e.g. onshore wind) and general awareness of community energy as a concept (Standal et al. 2021; Koirala et al. 2018). Social acceptance is also influenced by aspects such as age, gender, occupation, political opinion and geographical context that are more seldom explored.

Further, national or local discourses and narratives on RES and RES community energy (e.g. in policy, and public agenda) influence what actors are included or see RES community energy as attractive (Standal and Fenstra 2022; Palm 2021b; Berka, MacArthur, and Gonnelli 2020; Kooij et al. 2018). Lack of awareness and public discourse of energy communities entails that actors that are interested in such initiatives are to a large extent left to themselves to identify and understand their possible roles and benefits (Berka, MacArthur, and Gonnelli (2020), which again may hinder community energy from being inclusive, for instance in terms of gender (Standal and Fenstra 2022; Lazoroska, Palm and Bergek 2021). Only a few studies have explored RES community energy in terms of energy justice (Hanke,

Guyet and Fenstra 2021; Hanke and Lowitzsch 2020), even though participation of all consumers, including low-income and vulnerable households is emphasised in RED II (article 22). Literature finds that local preconditions in terms of competences, assets and capabilities are required to mobilise individuals to engage in the development of community energy (Tricarico 2021; Diaz-Chavez 2012), which makes justice dimensions an important set of barriers and drivers. Lack of time was also emphasised as a barrier for citizens to engage with community energy (Lazoroska, Palm and Bergek 2021; Koirala et al. 2018; Diaz-Chavez 2012).

2.5. Legal and regulatory frameworks

A central factor for barriers and drivers is the implementation of the requirements in RED II that apply to RECs, as well as general regulations that define RES energy communities' right to sell, store and share self-produced energy. The COME RES 'D2.1 Assessment report on technical, legal, institutional and policy conditions' (Standal et al. 2021) reveals a variation in the level of RED II implementation, especially concerning legal definitions of RECs and implementing enabling frameworks to promote and facilitate the development of RECs (see Box 1 for more detail). Further local and national regulations concerning planning and environment, licensing, and the power system (individual metering, consumer rights, distribution and sharing of produced electricity) constitute key barriers and drivers. Previous studies found that inadequate regulations may hinder the development of RES community energy initiatives (e.g. Campos et al. 2020; Koirala et al. 2018; Palm 2021a, b; Ruggiero et al. 2022). Additionally, in some contexts there is a reluctance among government actors to make deep changes in energy systems that were designed for centralised electricity supply, resulting in regulations that make it challenging for new actors to establish decentralised energy systems (Standal and Fenstra 2022, With, Gisslasson and Seidl 2018).

2.6. Network and organisational aspects

A significant dimension of drivers and barriers are perceived and experienced as organisational and cooperational aspects among potential shareholders/members of RECs and RES community energy. Organisational drivers and barriers include legal form, organisation structure and ownership, including scale, size and administrative aspects (Delnooz et al. 2020; Warbroek et al. 2019). A foreseen challenge here is how RES community energy is characterised by grassroots actors that operate on a smaller scale and is often initiated by actors outside the energy sector. RED II (recital 71) recognises that the specificities of RECs in terms of size, ownership structure and number of projects can prevent them from competing with large-scale players on an equal footing in the energy market and defines criteria for participation and control and measures to offset possible disadvantages.

Cooperation and networking with other actors, such as national/regional/local government and administration, energy utilities, service providers and grid operators can facilitate the development of RES energy community initiatives (e.g. Horstink et al. 2020; Palm 2021a) whereas lack of equipment, knowledge and expertise can hinder the development of RES community energy initiatives (e.g. Koirala et al. 2018). The importance of cooperation between potential REC members (citizens, SMEs and local authorities) was also highlighted in COME RES 'D2.2 Assessment report of potentials for RES

community energy in the target regions' (Laes et al. 2021). Cooperation with intermediary actors can help build the necessary knowledge, skills and capacity to develop REC and RES community energy initiatives (Busch et al. 2021; Palm 2021a; Warbroek et al. 2019). Lack of knowledge, information and awareness constitute a barrier to RES community energy development (Ruggiero et al. 2022; Tricarico 2021; Diaz-Chavez 2012). As an example, when there is a lack of knowledge of good examples to draw experience from in setting up RES community energy initiatives, local “champions” are important in overcoming existing barriers (Tricarico 2021; Diaz-Chaves 2012). This also involves empowering local communities to enable agency needed to organise and develop RES community energy initiatives (Coy et al. 2021).

2.7. Data collection

The data for this study was gathered in the form of interviews with focus groups or individuals in each target region or at national level. The interviews lasted about 90 minutes. In the interviews we asked questions about the participants' role or involvement in the establishment of RECs, including which technologies they are interested in, their social motivations for engaging in RECs, how they work in general and how they try to promote RECs, who they cooperate with and see as important network, what they experience as key impediments for the establishment and running of RECs. For more details on the research design and conceptualisation of drivers and barriers see section Figure 1 and Table 2.

This study focuses on target regions with low deployment of community energy and several of the target regions are not on track in the establishment of regulatory framework concerning RECs, making recruitment of research participants challenging. Recruitment was therefore adapted to the local context and accessibility. RES community energy is a new phenomenon in all the target regions, and per now there is almost no community energy project that aligns with the characteristics of RECs (as defined in RED II). Therefore, we have chosen to include participants that are interested in the development of RECs or similar RES community energy (in addition to those that are already engaged in community energy). Some of these research participants have engaged in the planning or have long standing experience with decentralised energy systems and thus bring useful insight into perceptions about drivers and barriers for community energy.

To enable a good discussion, the focus groups were designed so that participants have somewhat similar backgrounds, motivation and/or experiences with community energy. The focus group interviews thus provided both input for the study and knowledge exchange between the participants. The research focus group participants stated that they enjoyed discussing these topics together in a group and found it interesting listening to the other participants' experiences and challenges. The focus groups worked well in terms of different participants supporting and nuancing each other views. In some contexts, it was difficult to discuss the involvement of citizens, municipalities as well as SMEs in RECs since the detailed regulations are not elaborated and adopted. At the same time, the employed methods allowed the identification of principal challenges which could be further interpreted as barriers, depending on the context.

The interviews were conducted as physical meetings, online meetings using video and hybrid meetings (most present physically and some via Zoom/MS Teams). Interviews are ideally physical meetings as this makes it easier for the organiser to coordinate the discussion and consider aspects such as body language to facilitate communication. However, the interviews took place during the Covid-19 pandemic and in the winter months during a surge of reported cases. Online and hybrid meetings have been important tools to ensure research can be carried out under these circumstances and all participants were well acquainted with online meetings.

2.8. Research participants

The focus group participants were selected based on Article 2(16) in RED II which considers that RECs can be owned by citizens, local authorities (including municipalities) and SMEs. In the recruitment of citizens, we included participants representing a diversity of civil society organisations representing the citizen perspective. This included established RECs or citizen-led community energy, civil society organisations that are engaged with or interested in community energy production, and research institutions. Further, we recruited local authorities’ representatives such as county municipalities, municipalities, municipal agencies and municipal property enterprises, city administrations, local energy agencies and other local authority institutions. Finally, we recruited participants from several sectors such as energy and tech companies that directly work with solutions for RECs or other businesses interested in or already engaged in energy production such as tourist operators, food retailers, property developers, universities and more. The participants were engaged in, and/or interested in, a multitude of technologies (RES production from PV and wind, storage (batteries, hydrogen), Electric Vehicles (EV) and EV charging, heating/cooling). An overview of the research participants can be found in Table 3.

Table 3 Overview of research participants

Target region	Category	No of participants
Balearic and Canary Islands	Civil society	5
	Local authorities	5
	SMEs	3
Latvia	Civil society	2
	Local authorities	4
	SMEs	2
Norte/Portugal	Civil society	3
	Local authorities	3
	SMEs	4
Norway	Civil society	4
	Local authorities	4
	SMEs	4
Warmian-Masurian	Civil society	4
	Local authorities	4
	SMEs	4

2.9. Other background material

In addition to the focus group interviews this study also includes relevant background material from stakeholder consultations in the COME RES project. A core dimension of the COME RES project is consultation with stakeholders that have interest or concern about RECs or RES community energy, such as national and local policymakers and authorities, civil society organisations, business sector, associations and innovation agencies etc.

The COME RES project includes the establishment and maintenance of stakeholder desks in the selected target regions. The stakeholder desks are a vehicle to ensure wide engagement and network building of market actors and stakeholders throughout the project. A major theme in the stakeholder desk meetings and workshop has been REC development. We have used the results derived from these discussions for developing the indicative framework approach.

2.10. Ethical aspects

In accordance with the European legal framework and the general rules of the Horizon 2020 programme concerning data management the data collection has adhered to the ethical guidelines of the COME RES project set up in Deliverable 1.4, as well as ethical guidelines or regulations in the partner countries or institutions. Prior to the interviews, information about the project and purpose of the interview, as well as participants rights to not answer questions, to withdraw their consent and participation at any time (during or after the interview) were provided. All participants were asked to provide their written consent, following the ‘Informed Consent’ procedure in force in each Consortium’s member country.

The information gathered from the data collection are anonymised and all personal information is stored separately from interview notes and audio recordings. All material will be deleted once the COME RES project is completed unless permission is given by the participants to store for a longer period of time to ensure peer-reviewed research articles are published.

3. Results and findings

This section provides the analysis of the barriers and drivers for REDs and RES community energy considering the regional, environmental, legal and social contexts in the five selected target regions: Balearic and Canary Islands (Spain), Latvia, Norte (Portugal), Norway and Warmian-Masurian (Poland). The analysis enables a qualitative understanding of the participants' role or involvement in the establishment of RECs, including which technologies they are interested in, their social motivations for engaging in RECs, organisational structure, how they try to promote RECs, who they cooperate with and what they perceive as key impediments for the establishment and running of REC. The analysis is structured according to the factors identified in the indicative framework approach highlighting environmental, economic, social, network and organisational aspects, as well as legal and regulatory frameworks.

3.1. Environmental aspects

Most research participants primarily highlighted environmental aspects as a motivation and benefit of RECs and RES community energy. However, environmental aspects were also part of an underlying foundation for the decision or interest to engage in RECs in combination with other factors such as reduced energy costs, inclusion and social distribution aspects. Latvia is an exception, where financial motives ranked higher than environmental ones. Further, CO₂ reduction was seen as a global concern in Latvia and thus not relevant for local initiatives. Across the other target regions several of the research participants framed their engagement in renewable energy production as green (climate and environmentally sustainable) and forward-leaning, suggesting that RECs and community energy is part of identity-making for citizens, local authorities, and SME actors. Though all participants placed importance on environmental aspects as an important motivation, there were differences in what way environmental aspects were driving forces for their engagement or interest in RECs and RES community energy in the different groups of participants.

Among the civil society participants, the desire to actively contribute towards the energy transition and climate change mitigation was one of the main motivations of citizens to engage in the establishment of RECs and similar community initiatives. In Norway, two of the civil society participants were chairmen of housing cooperatives that had invested in rooftop PV systems for electricity consumption for the residents. Both had internalised norms concerning environmental awareness and resource management, in addition to technical skills and competence. They illustrate the importance of people with a driving force and commitment to work for social change. Civil society participants in the Balearic and Canary Islands and Norway highlighted the capacity of RECs to foster society's awareness of (the scarcity of) energy resources, as well as their potential to generate self-responsible and self-sufficient systems that incorporate awareness of energy consumption and costs, providing an alternative to the current top-down, monopolistic model of production and consumption. Further, issues of how RECs and decentralised local energy systems could contribute to more flexibility in the energy system was also raised in the discussions, particularly in Norway where community energy is mostly understood in technical terms. In general, civil society participants emphasised that emerging focus on climate issues

combined with relevant technologies becoming cheaper, has increased the interest in local energy communities over the last 3-4 years. This was further associated with a focus on the need for increasing power production and reducing energy consumption in national energy policies (e.g. Portugal and Norway).

A main environmental driver among the local authority participants' interest and engagement with RECs was the potential contribution to the achievement of local climate and energy targets. Such climate and energy targets could be derived from global or national level, as well as more locally contextualised and formulated policies and strategies. In Norway, both the municipal agency and municipal property developer had incorporated the Sustainable Development Goals (SDGs) as part of their strategies, in line with the Norwegian public sector in general. In addition, several of the municipalities participating from Norway, Portugal, and the Balearic and Canary Islands had political climate and energy transition targets that included implementing RES, provide grants for RES, climate projects or reduction of emissions. In Portugal, the municipalities align with the Covenant of Mayors initiative to reduce local greenhouse gas emissions as well as other targets on social and environmental aspects where they consider RECs as a potential tool to achieve those targets. In the Balearic and Canary Islands, the participatory roadmap 'Menorca 2030' was adopted in 2019 with the aim to achieve the decarbonisation of the island of Menorca's energy system (Campos et al. 2020). Notably, it establishes a 50% reduction target of CO₂ emissions by 2030). Also, in Latvia, about 15 municipalities (from 43 in total) have elaborated new Sustainable Energy and Climate Action Plans (SECAPs) for the 2020 – 2030 period. The SECAPs specific targets for CO₂ reduction were therefore perceived as potential drivers for REC development for municipalities and the private sector. The first community energy pilot project in Latvia in the Mārupe local municipality (short portrait of them is provided in the COME RES 'D5.2 Good Practice Portfolio' (Maleki-Dizaji et al. 2022) had been implemented due to high interest and support of the local authorities. Further, the declared political commitment to achieve 'zero-emission' in 2020 (now extended) was an important driver for one of the Norwegian municipalities to seek cooperation and solutions concerning renewable and decentralised energy systems (see Box 3 for more information).

Environmental aspects were also clearly emphasised among the SME participants. Identity and branding as green and forward-leaning have intangible benefits for their reputation with consumers and important collaborators, but it also grew out of strong personal commitment within the organisations. Several of the SMEs considered RECs as a contribution to their specific sustainability goals or strategies, for instance the SDGs. Moreover, the impact on the corporate image in the public (marketing) was also mentioned (e.g. tourism and property developers). A REC in the Balearic and Canary Islands particularly stressed their ability to reduce the carbon footprint of the stakeholders' business activities as a main motivation for creating a REC. In general, SME participants from the Spanish target regions highlighted environmental benefits such as reducing the carbon footprint of their economic activities and final products, and reducing the long-term dependency on fossil fuels, as a main motivation for engaging in RECs. The importance of utilising locally available RES resources was also mentioned by several SME participants. Spanish and Norwegian participants saw RECs as having several environmental benefits when developing properties, such as achieving climate neutrality and zero emissions in their own operations, as well as societal benefits by reducing costly grid upgrades.

Some SME participants not only had a particular focus on sustainability in their profile, but their business model was established on the basis of environmental sustainability, such as ecological housing/sustainable architecture. For them, RECs and community energy were included in a holistic perspective on low-carbon transformation in combination with aspects such as sustainable (urban) food production, biodiversity, and lifestyle changes.

3.2. Economic aspects

Likely economic benefits were perceived as important motivations for the establishment of RECs and RES community energy across all target regions and participant categories. Such benefits are considered as a necessary condition for the involvement of grassroots actors in REC initiatives. In Latvia and Warmian-Masurian economic benefits were seen as the main motivation, while for most participants this came second to or in combination with other factors.

3.2.1. Cost benefits

The most commonly cited economic drivers were the potential to reduce costs. In Norte, and Warmian-Masurian participants noted that sharing the investment cost in terms of involving the participation of several members/shareholders could provide better funding opportunities than single prosumers, as well as enabling more diversity in investors. Further, as emphasised by civil society participants in Norte, balancing supply and demand (through energy sharing among community members) could increase the economic benefits of renewable electricity generation and thus the willingness of citizens to participate in the investment. Potential economic benefits for the community were mentioned as a motivation for engaging in REC initiatives. As an example, a civil society participant from the Balearic and Canary Islands emphasised the development of local economies, noting that RECs have the potential to reduce distribution losses, create new business opportunities, foster citizen control over energy (democratisation of energy), and fix capital in the territory. In Norway, a participant from a farmer association noted that there is an increasing interest in making use of the resources on farms in a way that can make farmers energy self-sufficient while at the same time benefitting the local community. The incentive is not necessarily increased profits, but such projects have to be developed in a way so that farmers do not end up with a financial loss but provide a small income for farmers.

Several local authority participants in Latvia, Norte, and Norway saw the investment in renewable energy generation as a way to reduce energy costs, especially when the installation is placed on buildings and infrastructure owned by the local authority. Further, economic benefits such as promoting local economy and creation of jobs were seen as an important driver in this group. In the Balearic and Canary Islands, the cost of energy was perceived as comparatively higher than European average, thus decreasing the competitiveness of businesses. Self-generation and distribution of energy through RECs were seen as potential increase in the competitiveness of SMEs at EU level and beyond. In Latvia, most participants considered that the provision of economic benefits to the REC was a more important motivation than the prospect of generating benefits to the local area. However, as one participant noted, the distinction between benefits to the REC and benefits to the local community may be rather artificial, as RECs may help generate benefits to both.

Also, among SME participants the reduction of costs associated with energy use were mentioned as crucial for the involvement of enterprises in the establishment of RECs. As highlighted among the local authority participants, business competitiveness was seen as a potential motivation to engage in RECs, especially in the Balearic and Canary Islands. Another SME informant in the Balearic and Canary Islands stressed the benefits of distributed energy generation versus traditional centralised systems, which allows for a reduction of SMEs dependency on large energy supply enterprises.

The benefits of reduced costs were also discussed with market aspects as a backdrop. Several participants regarded the recent high in European electricity prices as a potential driver for individual citizens and other consumers to invest in renewable energy generation projects, to reduce their dependency from market variability. The focus group interviews with SME participants from the Balearic and Canary Island took place in late January where the urgent geo-political energy situation in Europe was gaining attention. However, the uncertainty regarding future energy prices and long-term economic sustainability of RECs was also seen as a barrier in all target regions. In this vein, Norwegian civil society participants raised the issue of high initial investment costs and the long time it takes for investments to pay off. Two of the Norwegian civil society participants were chairmen in housing cooperatives with rooftop PV production and in their experience long return on investment represents a barrier in the decision-making process as costs are covered through increases in the tenants' rent. On the other hand, the reduced costs of renewable technologies were referred to as a reason for increased interest in RES community energy initiatives in Norway in general.

3.2.2. Lack of business models

It was noted that, currently, the financial and market incentives for farmers to engage in REC initiatives are not clear, but that they are searching for models or examples of how to help farmers put renewable energy facilities in place to utilise existing farm resources. Different technologies are relevant, but solar and biomass stand out in terms of volume and some farms have good wind and water resources. The representatives of the housing cooperatives emphasised the possibility to save energy costs by investing in RES. This was also mentioned by representatives from local authorities. Among the SME participants, one participant stated that an important motivation when exploring different solutions (PV, wind, EVs) was financial (cost savings in own operations). This participant noted that they had considered the PV potential but yet needed to identify sound business models for exploring this option. A third participant recognised a marked demand for sustainable housing projects and collaborated with a professional partner to develop a sound business model. The representative from the wind energy company mentioned that local economic benefits were important to increase local acceptance for wind energy development and expected that the proposed wind energy production tax would likely serve to increase acceptance going forward.

A main economic barrier emphasised across the target regions and participant groups was the lack of economic incentives or how incentives were focused on few RES technologies. It was emphasised that key enablers to encourage the development of such initiatives included lower costs for purchase and operation of RES technologies and the possibility of obtaining funding to develop RES projects. In Norte, the civil society participants noted that the lack of access to credits and the inability to assume the risk

associated with the initial investment was a barrier to the development of SME and citizen-led RES community energy. The existence of financing models where a third party assumes the investment risk was referred to as crucial to foster the engagement of individual citizens. Access to financing opportunities and the existence of internal capacity to deal with the organisational aspects were referred to as elements currently missing in the Portuguese context. Further, the participants from Portuguese local authorities highlighted that the mechanisms (in line with RED II provisions) to guarantee that all citizens are allowed to participate are not yet in place, leading to the marginalisation of the most vulnerable. In the Balearic and Canary Islands case, a participant from the civil society noted that the volcanic eruption in the island of La Palma (Canary Islands) could provide an opportunity for the development of RECs, as such initiatives could be prioritised as part of the reconstruction funds. Similarly, a representative from the local authorities in the Canary Islands noted the importance of the financial opportunities provided by the Next Generation EU funds for REC development. In Latvia and Norway, the opportunities for economic support in general is skewed towards PV technology. For several actors hybrid and integrated systems are more relevant.

In Norway, all participants engaging in RES community energy experienced that financial support from an external partner had been an important driver. One of the housing cooperatives had initiated PV production through participation in a research project, which helped provide funding for the RES community energy initiative (as well as necessary competence). Also, for several of the other Norwegian participants collaboration with external partners had been vital to acquire necessary financial capital. The establishment of RES community energy in Norway is very often carried out with research and development funds for pilot projects (operating from a sandbox regulatory scheme) smaller Norwegian municipality. Also, policy uncertainty in connection with support schemes was seen as a barrier. In Norway, the previous green certificate scheme was mentioned as a driver for SMEs running medium installations. The scheme was included in their calculation of the profitability of the projects. This scheme is now phased out, which is also the case for several similar schemes in Europe (Standal et al. 2021).

BOX 2 ECONOMIC DRIVERS AND LEGAL FRAMEWORK CHALLENGES FOR RECS IN LATVIA

Both in the interviews for this study and COME RES workshop and policy round table (June 2021) a viable economical model was raised as a critical issue for the development of RECs in Latvia. Grants, low-interest loans from state-owned finance institutions and guarantees for loans issued by commercial institutions were highlighted as potential drivers, but the incomplete adoption of provisions for RECs in RED II is a significant barrier for such financial instruments. As a result of the incomplete implementation of REC provisions, needed coordination between different financial support instruments that could be used to promote RECs is not yet established. REC development in Latvia is the responsibility of the Ministry of Economics. However, the Ministry of Environmental Protection and Regional Development (MEPRD) could potentially also play an important role in supporting REC development considering their expertise in supervision of investment and co-financing programmes for households and municipalities. The draft 'Amendments to the Law on Energy' provides that the Ministry of Economics, in cooperation with the Ministry of Environmental Protection and Regional Development, should elaborate and publish the guidelines for a REC development, including the recommendations for state and municipal authorities on how to support as well as participate in a REC. On 16th November 2021, Latvia's Cabinet of Ministers approved the EU Cohesion Policy Programme for the years 2021-2027, which includes a measure to promote solar PV technologies and storage solutions. The commercial sector, municipal companies and energy communities are stated as beneficiaries. A financial instrument which includes both grant, loans is provided by the state authority (ALTUM) and guarantee for loans issued by commercial institutions is currently being planned. Financing of around 20 million Euros for all three groups of beneficiaries is planned (announcement of open tender planned 4th quarter of 2022). However, details regarding RECs are not yet elaborated. Another financial instrument, which should be considered as a tool to create the necessary economic stimulus for REC, might be the application of lowered tariffs (regulated costs) of power grid services. However, the financial support of the state through a favourable purchase price for the electricity produced by small RES installations was perceived as unlikely by the Latvian participants as previous feed-in-tariffs schemes were not economically substantiated, which

3.3. Social aspects

Though environmental and economic dimensions take precedence among the motivations and drivers for the participants, social aspects such as social acceptance and distributional effects of community energy were also highlighted in the interviews. The social benefits of RECs and RES community energy were perceived as an important driver, particularly among the Balearic and Canary Islands and Norte. The main social aspects discussed were 1) social and community acceptance and awareness concerning RECs and RES community energy, and 2) the importance of local “champions” and associated skills and leadership needed to promote RECs and RES community energy and 3) potential redistribution and community benefits from RECs and RES community energy.

3.3.1. Social and community benefits

The civil society participants in Norte, Norway, Balearic and Canary Islands emphasised how RECs can enable access to energy for all community members at a fair price. This has implications for supply and energy security, as such energy installations are also suitable for smaller and more isolated rural communities, for example at farms in isolated parts of Norway. Farms located in places where there are weak power lines can contribute with supply during black-outs and support the power balance with storage solutions. This also postpones or limits costly grid investments. Such grid investments have environmental consequences, but the costs are usually transferred to the grid customers.

The participants from the Balearic and Canary Islands, Norte and Portugal in general brought up energy poverty as an important dimension for driving development of RECs and RES community energy. In Latvia also, RECs were perceived as a potential new instrument for municipalities to reduce energy poverty. REC projects can contribute to combating energy poverty, for instance by distributing the energy generated through PV on public buildings in vulnerable neighbourhoods. For smaller and sometimes isolated rural communities this can also secure needed energy for new employment opportunities that are greatly needed to avoid depopulation and poverty. This was one of the main motivations for the small municipality participant from Norway. In Norway the interest organization for housing associations, which build and manage and assist housing associations, emphasised the need for upgrading building standards in the context of Norway’s cold climate. RECs were seen as an opportunity to increase housing quality to the benefit of residents while at the same time investing in climate measures. Such energy systems are especially relevant for older housing cooperatives that are more poorly insulated than new housing cooperatives. Older and more poorly insulated housing cooperatives are more often located in areas where the population are middle-class or below in socio-economic status. Social justice and distribution are however also a significant social and political barrier for RECs and RES community energy in some contexts. The investment costs needed for establishing a REC are high for housing cooperatives and for new or poorer residents the increased shared costs can be overwhelming. Further, in Norway the dominant political discourse has been dominated by concern for how costs of the grid supply will be transferred to general consumers when the number of

prosumers increase (since they do not pay grid tariffs and electricity taxes on the electricity they self-consume but the costs of the grid remain the same).

Participants from Balearic and Canary Islands also insisted on the opportunities provided by RECs to strengthen existing local social networks, foster collaboration, and develop a “sense of community”. One of the Norwegian SME participants had been part of building an eco-village and saw community energy as part of a motivation for a larger sustainable transformation, including consumption and lifestyle. The importance of community-building to achieve this change was highlighted. It was suggested that creating a closer link between production and consumption can have many other positive effects on a community such as a feeling of unity and better neighbourhoods. Involvement of the local community in wind energy production was also mentioned in the Norwegian context. Onshore wind power has become extremely contested in Norway, resulting in a complete halt of granting licenses to new actors. One of the Norwegian SME participants had followed the positive effects of community involvement concerning onshore wind power in Germany and Denmark, which had inspired his company to cooperate with consultants that specialise in community engagement. Implementation of enabling framework provisions in RED II can also empower SMEs as key actors in the energy transition and generate collaboration schemes between SMEs operating in proximity. As described below, the lack of a sense of community is one of the factors hampering the mobilisation of citizens to gather and collectively invest in energy projects.

BOX 3 INTERLINKED DRIVERS FOR RES COMMUNITY ENERGY IN A SMALL NORWEGIAN MUNICIPALITY

One of the local authority participants from Norway had engaged in a collaboration project to develop RES community energy. As a small and isolated municipality with exceptional rough climatic conditions, they experienced challenges with energy security and need for electricity to create work opportunities. They were collaborating with the regional grid company and relevant stakeholders in tourism, business sector, small-scale energy producers and research communities. Already the grid company had made grid improvements and implemented local storage solutions to balance and support the existing grid and ensure energy supply during shorter power outs. In addition, it is decided to implement a micro grid at a local tourist facility and another micro-grid at the municipal buildings. Further, there is dialogue between the municipality, the grid company and local and external business sector actors within fish framing to develop local and innovative RES based energy systems. In addition, the municipality is engaging in several research projects as a 'living-lab' to test out new decentralised energy solutions such as RES energy production and storage, as well as local solutions for prosumers to sell flexibility. The main driver for this collaboration is multi-dimensional. The municipality has declared political commitment to become 'zero-emission' in 2020 (now extended). The main obstacle to reach their zero-emission target is the ferry the inhabitants use for commuting. In order to electrify this ferry local energy production was perceived the best option, because expanding the capacity of the central electricity supply would be too costly. Further, depopulation to urban areas, as well as challenges with energy security in the past, has made the municipality focused on attracting business sector and employment opportunities by providing more RES energy locally to make their small community an attractive place for residents and leisure (cabins and tourism). The municipality also has a long history as an energy 'living-lab' for research and commercial activities. As

3.3.2. Social and community acceptance

Lack of public awareness and understanding of RES community energy and potential benefits were perceived as a significant barrier by many participants across the participant groups. The lack of awareness differs from geographic and socio-cultural contexts. In Latvia, there is very little public engagement or discussion on the role of community energy. In Norway, there has been a general lack of focus on decentralised energy systems in the public debate, though the issue is high on the agenda among several stakeholders (see also Standal and Feenstra 2022; Standal et al. 2021), but the concept is often understood in very technical terms with little focus on social aspects or grassroots energy transformation. In Norte, Portugal in general and the Balearic and Canary Islands the concept of REC as defined in RED II is little known, exacerbated by the concept's complexity and the existence of parallel and similar figures (renewable energy communities, citizen energy communities). From a cultural perspective, the main barrier identified had to do with people's conservative attitude towards energy consumption. According to one of the participants, people tend to stick with what they know best and what they perceive as reliable: that is, the traditional grid consumption system, whereby citizens are passive agents. Moreover, community-based initiatives such as cooperatives or public-private partnerships were considered to be poorly rooted in regions such as Norte and Warmian-Masurian.

The lack of awareness was also associated with lacking acceptance. The lack of information and knowledge by the different actors who should be promoting this type of initiative was understood as a recurrent barrier. The general lack of awareness was in Norway also attributed to the lack of citizen interest in energy supply and consumption in general. Rooted in people being more attuned to maximising their own benefits (such as self-consumption) and paying little attention to energy consumption since this has historically been a cheap resource in Norway. The notable exceptions are citizen-led resistance towards onshore wind, electricity exports and increased electricity prices.

In Latvia, Norte, and Portugal in general, lack of acceptance was also perceived as a socio-cultural barrier concerning sharing economy principles. Aspects of inclusion and accountability were mentioned as strong internal motivations for Portuguese civil society participants engaging in RECs and community energy. The culture of the individual in detriment of the sense of community does not align well with the establishment of community initiatives, and the adoption of the concept RECs by individual citizens. People's focus on private ownership, in line with capitalist ideologies (see Wilhite 2016) influence people's sentiments towards sharing economy and common ownership of assets. This lack of active participation of citizens in joint cooperation was mentioned as an obstacle to the implementation of energy initiatives through bottom-up processes. Moreover, due to the limited experience with cooperative and citizen-led initiatives involving energy over the past years, there is still mistrust towards the REC concept. A participant from the Balearic and Canary Islands argued that fear of the apparent complexity of this type of project including lack of pedagogical impetus and examples of RECs in the region resulted in difficulties for stakeholders to understand what the direct benefits of RECs could be. In this regard, local governments were considered a key lever.

In Latvia and Poland this can further be ascribed to socialist heritage. Citizen involvement in energy systems is low in all five selected target regions, but particularly in Latvia and Norway. Also, participants

from Warmian-Masurian discussed how the public opinion in society in Poland is different from Western Europe. People's scepticism towards joint investments and combining private and public capital was perceived as an important barrier, the anticipation was therefore that investments in decentralised production would come from private investments or large energy corporations. Further, in Norway there are several small-scale hydropower producers, and most water resources and grid companies are co-owned by municipalities, resulting in a perception that energy is part of the 'commons' and that there is no imminent need for a bottom-up energy transformation led by citizens or SMEs.

To initiate change in social acceptance of RECs the need for local champions was highlighted in the discussions across all target regions and different participants. A local champion was hailed as someone able to push for change and engage other citizens and promote their collaboration. One key driver that was emphasised was people with persuasive power, personal motivation and leadership skills, often in combinations with technical interest and knowledge. In other words, implementation is seen as dependent on individual motivation and leadership skills and the need for these preconditions to be in place to promote development RECs and RES community energy beyond a small niche. This was seen as interrelated with the lack of political focus and that legal definitions were not in place, making RECs a vague entity. In comparison, the number of self-prosumers is increasing more rapidly than community energy. Further, in all target regions the lack of information and 'success stories' that provide experiences and know-how to stakeholders who want to start developing a REC was seen as a significant barrier. As an illustration, in Latvia, experience from existing pilot projects confirms the importance of the existence of a competent local leader, and the role of the municipality as the promoter, motivator and consultant of RES community energy development. Lack of information was perceived as an associated barrier to lack of competence in all target regions and across most groups of participants. In the same vein, information campaigns, training and capacity building provided by state authorities were perceived as important drivers. In Latvia, a range of competence raising materials is currently being developed in the national language.

Community leaders pushing for change could increase awareness and acceptance of new forms of shared energy systems Participants from the Polish target region of Warmian-Masurian suggested how municipalities could engage with trusted actors, such as volunteer fire brigades and rural housewives' groups. This could possibly help to overcome the lack of acceptance towards RES community energy initiatives at the local level. It was generally agreed in the focus groups that such leaders encompass great commitment and have leadership and technical skills. This phenomenon has also been explored in studies on self-consumption prosumers (Inderberg et al. 2020; Standal, Talevi and Westskog 2019). One of the Norwegian SME participants served as an example. He was CEO of a tech company engaging in small-scale sustainable electricity production. The company was founded by three young people with a high commitment for the environment and climate and a shared interest in technology. From the start-up of the company until now, they had spent most of their time and energy on this company and taken considerable economic risks to make their visions come to life. It was evident that their efforts were based on motivations for low-carbon transformation on a higher scale than their own operations.

Interestingly, in Norway the significance of the visionary leader was also seen as a barrier. For community energy to become mainstream it requires that the process is seen as attractive and viable for more than people with strong conviction and particular technical and leadership skills. Though such leading pioneers are important to advance the development of RECs, attention must also be paid to ensuring that the threshold for participation is not too high.

3.4. Legal and regulatory frameworks

One apparent barrier for the development of RECs is the lack of full implementation of provisions in RED II that apply to RECs. This was mentioned in all target regions, except for Norte/Portugal. Norway is also not a Member State to the EU and in Norway RED II is still under review by EEA/EFTA with a very uncertain timeline, whereas RED II should have been implemented in Member States in June 2021.

3.4.1. Lack of clear legal definitions for RECs

The lack of clear legal definitions of REC were noted by many participants. In Norte, there was consensus among the participants that the provisions applicable to RECs were complex, ambiguous, and highly bureaucratic hampering the understanding of what can and what cannot be approved as a REC. The main barriers to the development of RECs identified by civil society participants were related to existing regulations and legislation, namely to the definition of RECs as established by the Decree Law nº162/2019 (GoP 2019) and the licensing procedures that need to be followed for their implementation. Lengthy licensing process, and the lack of a direct communication channel with the licensing entity are considered as discouraging factors. Participants from local authorities mentioned that existing legislation does not allow for the level of experimentation required at this stage. It is expected that the new legislation on the organisation and operation of the national power system, Decree Law nº15/2022 (GoP 2022), released in mid-January 2022, could help to overcome some of these barriers.

In Poland, there is no legal definition of RECs, and the few existing energy community initiatives are energy clusters and energy cooperatives. At the moment the participants from Warmian-Masurian saw energy clusters as a more likely approach to community energy than energy cooperatives (and RECs), as the concept of energy clusters (civil agreements between various entities regarding the generation and balancing of demand, distribution or trade in energy) was introduced in the Polish Act on Renewable Energy Sources already in 2016. Provisions to mobilise and improve the functioning of energy clusters, are currently under discussion and expected to come into force in 2022. Provisions for collective prosumers and virtual prosumers are expected to enter into force in 2023 and 2024, respectively. The expected regulations were emphasised as a driver for electricity generation in PV installations, and to the creation of clusters or special-purpose cooperatives.

In the Balearic and Canary Islands, the cooperative model is being considered the most suitable organisational model for RECs. However, there is a lack of specific regulation on cooperatives at the regional level. This makes it very difficult to set up and operate a cooperative. There was some disagreement among civil society participants regarding the extent to which existing administrative and bureaucratic procedures for setting up RES community energy initiatives constituted a barrier.

Specifically, one participant from the Balearic Islands did not consider this factor to be very relevant, while another participant from the same target region advocated for simplification. One civil society participant from the Balearic Islands target region also highlighted that the creation of an enabling framework (ecosystem) would be an important driver for the development of RECs in the region. Among the SME participants, the lack of a comprehensive regulatory framework was considered a key external barrier by most participants. Also, the current operation of the electricity distribution grid in Spain is regarded as challenging for REC development, given the lack of transparency regarding the capacity of different connection points.

As presented in Box 2, there is agreement regarding the main principles of REC in Latvia, but discussions are still ongoing about a range of issues which relate to the implementation of particular mechanisms and solutions in the electricity market and the role of different actors. Further, discussion regarding the regulated costs (tariffs) of power grid services related to RECs is expected as well. A lack of adopted legislation made it challenging to discuss existing barriers and drivers of the development of RECs in the Latvian focus groups, as it is currently difficult to discuss the possible involvement of both natural persons, municipalities, and SMEs in RECs before detailed regulations are elaborated and adopted.

As RED II is still under review in Norway, and there is no legal definition of RECs the concepts and debates of RES community energy is more focused on the rights of decentralised systems to share energy and agreement between important stakeholders (such as the regulator and the grid companies operating under regulated monopoly) is difficult to achieve.

3.4.2. Rights of RECs and unpredictable policy frameworks

An important existing barrier (and reverse potential driver) is the policy framework and commitment to RECs. This includes a lack of legal stability and constant changes that prevent the introduction of long-term strategies (e.g. regarding wind energy). As mentioned in the section on environmental aspects, defined local climate and energy targets was mentioned as an important motivation for the promotion of REC initiatives by participants in the Balearic and Canary Islands, Latvia, Norway, and Norte. A problem noted in Norway is the separation of climate and energy considerations in some municipal climate strategies, with electricity being defined as emissions free. Most of the municipality's efforts were directed at reducing emissions, while in the field of energy, efforts were mostly directed at energy efficiency.

As highlighted by Standal et al (2021), planning and licensing regulations was pointed out as a barrier to the development of RES community energy initiatives in several target regions, due to the lengthy procedures and temporal unpredictability in planning. As an example, Warmian-Masurian participants highlighted the unclear and unstable rules for the use of transmission infrastructure of the distribution system operators as a challenging barrier. However, these regulations were seen as less significant than the lack of legal and enabling frameworks for RECs.

The regulations concerning sharing electricity produced by decentralised energy production in Norway was one of the topics that dominated the discussions of barriers to the development of RES community

energy initiatives in the Norwegian focus groups. The electricity grid supply in Norway is managed by grid companies operating under regulated monopoly. In effect, this means that sharing own electricity between prosumers is not allowed as the grid is under the ownership of the grid companies. However, new regulations expanding the rights of prosumers are pending approval (NVE 2021). Today prosumers are defined as end users that consume and produce energy ‘behind the meter’, from which the power put into the grid does not exceed 100 kW at any time (GoN 1999). Prosumers may use self-consumed electricity free of charge (they do not pay grid tariffs and taxes on the electricity they produce) and can sell their excess production to an electricity supplier without a trading license. Only commercial entities or detached or semi-detached households can become prosumers at present. The proposed new regulations allow sharing of electricity produced within the same property. For housing companies and housing cooperatives, that are plentiful in Norway, the proposed regulations entail that energy production from e.g. rooftop PV can be distributed to all units without paying grid tariffs and electricity tax when electricity is exchanged between household connection points. The 100 kW limit is also likely to increase to a maximum of 500 kW installed capacity or 500 kW shared electricity within the property, providing opportunities for larger investments. The new regulations will provide equal treatment to house owners and flat owners. The proposition was welcomed by the housing cooperatives and property developers in the focus groups. However, the municipal agency and the SME that have responsibility for several properties were disappointed with the proposition. As an example, municipalities would like the opportunity to share excessively produced energy from rooftop PV on a school during summer vacations (when they are empty) to swimming halls or other municipal properties that are in use. At present this is not possible as the grid operators have monopoly of the grid lines.

Also in Latvia the current regulations make sharing electricity from RECs a significant barrier. There are a few examples of electricity sharing for self-produced electricity in multi-apartment buildings in Latvia and the experiences from them might be used for testing REC as a model.

3.5. Network and organisational aspects

Given the lack of experience with RES community energy in the selected target regions, important drivers and barriers for RECs and RES community energy are network and organisational aspects such as decision-making, competence and cooperation.

As discussed in the section above, the lack of clear legal definitions results in challenges in the forms and structures of organisation. In Norte, civil society participants found the complexity of organisational procedures for the establishment and operation of a REC, including the definition of internal REC rules to organise management, to be one of the main existing barriers. In addition to access to financing opportunities, the existence of internal capacity to deal with the organisational aspects of REC initiatives was referred to by the civil society and local authority participants as an element currently overlooked in the Portuguese context. This is aggravated by the lack of experience and proper models. In the Balearic and Canary Islands participants highlighted barriers such as the lack of examples/schemes to serve as reference for stakeholders, and underlined difficulties in terms of empowering REC’s members and steering groups. Further, challenges in internal communication between members of the REC was considered a potential barrier to their development.

As RECs are not at focus in Norway and (since Norway is not a EU member) and the Norwegian participants experienced organisational barriers according to the context they operated in. In common for several were decision-making barriers. As an illustration, the housing cooperative (so far, the most promising future option for joint citizen RES community energy) is a common legal form for many residential buildings in Norway and is subject to the law on housing cooperatives (GoN 2003). Investment decisions require a two-third majority in the general assembly, which comprises the housing cooperative's residents. To overcome this barrier, the role of the local leader and competence was highlighted (see discussion below). An SME participant, representing a family-owned company, highlighted that the decision to engage in RES production was facilitated due to the ownership structure of the company; the decision to invest in RES production was made by the owner alone. Again, this highlights the importance of a local leader with a motivation to engage in RES community energy initiatives.

Similar to what was highlighted in the Norwegian focus groups regarding the necessity to attain the consent of residents in order to develop RES projects on collective buildings, property developers in Warmian-Masurian noted that difficulties in obtaining the consent of all co-owners to carry out investments constituted a potential barrier. In general, participants highlighted those differences of opinion and different expectations and possible conflicts between stakeholders in the project could constitute a barrier. In Portugal, civil society participants mentioned that conflicts that may arise from the collective ownership of the land/roof (e.g. in apartment buildings), which implies the agreement of all individual owners and may imply an unfavourable distribution of the investment. A similar hurdle may occur when promoters are not the owners of the land/infrastructure where the project is being implemented.

Another significant organisational barrier discussed across the target regions is the need for competence and skills to establish RECs. The technological, administrative and managerial aspects of RECs may be too complex for ordinary citizens. A civil society participant from the Balearic Islands noted that a lack of qualified managers/administrators with highly technical and specific knowledge of RECs was an important barrier to their development. Also, smaller local authority institutions may lack competence and resources, constitute a barrier both for their own participation and for actors who wish to set up projects within their territory.

SME participants in Norte/Portugal highlighted that the diversity of profiles, especially within the industrial sector, hampers the identification of the most adequate business models and also the replication of best-practices in this context. Internal rules, including for energy sharing within the community, need to be adapted to the specific community context and require a deep knowledge of individual energy needs and local and national regulations. In this context, the absence of successful/already consolidated examples that can provide the necessary know-how to stakeholders who are interested in developing RECs was mentioned as a barrier in all target regions. In Norte, the professionalisation of citizens and/or entities responsible for the management of RECs was mentioned as key for the success of these initiatives, where the internal capacity to deal with the organisational aspects of REC initiatives is a barrier for their development. The lack of the necessary competence

required to initiate RES community energy projects was also highlighted as a possible barrier for RES projects in housing cooperatives in Norway. Housing associations are owned and managed by the residents, who do not necessarily possess the competence to initiate and develop RES community energy projects. In addition to reducing short-term costs to residents, increasing the expertise was highlighted as a key driver for local energy projects to be implemented in housing cooperatives. A lack of competence and good examples which can help guide the development of local RES energy projects was also highlighted from the perspective of farmers in Norway, both among civil society and local authority participants.

The promotion of pilot projects and the dissemination of respective results, with concrete evidence of the benefits of RECs at the individual and community level, was referred to as an important driver for the large-scale deployment of RECs according to participants in Latvia, Norte, and Norway. In Norway there is a great deal of decentralised energy system pilot projects that are supported by public grants, but systematic knowledge transfer from these projects to stakeholders beyond the regulator and donors do not exist. Promoting information and good examples were also brought up in conjunction with the need for local champions as described in the section on social aspects. The presence of local leaders who can engage other citizens and promote their collaboration can be key to overcoming barriers related to competence and decision-making.

An important driver and remedy for lacking competence and knowledge on REC and RES community energy models discussed in the interviews were social networks and cooperations with other actors. Local authority participants in Norte and Norway highlighted the need to involve different stakeholders (e.g. local authorities, national policy makers, grid operators) to successfully implement the REC concept, and adapt it to the local context. In Norway and the Balearic and Canary Islands it is difficult for small-scale and grassroots actors to enter the power system that is operated by traditional distribution operators. This necessitates cooperation with partners (often grid companies) to ensure access to connection points, adequate information and so on. Local authority participants from the Balearic and Canary Islands emphasised the need for an ecosystem of companies specialising in advising cooperatives on the creation of RECs. The same participants are pushing for the local government to encourage and include the participation of these companies in energy management so that they can advise citizens and other companies and public entities.

4. Summary of findings

This deliverable provides an analysis of the barriers and drivers for the establishment of renewable community energy, particularly RECs (as defined in RED II), considering the regional, environmental, legal and social contexts of five selected target regions: Balearic and Canary Islands (Spain), Latvia, Norte (Portugal), Norway and Warmian-Masurian (Poland). These target regions were selected on the basis of a low deployment of renewable community energy. The analysis addresses a diversity of technologies and rationalities such as energy security (island communities), tourism, farming, as well as social motivations and behavioural aspects relevant for promoting renewable community energy. Our findings in this Deliverable are drawn from focus groups as well as individual interviews with potential

REC actors (citizens, local authorities and SMEs). This method has provided the opportunity to gain qualitative and detailed understanding of the participants' role or involvement in the establishment of RECs, including which technologies they are interested in, their social motivations for engaging in RECs, organisational structures, how they try to promote RECs, who they cooperate with and what they perceive as key impediments for the establishment and operation of RECs.

The main findings derived from the interviews with potential shareholders/members of RECs show the important potential RECs and RES community energy have in the low-carbon energy transformation, but also the significant barriers that still exist. These findings generally support the state of research from current studies, but also provide new details on mechanisms and attitudes that serve as important drivers and barriers and how these differ according to different participants and socio-cultural and geographical contexts. We point out some particularly relevant findings:

- The main drivers identified were environmental (reducing emissions and environmental damage), economic or social benefits (e.g. social justice, energy democracy, community-building). This underlines the potential RECs have for grassroots energy transformations. In Latvia and Warmian-Masurian economic benefits were relatively more important compared to the other target regions, but social dimensions such as community benefits and community-building were highlighted by all participants.
- Policy targets and strategies are a significant driver for local authorities and SMEs. Such targets and strategies help emphasise issues concerning reducing greenhouse gas emissions, energy poverty as well as how dimensions of sustainability (SDGs) are interrelated. In this context RECs and RES community energy gain importance and actors are motivated to seek cooperation and solutions concerning renewable and decentralised energy systems that further promote REC development.
- There is a need to firmly place RECs and RES community energy on the public agenda and enable ways to provide information and knowledge on different models to help stakeholders in the process of establishing RECs. Lack of public acceptance and awareness of new RES energy models is a significant barrier to establishing such energy innovations. Lack of acceptance is in some places rooted in scepticism towards cooperative models or sharing economy principles. On the other hand, local champions and success stories were highlighted as potential levers to push for change and provide legitimacy and trust in RECs and RES community energy.
- Justice dimensions need to be promoted and better understood in the public agenda and policy frameworks. RECs and RES community energy have significant potential to ensure a fair distribution of costs and energy security, but this requires attention to inclusion and accountability which was highlighted less by the participants interviewed. The analysis also points to the importance of champions that have the commitment, skills and cultural and social

capital to push for change. However, attention to how such resources are distributed in societies is necessary for RECs to be inclusive.

- Though reducing energy costs and more optimal use of local resources were highlighted as a main driver for engaging in REC or RES community energy, financial barriers were emphasised in all target regions. This includes uncertainties regarding market conditions and long-term economic sustainability of RECs, limited access to credit and collateral, lacking financial and market incentives (support schemes, feed-in tariffs and grants) and a lack of knowledge about business models. If current financial barriers can be resolved, however, economic aspects can become a major driver for REC and RES community energy in the future.
- Regulations continue to be a notable barrier in all target regions, as found in ‘D2.1 Assessment report on technical, legal, institutional and policy conditions’ (Standal et al. 2021). Current regulations are considered too complex and ambiguous. Especially, the lack of clear legal definitions of RECs is considered one of the main barriers for the establishment of RECs. Further, existing limitations regarding prosumerism and electricity sharing make it difficult for new actor to establish decentralised energy systems without reducing profitability.
- The implementation of RED II provisions is slower in some target regions (Latvia, Norway and Warmian-Masurian). Regulatory and legal amendments are expected in both Norway and Latvia. Measures to improve implementation of RED II provisions and making these work better with local regulations, along with increased transparency and simplification of legal and regulatory frameworks in general is recommended as measures to remove current legal and regulatory barriers.

References

- Bauwens, T. (2016) Explaining the diversity of motivations behind community renewable energy. *Energy Policy* 93: 278 – 290.
- Berka, A. L., MacArthur, J. L., and Gonnelli, C. (2020) Explaining inclusivity in energy transitions: Local and community energy in Aotearoa New Zealand. *Environmental Innovation and Societal Transitions* 34: 165 –182.
- Bomberg, E. and McEwen, N. (2012) Mobilizing community energy. *Energy Policy* 51: 435 – 444.
- Brummer, V. (2018) Community energy – benefits and barriers: A comparative literature review of Community Energy in the UK, Germany and the USA, the benefits it provides for society and the barriers it faces. *Renewable and Sustainable Energy Reviews* 94: 187- 196.
- Braunholtz-Speight, T., Sharmina, M., Manderson, E. et al. Business models and financial characteristics of community energy in the UK. *Nat Energy* 5, 169–177 (2020).
<https://doi.org/10.1038/s41560-019-0546-4>
- Busch, H., Ruggiero, S., Isakovic, A., and Hansen, T. (2021) Policy Challenges to Community Energy in the EU: A Systematic Review of the Scientific Literature. *Renewable and Sustainable Energy Reviews* 151: 111535.
- Busch, H., Ruggiero, S., Isakovic, A., Faller, F. and Hansen, T. (2019) Co2mmunity WORKING PAPER No. 2.1, Scientific Review Paper on Community Energy Drivers and Barriers.
https://portal.research.lu.se/ws/files/65761630/co2mmunity_working_paper_No._2.1_%20v04.pdf
- Campos, I., Pontes, L. G., Marín-González, E., Gähns, S., Hall, S. and Holstenkamp, L. (2020) Regulatory challenges and opportunities for collective renewable energy prosumers in the EU. *Energy Policy* 138: 111212.
- Campos, R.M et al. (2020) Strategy Menorca 2030: Roadmap for decarbonizing the Island’s energy system. (in Spanish) <http://www.biosferamenorca.org/documents/documents/5289doc12.pdf>
- Cowell, R. and Devine-Wright, P. (2018) A ‘Delivery-Democracy Dilemma’? Mapping and Explaining Policy Change for Public Engagement with Energy Infrastructure. *Journal of Environmental Policy & Planning* 20(4): 499 – 517.
- Coy, D., Malekpour, S., Saeri, A.K. and R. Dargaville, 2021. Rethinking community empowerment in the energy transformation: A critical review of the definitions, drivers and outcomes, *Energy Research & Social Science*, Volume 72. <https://doi.org/10.1016/j.erss.2020.101871>
- Curtin, J., McInerney, C. and Gallachóir, B. Ó. (2017) Financial Incentives to Mobilise Local Citizens as Investors in Low-Carbon Technologies: A Systematic Literature Review. *Renewable and Sustainable Energy Reviews* 75: 534–547.
- Delnooz, A., Vanschoenwinkel, J., Mou Y. and Höschle, H. (2020) Possibilities of collective activities in Flanders.
https://www.energyville.be/sites/energyville/files/downloads/2020/infographic_energycommunities_engels.pdf
- Diaz-Chavez (2012) Community-based renewable energy in the Lake District National Park – local drivers, enablers, barriers and solutions. *Local Environment* 17:3, 261-280, DOI: 10.1080/13549839.2012.665855
- 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. 2018/2001/EU, 21 December 2018.
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC (accessed 15 Feb 2022).
- Fast, S. (2013) A Habermasian analysis of local renewable energy deliberations. *Journal of Rural Studies* 30: 86 – 98.
- Government of Norway (GoN) (2003) Burettslagslova. LOV-2003-06-06-39. (in Norwegian) at: <https://lovdata.no/dokument/NL/lov/2003-06-06-39> (accessed 15 Feb 2022).
- Government of Norway (GoN) (1999) Forskrift om kontroll av nettvirksomhet. FOR-1999-03-11-302. (in Norwegian) at: <https://lovdata.no/dokument/SF/forskrift/1999-03-11-302> (accessed 15 Feb 2022).
- Government of Portugal (GoP) (2022) Presidência do Conselho de Ministros. Decreto-Lei nº 15/2022 de 2022-01-14. Diário da República n.º 10/2022, Série I de 2022-01-14, 3 – 185. (in Portuguese) at: <https://dre.pt/dre/detalhe/decreto-lei/15-2022-177634016> (accessed 15 Feb 2022).
- Government of Portugal (GoP) (2019) Presidência do Conselho de Ministros. Decreto-Lei nº 162/2019 de 2019-10-25. Diário da República n.º 206/2019, Série I de 2019-10-25, 45-62. (in Portuguese) <https://dre.pt/dre/detalhe/decreto-lei/162-2019-125692189> (accessed 15 Feb 2022).

- Haf, S. and Parkhill, K. (2017) The Muillean Gaoithe and the Melin Wynt: Cultural sustainability and community owned wind energy schemes in Gaelic and Welsh speaking communities in the United Kingdom. *Energy Research and Social Science* 29:103 – 112.
- Haggett, C. and Aitken, M. (2015) Grassroots energy innovations: the role of community ownership and investment. *Current Sustainable/Renewable Energy Reports* 2(3): 98 –104.
- Haggett, C., Creamer E., Harnmeijer, J., Parsons, M. and Bomberg, E. (2013) Community Energy in Scotland: The Social Factors for Success. Report commissioned by ClimateXChange for the Scottish Government. https://www.climatexchange.org.uk/media/1585/cxc_report_-_success_factors_for_community_energy.pdf (accessed 15 Feb 2022).
- Hanke, F., Guyet, R. and Feenstra, M. (2021) Do renewable energy communities deliver energy justice? Exploring insights from 71 European cases. *Energy Research & Social Science* 80: 102244.
- Hanke, F. and Lowitzsch, J. (2020) Empowering Vulnerable Consumers to Join Renewable Energy Communities—Towards an Inclusive Design of the Clean Energy Package. *Energies* 13(7): 1615.
- Horstink, L. et al. (2020) Collective renewable energy prosumers and the promises of the energy union: Taking stock. *Energies* 13(2): 421.
- Inderberg, T. H. J., Sæle, H., Westskog, H. and Winther, T. (2020) The dynamics of solar prosuming: Exploring interconnections between actor groups in Norway. *Energy Research & Social Science* 70: 1 – 11.
- Juntunen, J.K. (2014) Domestication pathways of small-scale renewable energy technologies. *Sustainability: Science, Practice and Policy* 10 (2): 28-42.
- Kalkbrenner, B. J., & Roosen, J. (2016). Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. *Energy Research & Social Science* 13: 60 – 70.
- Kamin, T., Golob, U., Medved, P. and Kogovšek, T. (2020) Benefits for community members in terms of increased access to clean, secure and affordable energy. H2020 NEWCOMERS Deliverable D6.1. [NEWCOMERS D6_1_benefits_for_community_members_v_30-12-2020.pdf](https://www.newcomersh2020.eu/newcomersh2020.eu) (newcomersh2020.eu) (accessed 15 Feb 2022)
- Koirala, B. P., Araghia, Y., Kroesen, M., Ghorbani, A., Hakvoort, R. A. and Herder, P. M. (2018) Trust, awareness, and independence: Insights from a socio-psychological factor analysis of citizen knowledge and participation in community energy systems. *Energy Research & Social Science* 38: 33 – 40.
- Koirala, B. P., Koliou, E., Frieger, J., Hakvoort, R. A. and Herder, P. M. (2016) Energetic communities for community energy: A review of key issues and trends shaping integrated community energy systems. *Renewable and Sustainable Energy Reviews* 56: 722 – 744.
- Kooij, H.-J., Oteman, M., Veenman, S., Sperling, K., Magnusson, D., Palm, J. and Hvelplund, F. (2018) Between grassroots and treetops: Community power and institutional dependence in the renewable energy sector in Denmark, Sweden and the Netherlands. *Energy Research & Social Science* 37: 52 – 64.
- Laes, E. et al. (2021) Assessment report of potentials for RES community energy in the target regions. H2020 COME RES Deliverable 2.2. https://come-res.eu/fileadmin/user_upload/Resources/Deliverables/Del_2.2_Assessment_Report_of_Potential.pdf
- Lazoroska, D., Palm, J. and A. Bergek (2021) Perceptions of participation and the role of gender for the engagement in solar energy communities in Sweden. *Energy, Sustainability and Society* 11 (3).
- Leiren, M. D., Aakre, S., Linnerud, K., Julsrud, T. E., Di Nucci, M. R. and Krug, M. (2020) Community Acceptance of Wind Energy Developments: Experience from Wind Energy Scarce Regions in Europe. *Sustainability* 12(5): 1754.
- Linnerud, K. et al. (2018) A literature review of social acceptance of wind energy development, and an overview of the technical, socio-economic and regulatory starting conditions in the wind energy scarce target regions. H2020 WinWind Deliverable 2.1. https://winwind-project.eu/fileadmin/user_upload/Resources/Deliverables/Del2.1_final.pdf
- Maleki-Dizaji, P. et al. (2022) Good Practice Portfolio of Renewable Energy Communities. H2020 COME RES Deliverable 5.1. https://come-res.eu/fileadmin/user_upload/Resources/Deliverables/Del_5.2_Good_Practice_Portfolio.pdf
- NVE (2021) Renewable sharing scheme power generation: Proposed amendments to the Regulations on the control of grid activities and regulations on power sales and online services (in Norwegian). Norwegian Water Resources and Energy Directorate. https://www.nve.no/media/12625/forslag-til-forskriftsendring-delning-av-produksjon-3666137_1_1.pdf

- Palm, J. (2021a) Energy communities in different national settings – barriers, enablers and best practices. H2020 NEWCOMERS Deliverable D3.3. https://www.newcomersh2020.eu/upload/files/Deliverable%203_3_%20Energy%20communities%20in%20different%20national%20settings_barriers%2C%20enablers%20and%20best%20practices.pdf
- Palm, J. (2021b). The Transposition of Energy Communities into Swedish Regulations: Overview and Critique of Emerging Regulations. *Energies* 14(16): 4982.
- Maleki-Dizaji, P. et al. (2022) Good Practice Portfolio of Renewable Energy Communities H2020 COME RES Deliverable 5.2 https://come-res.eu/fileadmin/user_upload/Resources/Deliverables/Del_5.2_Good_Practice_Portfolio.pdf
- REScoop.eu (2020). Energy Communities under the Clean Energy Package. Transposition Guidance. Available at: <https://www.rescoop.eu/toolbox/how-can-eu-member-states-support-energy-communities>
- Ruggiero, S., Busch, H., Isakovic, A. and Hansen, T. (2022) Community Energy in the Eastern Baltic Sea Region: From Standstill to First Steps. In Coenen, F. H. J. M and Hoppe, T. (eds) *Renewable Energy Communities and the Low Carbon Energy Transition in Europe*.
- Seyfang, G., Hielscher, S., Hargreaves, T., Martiskainen, M. and Ad. Smith (2014) A grassroots sustainable energy niche? Reflections on community energy in the UK. *Environmental Innovation and Societal Transitions* 13: 21-44. <https://doi.org/10.1016/j.eist.2014.04.004>.
- Seyfang, G., Park, J.J. and Smith, A. (2013) A thousand flowers blooming? An examination of community energy in the UK. *Energy Policy* 61: 977 – 989.
- Slee, B. (2015) Is there a case for community-based equity participation in Scottish on-shore wind energy production? Gaps in evidence and research needs. *Renewable and Sustainable Energy Reviews* 41: 540 – 549.
- Soeiro, S., and M.F. Dias (2020) Community renewable energy: Benefits and drivers. *Energy Reports* 6 (8):134-140. <https://doi.org/10.1016/j.egy.2020.11.087>.
- Standal, K. and Feenstra, M. (2022). Engaging the Public for Citizen Energy Production in Norway: Energy Narratives and Opportunities and Barriers for an Inclusive Energy Transition, in Karimi, Farid and Rodi, Michael (eds.) *Energy transition in the Baltic Sea region: Understanding stakeholder engagement and community acceptance*. Routledge.
- Standal, K. et al. (2021) Assessment report on technical, legal, institutional and policy conditions. H2020 COME RES Deliverable 2.1. https://come-res.eu/fileadmin/user_upload/Resources/Deliverables/COME_RES_D2.1_Assessment_report_FINAL.pdf
- Standal, K., Talevi, M. and Westskog, H. (2019) Engaging Men and Women in Energy Production in Norway and United Kingdom: The Significance of Social Practices and Gender Relations. *Energy Research & Social Science* 60 (101338).
- Tricarico, L. (2021) Is community earning enough? Reflections on engagement processes and drivers in two Italian energy communities. *Energy Research & Social Science* 72, <https://doi.org/10.1016/j.erss.2020.101899>.
- Walker, G. (2008) What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy* 36(12): 4401 – 4405.
- Walker, G., Devine-Wright, P., Hunter, S., High, H. and Evans, B. (2010) Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy. *Energy Policy* 38: 2655 – 2663.
- Warbroek, B., Hoppe, T., Bressers, H. and Coenen, F. (2019) Testing the Social, Organizational, and Authorities Factors for Success in Local Low Carbon Energy Initiatives. *Energy Research & Social Science* 58: 101269.
- Wierling, A., Schwanitz, V. J., Zeiß, J. P., Bout, C., Candelise, C., Gilcrease, W. and Gregg, J. S. (2018) Statistical evidence on the role of energy cooperatives for the energy transition in European countries. *Sustainability* 10(9): 3339.
- Wilhite, H. (2016) *The Political Economy of Low Carbon Transformation*. London: Routledge. <https://doi.org/10.4324/9781315745787>
- Wirth, T., Gislason, L and R. Seidl (2018) Distributed energy systems on a neighborhood scale: Reviewing drivers of and barriers to social acceptance, *Renewable and Sustainable Energy Reviews*, Volume 82, Part 3, pp. 2618-2628, <https://doi.org/10.1016/j.rser.2017.09.086>.

Appendix

Table 4 Overview of research participants

Target region	Category	Type of institution	Date
Balearic and Canary Islands	Civil society	REC, Canary Islands	06.10.2021
Balearic and Canary Islands	Civil society	Research platform	06.10.2021
Balearic and Canary Islands	Civil society	Regional research centre	06.10.2021
Balearic and Canary Islands	Civil society	REC, Balearic Islands	17.12.2021
Balearic and Canary Islands	Civil society	Industrial park REC (pilot project)	17.12.2021
Balearic and Canary Islands	Local authorities	Association of municipalities	06.10.2021
Balearic and Canary Islands	Local authorities	Local energy agency	06.10.2021
Balearic and Canary Islands	Local authorities	County municipality	06.10.2021
Balearic and Canary Islands	Local authorities	Regional energy agency	17.12.2021
Balearic and Canary Islands	Local authorities	Municipality	17.12.2021
Balearic and Canary Islands	SME	Regional enterprises association	31.01.2022
Balearic and Canary Islands	SME	Energy consultancy firm	31.01.2022
Balearic and Canary Islands	SME	Wine business	31.01.2022
Latvia	Civil society	Participants with the background of planning (5 participants)	18.12.2021

Target region	Category	Type of institution	Date
Latvia	Civil society	5 participants	18.12.2021
Latvia	Local authorities	City municipality	22.12.2021
Latvia	Local authorities	City municipality	22.12.2021
Latvia	Local authorities	Local municipality (<i>novads</i>)	22.12.2021
Latvia	Local authorities	Local municipality (<i>novads</i>)	22.12.2021
Latvia	Local authorities	Regional public authority	21.12.2021
Latvia	Association (including SME members)	Renewable energy association	21.12.2021
Latvia	SME	Landowner: developer of ground mounted solar PV	21.12.2021
Norway	Civil society	Housing cooperative	29.10.2021
Norway	Civil society	Housing cooperative	29.10.2021
Norway	Civil society	Association for housing cooperatives	29.10.2021
Norway	Civil society	NGO engaging in the Norwegian farming community	29.10.2021
Norway	Local authorities	County municipality	8.11.2021
Norway	Local authorities	Municipal agency for climate and environmental authorities	8.11.2021
Norway	Local authorities	Municipal property enterprise	8.11.2021
Norway	Local authorities	Municipality, island community	8.11.2021

Target region	Category	Type of institution	Date
Norway	SME	Food industry company*	11.11.2021
Norway	SME	Property developer	11.11.2021
Norway	SME	Architect company	11.11.2021
Norway	SME	Windpower company	11.11.2021
Portugal	Civil society	Renewable energy cooperative	14.12.2021
Portugal	Civil society	Consumers' protection association	14.12.2021
Norte	Civil society	School parents' association	14.12.2021
Norte	Local authorities	Parish (local authority)	15.12.2021
Norte	Local authorities	Local energy agency	16.12.2021
Norte	Local authorities	Municipality (local authority)	20.12.2021
Norte	SME	University	16.12.2021
Norte	SME	Property owner (services buildings)	16.12.2021
Portugal	SME	Network of technology suppliers (industries, technological centres, RTOs)	16.12.2021
Portugal	SME	Automation, control and information solutions provider	16.12.2021
Warmian-Masurian voivodeship	Civil society	Private person	19.01.2022
Warmian-Masurian voivodeship	Civil society	Private person	21.01.2022

Target region	Category	Type of institution	Date
Warmian-Masurian voivodeship	Civil society	Farmer	21.01.2022
Warmian-Masurian voivodeship	Civil society	Private person	02.02.2022
Warmian-Masurian voivodeship	Local authorities	County municipality	17.01.2022
Warmian-Masurian voivodeship	Local authorities	County municipality	18.01.2022
Warmian-Masurian voivodeship	Local authorities	County municipality	24.01.2022
Warmian-Masurian voivodeship	Local authorities	County municipality	25.01.2022
Warmian-Masurian voivodeship	SME	District heating company	19.01.2022
Warmian-Masurian voivodeship	SME	Property management	19.01.2022
Warmian-Masurian voivodeship	SME	Solar panel company	28.01.2022
Warmian-Masurian voivodeship	SME	Metal industry company	01.02.2022

CONTACT

COME RES Project

info@come-res.eu

www.come-res.eu

PARTNERS

