COME RES

Advancing Renewable Energy Communities

Deliverable 4.1

Report on organizational and legal forms and business models for RECs

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Summary

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About COME RES

COME RES - Community Energy for the uptake of renewables in the electricity sector. Connecting long-term visions with short-term actions aims at facilitating 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.

Issues addressed and major steps

COME RES covers diverse socio-technical systems including community PV, wind (onshore), storage and integrated community solutions, investigated in nine European countries. The project has a specific focus on a number of target regions in these countries. These target regions are characterised as places where community energy has the potential to be further developed whereas model regions are places 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. Moreover, COME RES synchronises project

activities with the transposition and implementation of the Renewable Energy Directive (RED II) and other legislation of the Clean Energy Package. It places a particular focus on the provisions for RECs, of which the progress is discussed in policy labs. Policy lessons with validity across Europe will be drawn and recommendations issued.

Abstract

Overall, Work Package 4 (WP4) of the COME RES project is designed and executed to fulfil three main objectives. Firstly, to screen and analyse existing and organizational and legal forms and business models for RECs from across Europe T4.1). Secondly, to provide examples for novel financing instruments (T4.2). Thirdly, to develop key principles for business model proposals for four target regions (which are to be selected among the nine countries covered by COME RES: Belgium, Germany, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, and Spain).

More specifically, Deliverable 4.1. provides an overview of existing and planned organisational and legal forms and business models of renewable energy communities (RECs) from across Europe. In addition, this report includes - where relevant and not yet described in the COME RES Deliverable 2.1 "Assessment Report on Technical, Legal, Institutional and Policy Conditions"[1] - information on local conditions, such as regulatory specificities at local and/or national level, available resources and support mechanisms, as well as further financial conditions and barriers (economic, regulatory, social, technical, related to other local conditions). Business models in this context are understood as models that are financially viable and "provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits'[2]". Further aspects include a community's main value proposition to its beneficiaries, the key partners, its main activities, drivers and resources that are not monetary.

In sum, the COME RES project is designed to advance RECs, according to Directive (EU) 2018/2001, the recast Renewable Energy Directive (or RED II). Yet, the lack of - or the only very recently accomplished - transposition of provisions that require member states to establish enabling frameworks for energy communities, has not yet allowed for a great number of RECs to become operational across Europe – at least not in the sense the EU envisions. Therefore, this Deliverable is constrained to take a flexible approach and list a range of community models that are being operated in a number of countries and partly since long periods of time.

Deliverable 4.1. is based on the input received from involved project partners[3], as well as additional research carried out. To this purpose, a template was developed, in coordination with FUB and by taking into account the feedback expressed during the T4.1. kick-off meeting (July 2021). This template was sent out with the request to provide information on existing energy communities. After submission, a number of aspects that needed further clarification have been consulted on bilaterally.

[1] https://come-res.eu/fileadmin/user_upload/Resources/Deliverables/COME_RES_D2.1__Assessment_report_FINAL.pdf
[2] Art. 2 (16) Definition of renewable energy communities, Directive (EU) 2018/2001
[3] As listed under summary on page 2

Deliverable 4.1 lists real-life examples of existing community energy initiatives, and adds elements from local contexts that need to be considered for the exercise of developing tailor-made business models for RECs in four target regions. This is foreseen to be undertaken in Deliverable 4.3, and for which Deliverable 4.1 will built the basis for, in combination with Deliverable 4.2 (summary report on novel financing instruments for RECs).

This Deliverable is expected to feed into activities carried out by the COME RES country desks and the stakeholder dialogues (WP3), the best practice cases and sustainability scorecard for RECs (WP5), the capacity development and best practice transfer (WP6), the policy assessment and advice (WP7). It will also be disseminated and communicated to decision-makers and among the climate action and energy stakeholder community at EU, national and local level (WP8).

Contents

1 Introduction

In the transition to climate-neutral economies, there is no choice but to decarbonise the ways we produce and use energy. In the EU, the energy sector, including transport and heating, is responsible for close to 80% of the total GHG emissions, of which fossil fuels combustion represents 75%[4]. Reaching the EU's recently revised and increasingly ambitious climate and energy targets in the 2030 and 2050 timeframe requires profound transformations of energy systems and markets, which ought to become decentralised and digitalised further and faster. This means, among others, deploying and integrating much higher RES shares, e.g. by exploiting the widely untapped potential[5] of individual and collective self-consumption of renewable energy, incl. through the many forms and shapes that community energy models can be built on. Growing in size and numbers, experts expect to see many more of such initiatives emerging in the nearby future – in particular once Member States commit to effectively transpose a recent set of EU rules[6] into national law and create frameworks that can enable citizens and stakeholders to drive this process forward. Further support to nascent and existing communities, as foreseen or already turned into practice across a number of countries, could stem from regional, national and European funding sources, such as the Recovery and Resilience Fund in response to COVID-19, or else the Just Transition Mechanism, the Cohesion Fund and the European Structural and Investment Funds.

The value proposition to society is substantial, as community energy can provide a range of economic, social and environmental benefits: involving citizens and businesses, turning the so far mostly passive consumers of energy into active climate change mitigators, which is a prerequisite to accomplish Europe's energy transition – but also one of its hardest challenges to tackle. Renewable energy communities can deliver such empowerment, by enabling people to become part of their very own decarbonisation process, generating and using their green electricity (mostly, while also renewable fuel solutions are available) and reducing costs they pay for commodity, e.g. in transport and heating. Such inclusion and active participation strengthens the democratic processes and transparent governance models, and makes local community life more resilient, including through improved labour markets and short value and supply chains.

1.1 Purpose of this Document

Hence it is important to look at existing and functioning organisational and legal forms, as well as business models that are already applied in RECs, to improve the understanding and knowledge on evolving realities and recent developments in this respect. This document means to deliver insight from local levels that can be then applied in broader contexts and is relevant to stakeholder audiences at regional, national and European level, including to the COME RES partners, who can use it for further project implementation. It lays out the groundwork for deducting relevant and potentially replicable elements, in combination with adequate novel financing instruments identified under Task 4.2, and designs tailor-made key principles for business proposal, which can then be proposed to selected target regions under COME RES, and ideally be applied in as many

[4] European Commission, EU Long-Term Decarbonisation Strategy, 2018
[5] See also COME RES 2.2. – Assessment reports of potentials for RES in the target regions, 2021
[6] EC Clean Energy Package, adopted 2018-2019

parts of Europe as possible. Thus, this report builds the fundamental tool to start the practical exercise of transferring and applying valuable knowledge, to exploit the significant potential of making community energy advance across Europe, and upscale its tremendous value proposition, as described above.

2 Organisational and Legal Forms for Renewable Energy Communities

This report focuses on Renewable Energy Communities (RECs) as per the revised Renewable Energy Directive (RED II). The lack of political support, in form of incomplete or inconsistent transposition of RED II into national legislation, has led to a slow and rather isolated emergence of RECs that comply with the definition introduced at the EU level. Yet, extensive research and numerous publications on community led initiatives and collective energy actions show the wide range of potential organisational and legal forms (and business models) that exist across Europe, and could be applied in places where community energy is in earlier development phases or non-existent. Whether and to what extent new RECs will be established – or existing community energy initiatives will transform into RECs - much depends on national interpretation and transposition of EU laws. Research carried out for developing this report, as well as COME RES partner contributions and interviews conducted[7] reveal that the RECs (as per RED II) that exist today in Europe are often pilot sites that operate in regulatory sandboxes. Thus, they do not need to adopt any specific legal forms, nor rely on business models that make them financially viable and independent, being based on financial support that can come through a range of funding opportunities. Chapter 2 provides an overview on common as well as existing organisational and legal forms, before reiterating key characteristics of energy community frameworks as per recent EU legislation, and assesses the progress and regulatory challenges on transposing this EU legislation into national law. It will further comment on the regulatory treatment of energy cooperatives and other citizen energy models as RECs (as defined in RED II), and analyse to what extent well-established cooperatives identified in COME RES countries do qualify as RECs in this regard. This also helps to identify and better understand relevant models, or some of their main features, that could be applied in countries where evolving regulatory regimes and policy support is about to result in allowing for a more significant implementation of RECs.

2.1. Common Organisational and Legal Forms of Community Energy Initiatives

In Europe, a range of governance models are applied that enable citizens' participation in renewable energy development. Depending on the legal form chosen, they can differ in terms of governance structure, decision-making and liabilities - and can be fully owned by the community or developed in shared ownership and cooperation with public or commercial actors. Community-led initiatives can be organized in different forms, ranging from large cooperatives to collective self-consumption schemes (e.g. in housing associations) and off-grid island systems.

[7] With persons in charge of establishing energy communities, such as academics, local authorities, energy market and system stakeholders

The vast majority of Europe's citizen-led energy initiatives are cooperatives, which can be understood as a type of social and economic enterprise that enables citizens to collectively own and manage renewable energy projects. Citizens (mostly but not necessarily) living in geographical vicinity can invest in renewable generation by buying shares to finance a project and increasingly also consume the renewable energy the cooperative generates. Cooperatives are also the predominant form in most of the nine COME RES partner countries, incl. Belgium, Germany, the Netherlands, Spain, Italy, Portugal and Norway, some of which have developed into established energy market and system actors. In many cooperatives, the distribution of profits is limited and surpluses are reinvested to support its members and/or the community. The allocation of revenues is regulated by the statutes that the cooperative is based on, as well as by its main purpose and each country's legal provisions. Sometimes they can be distributed amongst the members through capped dividends, or else provide energy benefits in the form of lower energy prices. Cooperatives are based on a voluntary basis and democratic governance - i.e. decisions made on a 'one member–one vote' principle – and meet their members' needs which can be economic, environmental social or cultural, aiming to maximise local benefits rather than return on capital. New cooperative members usually pay a membership fee, while resigning members receive back the initial fee that was paid.

Another common legal form for community energy initiatives includes limited partnerships, with a limited liability company as a general partner. This form is suitable for larger projects with high investment volume and became popular for citizen-owned wind parks, with voting rights that are proportional to the capital invested, (instead of the traditional one member – one vote cooperative principle). The European Commission's Joint Research Centre (JRC) has summarized the most common legal forms as follows[8]:

Table 1: Common Legal Forms of Community Energy Initiatives

Legal Form	Description
Energy cooperatives	This is the most common form of community energy. This type of ownership primarily benefits its members and is widespread in countries where renewables and community initiatives are relatively advanced and traditionally well-established.
Limited partnerships	A partnership may allow individuals to distribute responsibilities and generate profits by participating in community energy. Governance is usually based on the value of each partner's share, meaning they do not always provide for a one member - one vote.
Community trusts and foundations	Their objective is to generate social value and local development rather than benefits for individual members. Profits are used for the community as a whole, even when citizens do not have the means to invest in projects (for-the-public-good companies).
Housing associations	Non-profit associations that can offer benefits to tenants in social housing, although they may not be directly involved in decision-making. These forms are ideal for addressing energy poverty.
Non-profit customer-owned enterprises	Legal structures used by communities that deal with the management of independent grid networks. Ideal for community

[8] JRC Policy Report „Energy communities: an overview of energy and social innovation, 2020

	district heating networks or electricity/gas grids operation on EU islands.
Public-private partnerships	Local authorities can decide to enter into agreements with citizen groups and businesses in order to ensure energy provision and other benefits for a community.
Public utility company	Public utility companies are run by municipalities, who invest in and manage the utility on behalf of taxpayers and citizens. These forms are less common, but are particularly suited for rural or isolated areas.

Source: JRC

The EU provisions as per RED II and Internal Electricity Market Directive (IEMD) do not require Member States to mandate energy communities to adopt any specific legal form[9], which is why many existing initiatives – to a large extent cooperatives – are expected to conserve their current legal form, while in practice evolving into RECs or CECs (as per RED II and IEMD), through the introduction of new definitions and regulatory elements that provide for enabling frameworks in EU countries (see following chapter). In theory, this would instantly and substantially increase the official number of RECs operating today in Europe.

2.2. Key Characteristics of Community Energy in EU Legislation - Renewable Energy Communities and Citizen Energy Communities

The definitions and provisions on RECs[10] and Citizen Energy Communities[11] (CECs), as well as the difference and overlap among them, have been analysed and assessed in great detail, including within COME RES[12]. RED II defines RECs as legal entities which, in accordance with national law, are based on open and voluntary participation, effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects owned and developed by that community. Shareholders or members can be natural persons, SMEs or local authorities, with the primary purpose to provide environmental, economic or social community benefits for its members or the local areas where it operates, rather than financial profits. RED II further sets out to what RECs are meant to be entitled, i.e. the activities that can be carried out as well as the access to suitable energy markets. Member states are required to assess the potential of RECs as well as existing barriers - something which to date, almost no member state has done. This assessment should precede the establishment of enabling frameworks for RECs that respect a number of minimum requirements, in terms of customer rights, administrative procedures, capacity-building and support schemes, and the cooperation with distribution system operators. While the IEMD definition and provisions for CECs[13] overlap with RED II with regards to participation, control, purpose and its scope of activities, the main difference to RECs is that CECs are not geographically limited nor restricted to renewable sources, with the IEMD provisions referring to electricity only. In a nutshell, similarities and differences can be summarised as in the following table 2[14]:

[9] Recital 71 of RED II
[10] Recast Renewable Energy Directive (2018/2001/EU) (RED II), Art.2, 22
[11] Integrated Electricity Market Directive (2019/944/EU) (IEMD), Art. 16
[12] COME RES Deliverable 2.1 „Assessment Report on Technical, Legal, Institutional and Policy Conditions", chapter 2
[13] H2020 PROSEU Deliverable 3.1 "Assessment of existing EU-wide and Member State-specific regulatory and policy frameworks of RES Prosumers", p. 23-24
[14] COME RES Deliverable 2.1 „Assessment Report on Technical, Legal, Institutional and Policy Conditions", page 11

Table 2: Similarities and differences of RECs and CECs

	Renewable Energy Communities (REC)	**Citizen Energy Community (CEC)**
Legal foundation	Renewable Energy Directive (Art. 2, Art. 22)	Internal Electricity Market Directive (Art. 2, Art. 16)
Sub-sector	Electricity, heating/cooling, transport	Electricity only
Technology	Only RES based technologies	Technology-open (fossil and RES based)
Legal form	Any	Any
Membership	Open, voluntary (→only natural persons, local authorities and SMEs whose participation does not constitute their primary economic activity. Participation accessible to all consumers including low-income and vulnerable households)	Open, voluntary (→any actor, as long as members/shareholders engaged in large scale commercial activity and for which the energy sector constitutes a primary area of economic activity do not exercise any decision-making power)
Autonomy	RECs to remain autonomous from individual members and traditional market actors that participate in the community as members or shareholder	Autonomy is not required. Decision-making limited to those members or shareholders for which the energy sector does not constitute a primary area or economic activity
Control and geographical limitation	Effective control by shareholders/members located in the proximity of the RE projects owned and developed by the legal entity; Member States may provide for RECs to be open to cross-border participation	Effective control by natural persons, local authorities or small enterprises; No geographic limitation, MS can choose to allow cross-border Citizen Energy Communities
Primary purpose	Social, economic and environmental benefits for members/shareholders or the local area in which the entity operates	
Activities	Generation, distribution, consumption, storage, sale, aggregation, supply and sharing of renewable energy, energy-related services (commercial)	Generation, distribution, supply, consumption, aggregation, energy storage, energy efficiency services, charging services for EV, other energy-related services
Enabling framework, support schemes	MS to provide enabling framework to promote and facilitate the development of RECs: ● Remove unjustified regulatory/administrative barriers ● Non-discriminatory treatment ● Tools to facilitate access to finance and information ● Regulatory and capacity-building support to public authorities in enabling and setting up RECs	MS to provide an enabling regulatory framework for CECs: ● Participation is open and voluntary ● Members/shareholders entitled to leave ● Members/shareholders do not lose their rights and obligations as household or active customers ● DSOs cooperate with CECs to facilitate electricity transfers within the community ● Transparent, non-discriminatory and cost-reflective network charges

Source: COME RES

In terms of regulatory treatment, the key difference between CECs and RECs lies in the nature of the Directives from which they emerge. The IEMD text formally recognises CECs as market actors and aims to create a level-playing field in the energy market, by defining CECs' entitlement and responsibilities among system and market actors along the energy value chain. The freedom for geographical extension also allows for virtual participation. RECs on the other hand emerge from the promotion of energy from renewable sources under RED II, putting greater emphasis on providing policy and regulatory support, such as for the design of schemes that allow

RECs to compete for support on an equal footing with other market participants. Also, RED II aims at eliminating existing barriers and exploit the considerable community potential that is available across member states[15].

2.3. Progress and regulatory challenges on transposing EU legislation into national law in the COME RES countries

While the deadline for transposing RED II into national law passed on 30 June 2021, most climate action and energy stakeholders, and especially legal experts, agree that most Member States have not sufficiently - neither in completeness nor conformity - transposed the EU legislation on RECs into national law. With regards to the nine countries covered under this project - Belgium, Germany, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, and Spain - the transposition progress,[16] as of December 2020 was assessed in detail and published in COME RES Deliverable 2.1[17]. Since then, progress has been made in Belgium (Flanders[18], but also Brussels) where a recent Energy Decree provides for legal definitions that comply with RED II, whereas in the Netherlands and Latvia, legislation is still in the drafting process, yet planned to apply soon – still, assessments of the drafts show moderate levels of compliance and completeness[19]. In Germany, there has been no attempts by the outgoing government to propose or adopt any new legislative acts, with energy communities falling under the rules that apply for all market actors in RES development. Poland hasn't progressed since December 2020 much either and remains to issue definitions and a framework for RECs that comply with the EU's legal requirements. Yet "energy clusters" aim for citizen participation and the provision of electricity, biogas or heat from renewables to their members exist since 2016. Although Italy, Spain and Portugal have introduced legal definitions and/or frameworks for RECs to a certain extent, the overall assessment of their transposition progress shows that many elements and criteria have not been adequately reflected in the countries' legal decrees. Criticism is also addressing the fact that entire parts of the Directive's text have been copy-paste. Nevertheless, Spanish, Italian as well as Portuguese lawmakers are contributing to initiate the development of RECs on their territories, with some of which that have started operating and others in planning stages.

Regulatory transposition challenges stem from a number of factors: the diverse reality and tradition of community energy initiatives in Europe, as well as the wide scope of definitions in IEMD and RED II make energy communities touch upon several different areas of regulation, in particular on consumer protection and infrastructure rules, including supplier and network charging arrangements. Certain aspects of energy communities, such as ownership of simple generation assets or direct services to the local community (e.g. advice on energy efficiency or initiatives to help reducing energy poverty) are largely unproblematic, from a regulatory perspective. However, energy sharing within energy communities in some respect defies the

[15] Art. 22,3 of RED II requires member states to assess barriers and the potential of RECs in their territories.
[16] Except Norway, which has not transposed RED II (currently under EEA/EFTA review).
[17] COME RES Deliverable 2.1 „Assessment Report on Technical, Legal, Institutional and Policy Conditions", chapter 3.2
[18] Due to the regional government structure in Belgium, different legal and policy frameworks for RES and RES community energy are being developed in the different regions. Here, we consider the frameworks in the Flemish region, where Belgium's COME RES target region is located.
[19] Detailed information on progress of the transposition with regards to the definitions is available in REScoop.eu's recently launched transposition tracker: https://www.rescoop.eu/policy#transposition-tracker

classical supplier-customer relationship. Depending on which EU and national regulation applies, energy communities may act as supplier or service provider (e.g. of aggregation and balancing services) or, if allowed by the relevant Member States, as grid operator. These activities fall under the competence of electricity market regulation and go beyond REC and CEC frameworks (for instance, RECs operating distribution networks would have to comply with the all regulatory requirements that apply to DSOs). Consequently, national regulatory authorities pay particular attention when introducing new business and organisational models and service provisions that imply increasing complexity for the consumer. The same diligence applies to questions that relate to new market roles, the complexity of network tariff design, as well as data protection and cyber-security requirements.

It is important to bear in mind that such regulatory challenges and the progress made by member states are intrinsically entwined, and do not exclusively depend on political preferences of decision-makers and vested interests of incumbent industries. Establishing new actors - in markets and systems that were designed and have been operating to generate and transport energy largely made from nuclear and fossil fuels since more than 100 year - is a fundamental challenge. Connecting substantially higher RES shares, which is a prerequisite for effective decarbonisation by 2030 and 2050, including in form of community energy, requires profound transformations, and taking a holistic system approach for integrating a wide range of emerging and existing layers of the energy architecture (in particular electricity, gas, heating, transport, buildings). Therefore, national regulators are tasked to establish and extend new energy market designs and optimise roles and responsibilities for all actors that are needed to deliver on Europe's climate ambition – as enhanced by the EU rules under "Clean Energy for all Europeans" package, and now being strengthened through the recently proposed "Fit for 55%" measures. This results in Member States having to transpose and agree on a complex and extensive set of provisions, including new rights for active customers and self-consumers (and energy communities), rules on new market entrants such as aggregators, and changing roles and obligations for transmission and distribution system operators that are tasked to develop more flexible and digitised - as well as integrated and decarbonised - infrastructures. It further encompasses stronger rules under the emissions trading schemes (with the consideration to include transport and buildings) a revised regime for guarantees of origin, the substantial reduction of administrative barriers, better support mechanisms and educational tools with regards to renewables, incl. for the uptake of hydrogen produced from additional renewable capacity. Each of such regulatory challenges is likely to impact the development also of community energy frameworks.

2.4. Regulatory Treatment of Energy Cooperatives as Renewable Energy Communities (as per RED II)

According to the European network of citizens' energy cooperatives (REScoop.eu), there are about 3500 renewable energy cooperative in Europe, mostly spread across the North-West of the continent. Representing the major form of community-led initiatives in energy, stakeholders and in particular national regulatory authorities are facing the question if and to what extent the many existing cooperatives can be treated as RECs from a regulatory perspective, when transposing the RED II provisions on RECs and CECs. While energy cooperatives comply to some extent with the provisions on autonomy, membership and effective control – and

most importantly, the primary purpose to provide social, economic and environmental benefits, rather than financial profits – there are a number of important features and activities that RECs should be entitled to fulfill and carry out, and which many of today's cooperative models do not offer. In particular, this refers to sharing renewable energy within the renewable energy community[20] and amongst participating entities without brokerage of a third party, even when using the public grid. Another crucial aspect of a REC's definition is geographical limitation - although the term "proximity" leaves room for legal interpretation, there are many energy cooperatives that are not being "effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects"[21].

At national level, the regulatory treatment of energy cooperatives will determine the ambition of Member States to establish enabling frameworks and to amend existing provisions, in order to allow for existing initiatives to evolve and qualify as RECs – which in return might facilitate the further uptake of community energy, including in countries where citizens already can easily access collective energy actions. Nevertheless, it might yet have a far greater impact to kick-start community led initiatives in countries where there is no or only little of such occurrence (but where cooperatives in general are legally established and exist, as across Eastern and Central Europe).

2.5 Regulatory Assessment as per RED II of Established Energy Cooperatives and other Citizen Energy Models

In the sections below, a number of cooperatives and other citizen energy models are described that exist since long before the EU's Clean Energy Package was adopted. These models have been selected from among the COME RES partner countries and represent common forms of existing community energy initiatives in each of the national contexts. Assessing the selected examples against the provisions set out in RED II not only helps understanding in which parts they do not fully qualify as RECs (as per RED II), but also clarifies that the overall concept and scope of RECs is meant to be - in a number of aspects - distinct from existing cooperatives and other models. It is important to add that this does not have to impact their capacity to provide environmental, economic and social benefits to members and shareholders.

2.5.1. Ecopower, Belgium

Established in 1991, Ecopower is today the largest renewable energy cooperative in Belgium, supplying its approx. 60.000 members – and shareholders – with cost-competitive and green electricity. Grown into a well-established and successful energy market player, Ecopower employs 54 in staff and invests in renewable energy development, incl. wind, PV, small hydro, cogeneration, wood pellets and brickets, as well district heating and cooling network and supply. Producing 100 GWh/year of electricity which is more than its members consume, Ecopower is selling surplus electricity on the market and green certificates to other suppliers. Another significant value proposition Ecopower is delivering to its members is energy efficiency advice, making

[20] Art. 22 2b), RED II
[21] Art. 2 (16), RED II

them consume only half as much electricity compared to the average Belgian retail customer. The cooperative does not foresee to change its legal status, now after in Flanders recently adopted regulation has entered into force that is compliant with RED II.

Table 3: Compliance of Ecopower with RED II

	Ecopower	**Renewable Energy Communities (REC)**
Sub-sector	Compliant	Electricity, heating/cooling, transport
Technology	Compliant	Only RES based technologies
Membership	Membership is open to shareholders who are entitled to acquire up to 50 shares.	Open, voluntary (→only natural persons, local authorities and SMEs whose participation does not constitute their primary economic activity. Participation accessible to all consumers including low-income and vulnerable households)
Autonomy	Compliant – one member-one vote principle in General Assembly, regardless of how many shares one member acquires	RECs to remain autonomous from individual members and traditional market actors that participate in the community as members or shareholder
Control and geographical limitation	No geographical limits for shareholders/ members, who can join Ecopower from anywhere in Belgium	Effective control by shareholders/members located in the proximity of the RE projects owned and developed by the legal entity; Member States may provide for RECs to be open to cross-border participation
Primary purpose	Compliant	Social, economic and environmental benefits for members/shareholders or the local area in which the entity operates
Activities	Generation, energy efficiency advice, supply – but no direct energy sharing within the cooperative	Generation, distribution, consumption, storage, sale, aggregation, supply and sharing of renewable energy, energy-related services (commercial)

Source: COME RES partner contribution

2.5.2. Spinderwind, the Netherlands

Established in 2015, the citizen wind park of Spinder ("Burgerwindpark de Spinder") is a cooperative made up of 11 local energy cooperatives, holding 50% ownership of a wind park that consists of 4 turbines and generated close to 24.000 MWh of renewable electricity in 2020. The other 50% are owned by a public investment fund (EnergieFonds Brabant), with the profit equally split among both entities. Members of the cooperative can buy up to 80 shares of €250 each, receiving a maximum yearly return of €18,50 per share, while excess profits go to new local renewable projects. Spinderwind is a licensed supplier, offering to the member to contract their electricity supply directly from the cooperative. In parallel, electricity is sold to the wholesale market. Starting in 2017, Spinderwind is subsidised over a period of 15 years under the Dutch "Sustainable Energy Production Incentive Scheme" (SDE+), supporting the cooperative to compensate the difference in production price between wind power and fossil fuel generation.

Table 4: Compliance of Spinderwind with RED II

	Spinderwind	Renewable Energy Communities (REC)
Sub-sector	Compliant	Electricity, heating/cooling, transport
Technology	Compliant	Only RES based technologies
Membership	Membership is open to all residents located in the seven municipalities in the Tilburg area. Membership comes with the acquisition of shares ("Spinderdelen")	Open, voluntary (→only natural persons, local authorities and SMEs whose participation does not constitute their primary economic activity. Participation accessible to all consumers including low-income and vulnerable households)
Autonomy	Decision-taking power increases with the number of shares	RECs to remain autonomous from individual members and traditional market actors that participate in the community as members or shareholder
Control and geographical limitation	Control is not only exercised by shareholders that are located in the proximity of the RE project; Geographical limits are set through the seven municipalities of the Tilburg area[22]	Effective control by shareholders/members located in the proximity of the RE projects owned and developed by the legal entity; Member States may provide for RECs to be open to cross-border participation
Primary purpose	Next to environmental benefits, shareholder benefit from economic benefits, in form of returns on investment. Yet, this is not the cooperative's primary purpose	Social, economic and environmental benefits for members/shareholders or the local area in which the entity operates
Activities	Generation, supply – but no direct energy sharing within the cooperative	Generation, distribution, consumption, storage, sale, aggregation, supply and sharing of renewable energy, energy-related services (commercial)

Source: COME RES partner contribution

2.5.3. Citizens Wind Park Ellhöft, Germany

In operation since 2000, the citizen wind park Ellhöft was initiated by municipal authorities and farmers, offering every citizens and land owners of the local community (130 inhabitants) the possibility to become member of the company that operates the 6 turbines of the wind farm – which in return can deliver on average electricity supply for 4100 households. Windpark Ellhöft GmbH & KG was set up under a hybrid legal form, combining a private limited company[23] and a limited partnership[24], with citizens providing for investment capital and having received 12 to 16% returns in investment. With regards to revenue streams, after the financial support provided under the Renewable Energy Sources Act[25] in form of a feed-in tariff expired after 20 years in 2020, the wind park operators started to convert parts of the electricity produced into green hydrogen and to sell it to the transport sector. The identification of new business models led to conclude a Power Purchase Agreement (PPA) with the Hamburg-based energy cooperative Green Planet Energy, a green electricity and gas supplier, to whom Ellhöft started supplying wind energy since 2021 and over a period of 5 years.

[22] In the Netherlands, geographical limits are set by postal code.
[23] Gesellschaft mit beschränkter Haftung, GmbH
[24] Kommanditgesellschaft, KG
[25] Erneuerbare-Energien-Gesetz, EEG

Table 5: Compliance of Wind Park Ellhöft with RED II

	Wind Park Ellhöft	**Renewable Energy Communities (REC)**
Sub-sector	Compliant	Electricity, heating/cooling, transport
Technology	Compliant	Only RES based technologies
Membership	Membership is open to all local residents located. Local authorities and SMEs are partners and members as well	Open, voluntary (→only natural persons, local authorities and SMEs whose participation does not constitute their primary economic activity. Participation accessible to all consumers including low-income and vulnerable households)
Autonomy	Compliant: Decision-taking depends on the number of shares held by a member, but no single partner dominates the company.	RECs to remain autonomous from individual members and traditional market actors that participate in the community as members or shareholder
Control and geographical limitation	Compliant: control is exercised by shareholders that are located in the proximity of the RE project; Geographical limit is set by municipality of Ellhöft	Effective control by shareholders/members located in the proximity of the RE projects owned and developed by the legal entity; Member States may provide for RECs to be open to cross-border participation
Primary purpose	Compliance unclear: next to environmental and social benefits, return on investments is being paid to shareholders	Social, economic and environmental benefits for members/shareholders or the local area in which the entity operates
Activities	Generation, sales – but no direct energy sharing within the cooperative	Generation, distribution, consumption, storage, sale, aggregation, supply and sharing of renewable energy, energy-related services (commercial)

Source: COME RES partner contribution

2.5.4. Overall Reflection

The success stories of the models listed here above, as well as their regulatory compliance with most of the criteria and definitions as per RED II, should not be used by national authorities as a pretext for not introducing or amending enabling frameworks that already allow for flourishing models, with regards to both legal and organizational forms, as well as business models that are sustained by policy and financial support[26]. On the other hand, the EU Commission based the Clean Energy Package provisions on individual / collective and community led energy actions (in RED II and IEMD) on the prospect to engage with as many energy consumers as possible, and to implement a substantially higher number of initiatives in this respect, complementing the many well-functioning cooperatives that are operating in Europe – or else provide regulatory tools to further develop their portfolio of activities and benefit from new and innovative business models.

[26] See e.g. chapter 4.2. on the transposition debate among German government officials and climate and energy stakeholders

3 Business Models for Renewable Energy Communities

3.1. Climate change mitigation in the context of energy sector developments and new opportunities for RECs

Decision-makers have since long emphasised that without putting consumers at the heart of Europe's energy transition, we would fall short of meeting our climate and energy goals, and of effectively decarbonising in the trajectory of the coming 30 years. Consequently, the "Clean Energy for All Europeans" Package (CEP) introduced a strong set of measures that was meant to empower and protect consumers, namely through 1) better information and access to energy consumption data and costs, 2) a tighter safety net to address energy poverty and vulnerable consumers, 3) by increasing cost savings and energy-efficient behaviour through energy labels and eco-design measures, 4) giving consumers more choice in their homes, 5) and by facilitating consumers to play an active role and engage in individual and collective self-consumption – including in renewable energy communities - and benefit from participating in functioning and organized electricity markets. The CEP further enhances active participation by facilitating power-purchase agreements, peer-to-peer trading and demand response schemes.

In addition to stronger consumer empowerment, the CEP's market design adapts regulation to decentralised systems and evolving technologies. It also accommodates developments that are driven by the electrification of end-use, the rise of storage and the increasing digitalisation of energy. RECs are well positioned to largely benefit in particular from greater digitalisation, which is being enabled by advances in data, analytics and connectivity. This includes increasing volumes of data, declining cost of sensors and data storage, rapid progress in advanced analytics such as machine learning, greater connectivity of people and devices, and faster and cheaper data transmission. The lifetime, efficiency and utilisation of energy installations can be increased (and costs can be reduced) by a combined application of these elements. More fundamentally, connectivity can support consumers and producers in any sector to actively participate across energy system operations, increasing the flexibility so the system can cope with changes in supply and demand, and reducing the cost of integrating new technologies like distributed generation, energy storage or electric vehicles.

To exploit the vast potential of benefits and progress achieved through the roll-out of digital innovation and technologies, regulatory changes on energy market designs include new rules on aggregation and dynamic price contracts, a set of minimum functionalities for smart meters, principles for data management models that promote interoperability of energy services and competition in retail markets. Also, new responsibilities are mandated to DSOs and TSOs who are getting tasked to act as neutral market operators, with regards to the use of flexibility services, the ownership and operation of storage and EV recharging infrastructure. Measures further address access and connection to electricity networks as well as the cooperation among TSOs and DSOs, and the development and implementation of existing and new Network Codes (e.g. on demand-side flexibility), whereas principles on tariff design and methodologies aim at striking a balance between investment needs in

energy infrastructure and incentives offered to active customers - such as renewable energy self-consumers and communities.

Further energy sector and regulatory developments that are likely to impact the development and set-up of RECs and their business models is the optimization of Europe's energy systems through sector integration. Sector integration means linking the various energy carriers - electricity, heat, cold, gas, solid and liquid fuels - with each other as well as with the end-use sectors, such as buildings and transport. In this context, hydrogen is expected to play a key role for integrating electricity, gas, mobility and heating and industry sectors. EU strategies[27] have explored a wide scope of hydrogen potentials and strands of action, with respect to production, infrastructure, appliances and research and innovation, while the European Commission is about to table legislation and propose a revised framework for decarbonised gas markets[28]. In view of such regulatory support and the projected hydrogen market uptake, RECs could potentially produce green hydrogen from renewable electricity, and use it for serving flexibility needs in the decentralised systems they operate, long-term storage solutions, in heating as well as in sectors that are hard to decarbonise, such as local and energy intensive industries like chemical or steel production. Business cases based on sector integration and decarbonised gases such as hydrogen could become more attractive also to RECs, especially if energy prices remain at high levels.

The combination of adapting and implementing regulation and the deployment of evolving and new technologies plays a key role for the further development and application of business models that can make RECs advance. It is therefore essential (as outlined in chapter 2.3.) that Member States and relevant stakeholders facilitate the above described market and regulatory developments, if they are to foster functioning business models for RECs that will secure financial viability and less dependency from support and subsidy schemes.

3.2. Potential Business Models and the Viability of RECs

Research for developing this report put out that the few existing RECs (as per RED II) in Europe – in contrast to the many energy cooperatives that are economically viable - are currently being set up and operated by means of strong financial support, for instance in the form of pilot sites. Support schemes range from national programs and EU funding mechanisms and industry initiatives – which is why it is fundamental to develop business models further, and strengthen the financial viability of RECs, translating the extensive theoretical work on potentially suitable models into practice. In particular, the COME RES sister H2020 project NEWCOMERS has constructed a detailed and extensive "Typology of new clean energy communities[29]", setting out 5 "emerging energy community business models" which are mostly based on literature review. Their implementation in existing and nascent RECs will, among other things, much depend on the market and regulatory developments described in chapter 3.1.

[27] EU Strategy on Energy System Integration, EU Strategy on Hydrogen, both July 2020
[28] The legislative proposals are announced to be launched on 14 December 2021
[29] Deliverable 2.2. of H2020 project NEWCOMERS, December 2019 – page 24 and following

While COME RES focuses on renewable energy communities and inter alia identifies existing business models that could be applied in the project's target regions[30], NEWCOMERS takes a more holistic approach and analyses energy communities from various angles, drawing on theories and methods from a broad range of social sciences. Therefore, this report hereafter summarizes and reality-checks the business models, as developed by NEWCOMERS, against the existing models, as identified by COME RES, incl. their ambition to apply one or several of the following five models in the future.

1. Local renewable energy generation and supply

This model combines renewable energy generation, storage facilities and consumption, in many cases supported by standalone micro-grids or own distribution networks. This model promotes sharing of distributed generation between prosumers and others, with demand side management systems or time-of-use tariffs optimizing consumption behavior and connecting local demand and generation. Value is created by supplying and consuming self-produced energy, by trading flexibility and ancillary services to system operators (e.g. through aggregators), as well as by receiving remuneration through network charges in case distribution grids are operated.

Most of the existing initiatives identified within COME RES apply this model, or some of its main features. In particular, energy cooperatives generate and supply energy from renewable sources, while energy sharing within communities is in most cases still in development stages, except for the RECs and pilot sites, as described in chapter 5. A number of (mostly longstanding) cooperatives own distribution networks[31], or have acquired concessions to operate them[32]. In most places, local flexibility markets have not sufficiently matured yet, for individual or collective self-consumers to trade flexibility (but are being tested in pilots).

2. Innovative contracting and community-based products (including e-mobility)

This model of innovative contracting and community products involves consumers on a contractual basis. For instance, PV leasing and contracting means that homeowners provide roof surface to the contractor who installs and operates a PV unit on the rented space, reducing the customer effort and provides for energy self-sufficiency in return. Contracting can be further applied to technologies, such as storage and cogeneration, and the provision of EV services. While this model is not specifically designed for community energy and can be applied to any final customer, it unlocks potentially profitable flat rate and user-friendly solutions for energy supply, as well as exploiting the value flexibility offers, for e.g. load shifting (just as applied in the first model, on local renewable energy generation and supply). The business case based on using flexibility can be based on innovative technologies, such as blockchain, but will also require regulatory frameworks that establish a supportive market design.

[30] See the COME RES flyer for more information at https://come-res.eu/fileadmin/user_upload/Materials/COME-RES-flyer-A5.pdf
[31] The Spanish energy cooperative ENERCOOP was founded in 1925 and operates its own distribution networks.
[32] The German energy cooperative EWS Elektrizitätswerke Schönau operates electricity and gas networks.

From the existing community energy models identified under COME RES, the RECOCER project[33] supports with €5,4 Mio the establishment of 15 RECs in the Italian region of Friuli Venezia Giuliato, and, among others, tests business models that combine RECs and e-mobility services. Also in Italy, the RECAP project[34] seeks to develop RECs in a number of Alpine skiing resorts, incl. the provision of sustainable mobility solutions in forms of e-vehicles, e-bikes, e-shuttles and e-busses.

3. Community energy storage services

This model is built on community energy storage and understood as a system of aggregated individual batteries that are managed through a central system, as opposed to one single system that is shared amongst users. Storage services create value in form of bulk energy, renewables integration, ancillary services to DSOs and TSOs, reduced transmission and distribution capacity, and customer energy management – all of which, alone or combined, offer flexibility options that create value within the energy system. This can be done, as described in model 2, through contractual arrangements that include paying a fee and storing generated but unconsumed electricity virtually in a centralized battery (which is owned by a third party), and consume it later. Such an arrangement also entails the use of flexible and smart systems, and adequate market designs.

Storage is being used in REC pilots as identified by COME RES, e.g. in the COMPTEM model that is described in chapter 5.2. Also, REC developers, such as the Italian Forum of Energy Communities[35] (IFEC) are currently carrying out extensive research on business models that combine REC and storage, also with regards to using distributed storage capacity offered by e-vehicles for balancing and other flexibility services.

4. Peer-to-peer energy trading platforms

Peer-to-peer trading is the exchange of energy surplus among prosumers and their neighbors (or virtually without any limitation to location), and/or consumers directly choosing local renewable generation, for example through their established supplier or directly and without intermediaries. This model is enabled by a software trading platform and supported by a smart electricity infrastructure that can match buyers and sellers who can then negotiate prices and enter into contractual agreements. Based on blockchain, this model incentivizes prosumers to produce and consume energy at times when electricity is generated locally by their peers. Still, a licensed operator must be in charge of balancing electricity networks. While peer-to-peer trading can in theory be applied among any energy market actor, it can offer RECs additional revenue streams, who can trade surplus electricity within the community or among several communities.

Peer-to-peer is being tested in the REC of Magliano Alpi (see chapter 5.1.). Also, numerous pilot sites across Europe are currently testing the feasibility of setting up market platforms for this model. Elektrizitätswerke Schönau eG (EWS) is a citizen-owned energy cooperative located in Schönau in the Black Forest, Southwest Germany. The cooperative is one of the four largest suppliers of green energy in Germany with more than

[33] https://recocer.eu/en/recocer-projects/
[34] Renewable Energy Communities Alpine Pearls: https://www.alpine-pearls.com/en/about-us/projects/recap/
[35] https://www.wec-italia.org/ifec-italian-forum-of-energy-communities/

200,000 electricity and gas customers across the country. In addition to grid operation in Schönau and the nationwide supply of final customers with green electricity, EWS owns and operates several wind and PV assets in Southern Germany. Moreover, EWS owns and operates several local heating networks. In 2017, EWS started a pilot for testing real-time electricity sharing in prosumer communities. EWS customers within the own distribution grid as well as in surrounding grids are participating, including single family houses, farmers, apartment buildings with landlord-to-tenant electricity supply. The three implementation phases in the P2P energy community pilot can serve as a structure to develop different community products with value propositions for specific target groups (community with focus on individual self-sufficiency, community with focus on virtual power plants and community with focus on pee-to peer training)[36]

5. Community energy aggregators

Community energy aggregators are service providers that can increase or moderate the electricity consumption of a user group on whose behalf the aggregator is acting. Depending on the status of the electricity network, aggregators influence grid-connected units via communication interfaces that are usually coordinated by centralized optimization algorithms, with the purpose to meet certain control goals. Aggregators use the units in their portfolio for trading in electricity wholesale and ancillary service markets, and can reduce prices by optimizing demand and supply behaviours and lowering balancing costs. In increasingly decentralized markets with individual and collective self-consumers incl. RECs, aggregators can sell self-generated surplus electricity as well as the aggregated flexibility from demand and supply.

In Italy, plans foresee to establish so-called “Territorial Energy Communities” that are based on ICT/IoT platforms, enabling interoperability among RECs and with the long-term vision to create “virtual energy utilities” at Italian national level. In Germany, the cooperative Bürgerwerke eG (“Citizen Works”) comprises some 100 energy cooperatives from all over Germany representing about 40,000 local energy citizens. The purpose of Bürgerwerke is to enable energy cooperatives to market electricity and biogas. Bürgerwerke acts as an energy supplier and obtains its electricity partly from PV and wind energy plants of its member cooperatives and partly from a German hydropower plant. Together with service providers, Bürgerwerke handles the energy management and service-oriented processes: 1) procurement of green electricity from member plants and a certified hydropower plant; 2) procurement of biogas from organic residues; 3) coordination of energy-related customer processes: Supplier change, grid usage management, billing, receivables management; 4) tariff design and 5) customer service. Procurement of electricity is organized independently of the support scheme under Germany’s Renewable Energy Sources Act. Accordingly, the plant operators do not receive a market premium, but an individually agreed fee from Bürgerwerke. Through this procedure, electricity can be sold as “green electricity”. Bürgerwerke is aggregating RES generation capacity from citizen- and community-owned RES installations so that citizens are able to supply themselves with clean energy from local sources, independently of energy companies. The cooperative acts as a not for profit service provider for the its members.

[36] Löbbe, S. et al. (2020): Customer Participation in P2P Trading: a German Energy Community Case Study. In: Sioshansi, F. (ed.): Behind and Beyond the Meter. Digitalization, Aggregation, Optimization, Monetization.1st edition, February 2020.

4. COME RES Country Overview and Update

The following COME RES country updates provide national context and give an overview on common types of organisational and legal forms and business models, and recent developments in community energy, incl. on regulatory regimes. This will also help understand in which national settings the nascent models, as described in chapter 5, are being established.

4.1. Belgium

Collective energy actions such as RECs that are in line with the Clean Energy Package are still in early stages in Belgium, with two of the country's three competent regional administrations (in addition to the transposition done at federal level) just having adopted new legislation (= Flemish Region) or are about to do so (= Brussels Capital Region). Changes to legal frameworks are expected to provide for policy and investment support to collective renewable energy development, complementing already existing measures applied by local authorities (mostly at province and municipality level) to promote community projects. This can be further enabled by so-called Regulatory Innovation Zones, designed to promote and test self-consumption, the use of storage, e-vehicle charging and demand response over defined periods of time, in regulatory sandboxes and for the purpose of research and development.

Also, today in Wallonia, collective renewable energy producers who self-consume are exempted from common supplier obligations to buy renewable certificates, thus creating electricity cost savings. This allows for using business models that are based on sharing such savings among the producers, the operational management entities and private sector companies who provide technical support, incl. community consumption profile simulation, and administration services such as invoicing, participant registration, dispatching rules and surplus management[37].

Notwithstanding past or present regulatory deficiencies, Belgium has a long-standing tradition in operating community energy models, with a number of sizeable and well-established market actors who generate and provide green and cost-competitive energy to its members and shareholders (see chapter 2.4.1. for more information). With the exemption of profitable energy cooperatives[1] who also act as suppliers, most community projects such as business parks and those established by the private sector remain largely dependent on subsidies and own contributions.

4.2. Germany[38]

Germany is among the pioneers in the field of collective energy actions and looks back at a long tradition of private individual and collective ownership of renewable energy that dates back to the early 19th century and the rural electrification of mostly remote areas, when first cooperatives built and operated hydropower plants.

[37] Based on information taken from the Bridge report "Economies of Energy Communities – Review of electricity tariffs and business models", April 2021
[1] In Flanders, there are 17 cooperatives with an estimated 70.000 citizens owning shares. Source: REScoop Vlaanderen
[38] Some of the information is taken from the Bridge report "Economies of Energy Communities – Review of electricity tariffs and business models", April 2021

According to estimates, citizens and communities have put in place 40% of Germany's total installed renewable capacity[39]. Collective actions take various forms - mostly energy cooperatives, but also models for collective self-consumption and citizen energy companies.

In 2020, close to 900 energy cooperatives involved about 200.000 members and accounted for investments of €3.2 billion in RES, generating about 8.8 TWh of electricity from wind and PV - which is equal to 3.5% of Germany's overall renewable electricity generation[40]. Cooperatives, which are commonly based on democratic governance models, distribute profits and losses in a way that surpluses are reinvested to support its members and the community. Direct financial profits can be distributed amongst the members through dividends and/or lower energy prices, partly also through the operation of electricity and gas distribution networks, acting as suppliers and/or owners of renewable generation units, and provide energy efficiency services. The legal and organisational model of registered cooperatives is dominant in the rooftop PV sector, where cooperatives are usually initiated and set up directly by citizens and local communities. Another common legal form is that of a Civil Law Association (*Gesellschaft bürgerlichen Rechts, GbR*), which is sometimes used for the operation of small or medium solar PV schemes (rooftop). With regards to ground based PV, limited liability companies and limited liability partnerships are prevailing. The latter legal form is also often used in the wind sector.

Collective self-consumption models exist at building scale but do not, according to current legislation, allow for energy sharing among consumers. Germany introduced the concept of "Mieterstrommodell" (tenants' electricity model or landlord-to-tenant electricity model) in 2017, where plant operators in multi-apartment buildings become suppliers and are entitled to sell locally generated electricity to residents living in direct vicinity. PV plants with maximum capacity of 100 kW that are installed on residential buildings can receive self-consumption support from the DSO of 2.37 – 3.79 Cent/kWh over a period of 20 years. In order to receive support, the plant operator can sell the electricity to either tenants or apartment owners. However, the concept of jointly acting renewables self-consumers, as defined by in RED II, goes beyond and covers cases where the residents invest in and own the RES schemes themselves. However, such models still face various legal and regulatory constraints.

Also in 2017, Germany introduced the concept of "Bürgerenergiegesellschaft" (= citizens' energy company) and linked it with financial privileges available in wind power auctions. Such companies need to consist of at least 10 natural persons, with 51% of voting rights to be held by natural persons that – prior to submission of the bid – are located in the urban or rural district in which the onshore wind farm is to be developed. Focussed on electricity generation from wind, citizens' energy companies can benefit from reduced financial security deposits (from 30 to 15 cent/kWh) and a remuneration equalling the clearing price instead of the bidding price, setting the respective market premium at a level of the highest successful bid of an auction round.

However, with the transition to auctions for large PV and onshore/offshore wind and the phase-out of feed-in tariffs (which were a strong facilitator of Germany's community energy for many years), the number of new

[39] Short study „Eigentümerstruktur: Erneuerbare Energien", Agentur für Erneuerbare Energien, 2021
[40] Deutscher Genossenschafts- und Raiffeisenverband (2021): Energy Cooperatives in Germany. State of the Sector 2021 Report. Available from https://www.dgrv.de/wp-content/uploads/2021/06/20210623_ENG_DGRV_Umfrage_Energiegenossenschaften_2021.pdf

cooperatives has significantly decreased. While there are successful community-led wind farms in North and coastal Germany, only few such examples exist in its Eastern parts. In general, renewable energy development is met with resistance stemming from social and environmental concerns, with citizens e.g. opposing installing wind turbines or additional grid components (in particular high-voltage transmission lines) close to residential areas or eco-systems. And despite the progress made on regulating RES prosumption, the increasing complexity of German legislation makes establishing and operating energy communities highly challenging, in particular for entities that lack human and financial resources. Also, NGOs and further stakeholders address strong claims to Germany's federal government for not having developed any comprehensive legal and enabling framework for collective self-consumption at building level and for RECs (as requested by RED II), which is even at risk of facing lawsuits in this matter. At federal level, community energy development is promoted with regards to risk capital or capacity building, as well as to storage solutions and further integrated community-led solutions, applying a range of innovative technologies in research and lighthouse projects. So far, most of Germany's energy communities had based their business cases on receiving feed-in tariffs and premiums guaranteed by the Renewable Energy Sources Act (EEG), which helped to create a rather attractive, low risk business and investment environment. In parallel, there is a small but growing number of innovative business models, including power purchase agreements concluded between community energy companies and electricity providers or other actors, community energy aggregation, peer-to-peer trading platforms or energy sharing initiatives. However, many of these initiatives are still in an embryonic state and carried out as pilot projects (see also section 3.2).

4.3. Italy

As such, the development of RECs in Italy is still in early stages, despite recent and meaningful legislative changes made in the context of transposing RED II into national law – which have led to establish a first number of successfully operating REC pioneers. While community hydro schemes, in form of cooperatives, have a long tradition mainly in the Alpine region, the potential and interest in implementing models which are now available under Italy's latest frameworks is substantial – estimates show about 500.000 energy communities could be created, 80% of which in residential areas[41]. Also, considerable support is provided through national and EU funding such as the COVID-19 recovery and resilience plan (Next Generation EU), allocating a total of €2,2 billion to smaller and medium sized cities with the intent to setting up RECs. Anticipating RED II transposition, some of the Italian regions started to establish regulations and procedures for REC pilot projects, foreseeing to involve citizens' in initiatives that are deploying RE installations. Such bottom-up models are different from Italy's traditional cooperatives, as they do not benefit from a special legal status, cannot own local distribution networks, and do not constitute RECs that qualify as such (as per RED II). Also, they are not necessarily limited in terms of proximity and mostly based on shared investment and sales of renewable electricity. Frontrunners to issue enabling measures were Piedmont and Apulia (COME RES model and target region), incl. on criteria and methods for obtaining financial support. Further incentives should boost the profitability of RECs and will be made available for renewable energy installation up to 1MW with the final transposition of RED II, which is expected for May 2022[42].

[41] Politecnico di Milano Energy & Strategy Group Report, July 2020
[42] Interview with Prof. Sergio Olivero, Politecnico University of Torino and Head of Scientific Committee of the Magliano Alpi REC

In December 2020, the national government adopted legislation introducing definitions for the two following collective energy actions: collective self-consumers (CSCs) and renewable energy communities (RECs)[43]. CSCs are models designed to facilitate multi-apartment buildings and condominiums generating and sharing renewable electricity among residents living in the same building. This legal form excludes making such activities the CSC's core business and aims to mitigate energy poverty by helping low-income and vulnerable households. RECs on the other hand involve a broader spectrum of actors and activities, incl. natural persons, SMEs, local/regional authorities as well as private companies. Generation plants (individually not exceeding 200 kW) need to be located in the low or medium voltage network and connected to the same substation – which is restricting a REC's outreach and presents a major barrier to further development. Legal reform is foreseen to remove this limitation and extend the connection arrangements to the high voltage level, while also to take the overall RED II transposition forward, which by now only extends to definitions - that do not include all of the criteria contained in RED II. In particular, neither autonomy nor effective control are addressed, with the REC's definition being aligned to CSC, presuming an inherent technology focus for RECs that may limit the ability to operate all across the energy value chain and markets[44]. Yet regulatory advancements, combined with substantial available funding, is expected to exploit Italy's great potential in community energy and have many more RECs established in the foreseeable future.

4.4. Latvia

In Latvia there are no practical examples for community ownership of RES projects. There are no renewable cooperatives as up to now, framework conditions for developing new RE projects including community energy have not been favourable – which is also due to the government's decision in 2011 to stop financial support and phase-out feed-in tariffs for new renewable energy installations. Also, there hasn't been any instrument that allows co-financing of renewable energy investment in community projects.

Yet, there is progress on the RED II transposition process in Latvia, with the introduction of rather general definitions for energy communities, done through amendments to relevant legislation (the Energy and Electricity Market Laws). However, these amendments are still in the drafting process and haven't been submitted to the Parliament for adoption yet. Afterwards, the government plans to issue more specific regulations and initiate procedural issues specifically for RECs, as well as for so called electricity communities[45]. The enabling framework and definitions (incl. the proximity criterion) for energy communities is foreseen to be developed pursuant to this.

Thus so far, Latvia has no experience in developing RECs as issued in RED II. Yet there are (a small number of) pilot projects[46] and further renewable initiatives that bring together citizens at local level who undertake collective actions, e.g. with regards to PV installation and heat collectors in multi-apartment buildings, and use

[43] Legislative Decree 162/19, Article 42-bis
[44] See https://www.rescoop.eu/policy/italy-rec-cec-definitions
[45] "Electricity communities" is the term in Latvia legislation that will correspond to Citizen Energy Communities (Art. 16, IEMD)
[46] Study (in Latvia) on the identification of projects for RECs and their technical and economic feasibility evaluation, IK "eBIOpowers" within the Energize Co2mmunity project, October 2021

already existing legal forms, such as associations of apartment owners. Such legal form is not different from any other association and subject to Latvia's laws on associations and foundations, as well as on administration of residential houses, granting the right to management and implementation of decisions taken by its associates. And although the current legal framework does not explicitly acknowledge the role of community owned renewable facilities, the planned amendments contain a number of provisions that comply with RED II. In combination with the new definitions on energy communities, future associations run by apartment owners are expected to become important actors in the development of RECs in Latvia. In parallel, researchers are evaluating the technical and financial aspects of the potential implementation of community projects in multi-apartment buildings, while there are plans to make energy communities benefit from programs that are designed to co-finance investments in solar PV technologies[47].

4.5. The Netherlands

The most prevalent form of collective energy actions in the Netherlands is through energy cooperatives and associations, which are defined in Dutch regulation since 2015, focussing on electricity from renewable sources, including for electric heating and mobility. Dutch law allows for cooperatives to organise and operate in regulatory sandboxes over limited period of time, with exemptions from regulatory requirements with regards to network operators, tariffs, electricity generation, as well as metering, supply, smart grids and data management. While this approach is useful for applying and testing innovation and new technologies, regulatory exemptions can substantially reduce the replicability potential.

Today, there are more than 623 energy cooperatives[48], with significantly growing generation capacities and positive outlooks for the upcoming years. This applies to all alternative energy resources and services, from solar to wind, renovation, mobility and heating. Collective solar power capacity answers to the electricity demand of almost 50.000 households and has grown by 41% compared to 2019, with more than 200 new projects in the pipeline. In 2020, cooperative wind power capacity reached a total of 229,9 MW, increasing by 37,1 MW compared to 2019, with 92,5 MW still to be realised the coming year[49]. Collective heating initiatives equally saw an impressive growth of about 43% compared to the previous year, whereas storage projects are recently emerging. By the end of 2018, one or more cooperatives had been established in two thirds of all municipalities, with an estimated number of 70,000 members who represent about 1% of all Dutch households. Business models of cooperatives include joint investment in renewable energy projects, annually balanced self-consumption of locally generated electricity from PV that is organised according to postal code affiliation, as well as offering aggregation of available capacity to energy markets (min. 1 MW for participation required) and providing energy services. Also, there is increasing engagement in energy supply, with local cooperatives joining forces and setting up so-called 'cooperative of cooperatives', with a permit to trade on energy markets and having revenues returned to its members. Innovative elements are certified trade labels[50] that serve as

[47] Under Latvia's new national Operational Programme for the 2021-2027 planning period
[48] The Dutch initiative HIER opgewekt publishes every year updated numbers in the Local Energy Monitor
[49] Bridge report "Economies of Energy Communities – Review of electricity tariffs and business models", April 2021
[50] The so-called Keurmerk Mienskips Energie

guarantees of quality and origin for energy that is sustainable and produced locally. Additional means are provided through specific support schemes for projects of different size[51].

While the Netherlands have a long tradition of collective ownership and decision-making, which can explain the strong development of cooperative energy, the concepts of RECs, collective self-consumption and CECs have not been transposed into Dutch legislation. Recent draft legislation proposes to merge REC and CEC definitions into one single concept - the 'energy community' – which effectively distinguishes between respective participation requirements in RECs and CECs. While not all of the RED II governance principles are reflected nor laid out in detail, the draft acknowledges the need to address additional issues[52].

4.6. Norway

Norway is unique compared to other European countries, due to its high renewables share (about 98% hydro power) in the electricity mix. The energy regulatory authority identified 30 local community energy projects, of which the majority are only in the concept phase (NVE 2019). Property developers and real estate companies are the driving force behind more than 70% of those projects that mostly focus on local power production and self-consumption of locally produced energy. However, none of the existing community energy projects are fully in line with RECs as understood in REDII and citizen's engagement in community energy is quite low. Technologically, most of the projects include solar and battery storage in order to improve self-sufficiency, energy efficiency and combined heat and power generation. Only one project is explicitly using wind energy. In some island communities along Norway's coast battery storage facilities are being installed, while support has been provided to raise the number of residential prosumers (PV) – both of which are initiated by local municipalities and in cooperation with local utilities and suppliers.

Existing models include cooperatives with shared ownership among shareholders, such as citizens and landowners, and energy market actors who are in charge of constructing e.g. small hydropower plants, and provide services needed to realize such projects in cooperation with local communities, with regards to operation, maintenance, power sales and financing. This kind of cooperatives are set up in the legal form of stock-based limited companies (Aksjeselskap, or A/S), where owners can be held liable beyond the stock capital, according to the Norwegian Companies Act. Other common legal forms are 'housing cooperatives' that many residential apartment buildings in Norway assume. Subject to the law on housing cooperatives, shareholders are natural persons (and can be, to a limited extent, municipalities or employers) who can set up community energy systems that can include and combine rooftop solar, storage facilities and charging points of e-vehicles.

Traditionally, ownership of small-scale energy infrastructure, renewables generation units as well as local distribution grids are often in the hands of farmers, land-owners and municipalities. Up to now, the general idea of community energy has not played any major role in Norway's discourse on energy transition and decarbonisation policies. Norway has been lacking behind when it comes to enabling citizen's active role in

[51] SDE+ scheme for large projects and 'Post-CodeRoos' for smaller projects
[52] See https://www.rescoop.eu/policy/netherlands-rec-cec-definitions.

RE development. Yet, there is regulation that allows citizen's to become prosumers and subsidies to refund up-front costs. Present regulations[53] allow prosumers exemptions from certain metering requirements, calculation of power distribution and billing of grid services. Prosumers can feed a maximum of 100kW into the grid, which is considered as a barrier to further deploy larger installations of solar power in Norway, incl. to community energy. New regulation that should apply from 2022 onwards has been designed to strengthen the rights of housing cooperatives' and self-consumers in energy markets and systems. It is expected to allow electricity sharing between units within the same buildings and to increase the 100kW threshold to 500kW. As for EU legislation, RED II has not been transposed and is still under review by EFTA/EET[54]. By now, existing models are often research pilot projects that include a variety of actors such as municipalities, grid companies, business sector and technology companies.

4.7. Poland

In general, Poland's framework conditions and support to renewable energy development and community projects in particular have so far not been playing any major role in decarbonising the energy sector, which is dominated by incumbents from fossil power generation and mining industries. Collective citizen and community engagement in renewable initiatives are seldom, although Polish legislation recognises two concepts of energy collective actions: energy clusters (since 2015), and energy cooperatives (since 2019).

Considered to be pioneers in decentralised and community led decarbonisation initiatives, energy clusters are based on civil law agreements among actors such as citizens, legal persons, businesses, researchers and local authorities, who seek to engage in energy production, balancing, trade or distribution, and mean to create synergies at local level and more sustainable supply chains. Entitled to cover the area of up to one county or five municipalities, clusters do not form legal entities, but are represented by a coordinator who can claim rights and fulfil duties and responsibilities. Initially, 66 energy clusters were set up by initiatives taken by municipalities and certified by government authorities, in collaboration with suppliers and DSOs. Yet, tailor-made incentives and financial support that was meant to follow the clusters' establishment was not delivered – which is also why today, only around a dozen of such clusters still exist. However, the government is preparing a program, within the framework of National Recovery Plan, dedicated to RES investments being made by energy communities. The program has been recently released by the Ministry of Development and Technology and foresees pre-investment support, horizontal support as well as investment support. The estimated number of energy communities benefiting from pre-investment stage is 139 and investment stage is 10. The first call is foreseen for the first half of 2022.

Energy cooperatives, as opposed to energy clusters, are legal entities and are subject to the same rules as prosumers. A cooperative can consist of maximum 1000 members and can operate in the area of rural or urban-rural municipality or in the area of no more than 3 such municipalities that are directly adjacent to each

[53] European Energy Law Report, Chapter VIII –Prosumer Legislation in Norway: A First Step for Empowering Small Energy Consumers. 2019

[54] Implementing EU Directives in Norway depends on individual procedures and negotiations between the EU and the EEA/EFTA for each policy. It can take several years from when the EU decision is made until it is included in the EEA agreement.

other. The business model is based on self-consuming locally produced energy, allowing to net-meter some of this energy. As for electricity generation, the total installed capacity may not exceed 10 MW (and 30MW for heat & 40 million m3 of biogas per year). Cooperatives must cover at least 70% of their members' own energy needs over the year. At present, Poland is home to one operating energy cooperative ("Nasza Energia", started in 2014). In parallel, investments in solar collectors and PV installations on private buildings are gaining popularity, often facilitated by municipalities that make use of financing programs offered by the state. Since August 2019, the net metering scheme originally for households and public authorities has been extended to enterprises. Nevertheless, there are multiple technical, legal and regulatory barriers for community PV. Poland is currently working on the transposition of REDII, and preparing an extensive amendment to the RES Act, which will introduce to the legal framework provisions on virtual and collective prosumption, a definition of citizen energy community and regulation on balancing and accounting issues that are relevant to energy cooperatives.

4.8. Portugal

In Portugal**,** local renewable generation, and energy communities in particular, are seen as part of the solution to achieve its national climate and energy targets, incl. a 47% share of RES in the energy mix by 2030 (30,6% in 2019). While currently there are no operational RECs in Portugal, there are several ongoing initiatives which aim at the implementation of RECs – by September 2021, DGEG (entity responsible for the licensing process) has approved 10 RECs. In parallel, there are several projects of collective self-consumption being implemented over the last two years. RECs are mostly considered to facilitate higher PV penetration, due to the cost-efficient potential of small-scale generation in the Portuguese context, in comparison to the other RES technologies.

Prior to the establishment of the legal provisions for RECs and collective self-consumption (DL 162/2019), collective energy actions were realised through energy cooperatives - which are expected to build the basis for the development of RECs in the future. Energy cooperatives are, as in many other European countries, set up with the purpose to have its members jointly investing in renewable energy development, and supply green electricity. The common legal form stems from the law on the cooperative sector (Código Cooperativo), which does not limit cooperatives to operate within specific geographical areas, and allows for implementing projects across the country. Some of the cooperatives exist since many decades and helped to assure energy supply and operate distribution networks in remote areas (but do not necessarily generate energy themselves).

In legislation that applies since 2020, Portugal has partially transposed RED II, introducing a framework for RECs and self-consumption in the electricity sector, including the definitions and applicable rules and procedures. Over the last 2 years, the regulation for self-consumption of electricity (also applicable to RECs) was already amended, learning from the emerging national and international experiences, while another amendment is currently under public consultation.

The business model as such is likely to depend on subsidies received for selling the renewable energy generated, as well as on advantageous and incentivising network tariffs. Further provisions are meant to simplify licensing procedures, with reduced permit and certification requirements, as well as for trading excess

electricity. Yet, most of relevant provisions of RED II, including the definition, are copy-paste from the EU Directive, thus providing only little legal clarity on RECs and their role in Portuguese energy markets and systems.

4.9. Spain

Spain has a long tradition of energy cooperatives, which have been created since early the 1920s and contributed mainly to advance rural electrification, representing the main form of the country's collective actions in energy. Energy cooperatives carry out activities such as supply and/or distribution system operation, providing services (e.g. through external Energy Service Companies, or ESCOs) with regards to smart grids, IT solutions, asset control in real-time, demand response, consumption profile optimisation, billing, as well as mobility services such as the provision and maintenance of e-vehicle charging points, and energy efficiency services.

The (minority of) Spanish energy cooperatives who own and operate distribution networks were created in the early 19h century, in particular in remote areas and on account of concerns related to security and quality of supply. Mostly owned by citizens and active in a wide range of electricity market and system activities, such cooperatives are not profit-oriented and reinvest benefits back into maintenance and the increase of their renewable asset base. PV systems for collective self-consumption are installed and connected by the cooperative's own DSO. Combining generation, distribution and supply can make profitable business cases, with some outfits having grown into considerable market actors[55].

Throughout the last decade, mostly due to regulatory changes introduced that established cooperatives as electricity market actors in 2010, numerous such entities were founded, most of whom do not own and operate distribution networks. Many of these recent cooperatives were initiated by citizens who jointly invest in installing renewables projects such as PV systems, supplying green electricity to its members[56], with the main purpose to increase collective self-consumption, as feeding surplus electricity back into the grids is not incentivised by Spanish regulation.

Individual and collective self-consumption has been regulated since 2015 through a series of laws, with the Royal Decree-Law 244/2019 being the latest one. Nonetheless, this regulation does not establish many of the elements that would be required to build an enabling framework for RECs. Persisting barriers include limiting the distance between generation and consumption units to a maximum of 500 meters and restricting self-consumption to installations in the low-voltage grid, leaving out a significant number of buildings connected to the medium-voltage grid, thus preventing many businesses, the industry or public authorities to apply self-consumption. As for transposing EU law, Spain has introduced the REC definition in 2020 through the Royal Decree-Law 23/2020 (the legal text is a copy-paste of the EU's definition in Art.2(16) of RED II, without any further specification) and legally incorporates RECs as new market actors, establishing to take particularities

[55] Founded in 1925, the cooperative ENERCOOP today has 11.000 members, and owns distribution networks.
[56]The cooperative SOM Energia started with buying local green energy from regional sources, and has recently built its own solar power installations and a 500 kW biogas plant. Founded in 2010 by 150 citizens, SOM Energia accounts today for 47.000 members.

of RECs into account when competing for access to remuneration frameworks, on an equal basis with other participants[57]. While the RED II transposition process is expected to continue, the lack of legal clarity on the definition itself, as well as the regulatory absence of specific rights, incentives or support, RECs are being set up and tested in pilot projects, which are promoted by government agencies as well as the industry[58]

The support to RECs development is included in several national strategic plans. The Spanish National Energy and Climate Plan (NECP) foresees several measures to foster energy communities. RECs are also mentioned in the Recovery, Transformation and Resilience Plan "España Puede", and in the National Long-term Strategy document “España 2050”. The Institute for Energy Diversification and Savings (IDAE, a government agency) has published a guide on the development of RECs.

[57] See https://www.rescoop.eu/policy/spain-rec-cec-definitions.
[58] The small “Hacendera Solar” tests the viability of a REC in Castilfrío de la Sierra, receiving its main support from Spain’s TSO, Red Electrica

5. Existing Renewable Energy Communities and Pilot Sites

The previous chapter's COME RES country updates show that the development of RECs as per RED II is in most places still in very early stages, with the following existing RECs that have either started operating since after national governments have transposed RED II into national law, or were set up as pilot sites. Having received financial support from authorities at national and EU level as well as the industry, it is challenging to classify and compare, at this time, business models as well as legal and organisational forms from across Europe (for RECs as per RED II). Yet, this is about to substantially change, considering the promising market and regulatory developments, as described in the previous chapters of this report. The following examples are demonstrating the real-life consequences and local benefits that come with policy and financial support, resulting in having RECs established in growing numbers. In addition to descriptions on each of models, chapter 5.1. focuses in more detail on describing the organisational and legal form and the financial set-up of Magliano Alpi, as well as its ambition to expand and replicate. The three other models are either pilot sites or still in planning stages.

5.1. The Renewable Energy Community of Magliano Alpi[59]

Copyright © 2021 CER Magliano Alpi, Comunità Energetica Rinnovabile Energy City Hall

General Information and Value Proposition

[59] Chapter 5.1. is based on information provided by COME RES partner ENEA (see page 41), as well interviews conducted with Prof. Sergio Olivero, Politecnico University of Torino and head of Scientific Committee of the Magliano Alpi REC

The town of Magliano Alpi, located in the southern Piedmont region, accounts for around 2200 inhabitants and has established Italy's first Renewable Energy Community, after the country established elements of the "enabling framework", as requested by the EU (see chapter 4.3.). Initiated by the town's local authorities and mainly driven by local SMEs, this first REC started operating runs under the name "Energy City Hall" in form of 20kV PV rooftop installation that is connected to 5 households, the school and the library. The Magliano Alpi model is thus based on collective self-consumption and electricity sharing among the buildings and parties who are members of the REC, who benefit from reduced energy bills by consuming the electricity generated. In addition, charging points for e-vehicles are made available for community members free of charge. The municipality provided for the instalment of smart metering and data management systems that allocate and control electricity flows between production and consumption points.

Next to financial benefits that come in form of reduced expenditure on energy - which is important in view of the disastrous impact COVID-19 had also on Northern Italy - the REC in Magliano Alpi proposes substantial social and environmental value. This encompasses reduced GHG emissions, local sustainable development and improved resilience, as well as the active empowerment of citizens and local businesses in the energy transition. For instance, a cooperative entity of professionals was created to foster local supply chains of services and products, with regards to instalment, design, urban planning and maintenance. This community group called Gruppo Operativo di Comunità is involving local professionals into the decarbonisation process and boosts labour markets through job creation as well as re- and upskilling. What further stands out is that REC drives a holistic green innovation process that go far beyond how to produce and use energy, reaping the benefits of transformations that come with the transition towards climate-neutral societies. In Magliano Alpi, this is reflected in stronger public-private partnerships, with the REC being a private non-profit entity whose members include the municipality, as well as substantial levels of local interest that increases the RECs replicability potential, with surrounding municipalities committed to adopt comparable models.

Organisational and Legal Form

The REC's forms a public-private partnership, with its members being the municipality, citizens and local businesses. In the case of Magliano Alpi, the REC was initiated and coordinated by the municipality who administered the instalment and operating of PV units. Technical and organisational support is provided by a scientific-technical committee, which includes seven experts from industry, academia and public administration and is led by Prof. Sergio Olivero from the Energy Center of the Politecnico University of Torino.

The REC is digitally organised through an energy system management in form of an IoT platform that maximises the self-consumption of energy and regulates bidirectional energy flows, networks and services. It further analyses and manages consumption and load curves and correlates these with energy usage, and allocates economic returns among the REC partners according to criteria set out by internal regulations. Also, the platform monitors in real-time and controls generation units remotely, providing for flexibility and demand response services. In addition, it has created a mobile application that is made available to REC members, and can be used for concluding smart contracts and process payments with blockchain technology (peer-to-

peer trading is currently being tested).

The REC's legal form stems from the recent transposition of RED II into Italian law. As a non-profit association, it respects main features that includes the adoption of statutes and the legal requirement to provide economic, social and environmental benefits. For instance, the statutes set for sharing profits among the REC members. The legal entity is capable of acting in its own name and being the recipient of obligations and rights (just as any association and cooperative)[60].

Business Model, Revenue Streams, Financial Set-Up

Magliano Alpi's business model is compatible with regulations of local authorities and aims at maximising the support, as foreseen by Italian law, in form of incentives and fiscal bonuses that are meant to support local development in the post-pandemic phase. The REC "Energy City Hall" required public investments of €100.000 into PV rooftop installation, while also micro-wind and hydroelectric are planned to be installed, reducing the electricity consumed from the grid by 30%. Currently, the Italian private sector can tap into a 50% tax incentive – the so-called "super bonus"- for building renovation projects and benefit from a subsidy of €110,00 awarded for every MWh that is shared within renewable energy systems not exceeding 200 kW. Excess electricity can be injected into the grid, but with no remuneration, which encourages RECs to resort to storage. In addition, a national support scheme grants all municipalities with less than 5,000 inhabitants €100.000 to spend on community energy. This allocation will last until 2024 and is complemented by €2,2 billion from the EU's recovery and resilience fund issued in response to COVID-19 ("Next Generation EU") that Italy has decided to spend on REC development, also in cities with a population of less than 5.000. Furthermore, shares of profits from PV sales and other activities like energy management that are generated across local supply chains, are foreseen to be distributed among the REC's membership, providing additional economic value in particular to the energy poor (such an initiative is currently being developed). Shortly, a second and third REC are about to enter into operation, the "Energy Sporting Center" and the "Citizen Endeavour". The Magliano Alpi's REC's success is reflected through the great level of interest expressed by citizens and local businesses – for 2022, additional capacity and consumers will be connected.

Ambition

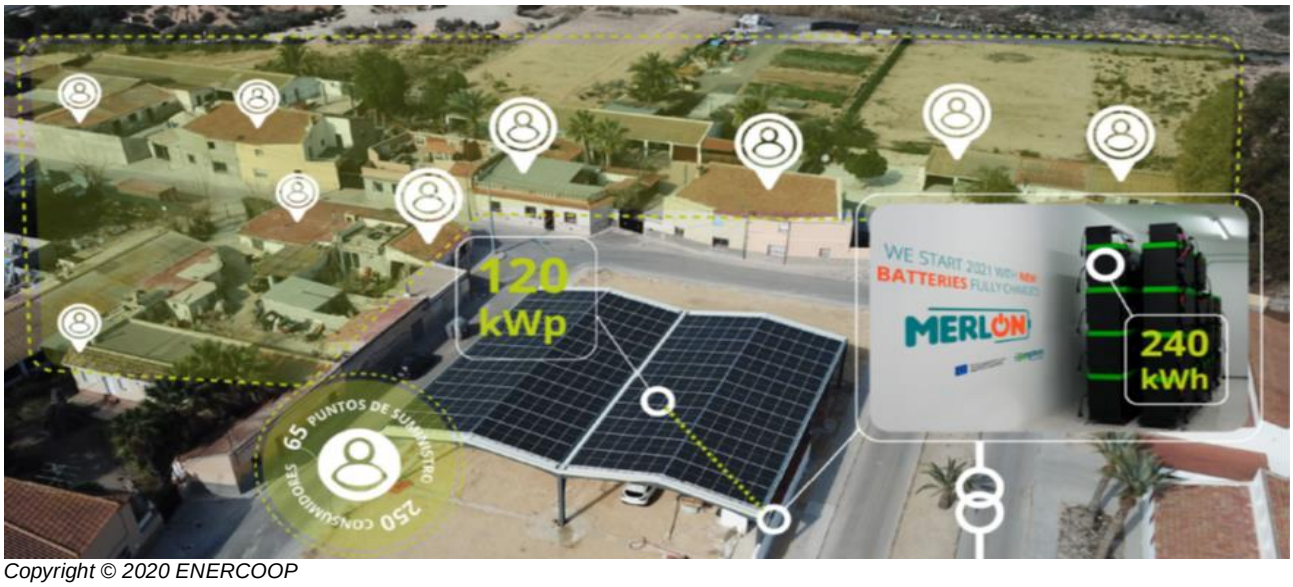
While the Magliano Alpi REC's financial set-up is so far based on the support provided through incentives and public investment, the REC coordinators are planning to implement several of the emerging business models as described in chapter 3.2. Active until now in local renewable generation and consumption, business models that include contracting community services and community incl. with regards to sustainable mobility, energy storage and aggregation services as well as peer-to-peer trading are being planned and tested in Magliano Alpi, and explored in the context of numerous cooperation arrangements. This includes benchmarking a number of ICT/IoT platforms in so-called "Territorial Energy Communities" and their interoperability to enable

[60] According to the Italian decree-law 162/19 (article 42bis) and resolution 318/2020/R/eel of ARERA (Italian Regulatory Authority for Energy, Networks and Environment) and the Ministerial Decree of 16 September 2020 of the MiSE (Italian Ministry of Economic Development)

the creation of “virtual energy utilities” at national level, research on business models combining RECs and storage also with regards to e-vehicles, as distributed storage capacity and balancing services, as well as testing peer-to-peer trading platforms in Magliano Alpi and pilot sites.

To this purpose, the city network “Magliano & Friends” was created to build clustering-capacity and replicate the REC model in 10 neighbouring municipalities that represent 40.000 inhabitants and are currently in the process of signing compliance agreements. In parallel, synergies are sought in Italy’s biggest REC development project “RECOCER[61]” that is funded with € 5.4 million by the Italian Autonomous Region of Friuli Venezia Giulia and further municipalities such as Collesalvetti in Tuscany, Montelabbate in Marche Region, Ventotene island, the cluster of cities of the Orta lake in Piedmont, the municipalities of Rittana and Carrù in the Province of Cuneo. Further cooperation at national and European level takes place with stakeholders such as the Italian Forum of Energy Communities (IFEC) and the Association for sustainable and fair energy transition through collective self-consumption (ATENESAUC), as well as under the umbrella of EU research projects such as ERIGRID[62], ENEA’s[63] Smart Cities & Community Laboratory and the ENEL Living Lab & Testbed run by the ERA-NET network[64].

5.2. The Pilot Project COMPTEM - Comunidad para la Transición Energética[65]



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With COMPTEM, the electricity cooperative ENERCOOP has set up its first pilot REC. ENERCOOP itself was founded in 1925 and has grown into a major non-profit energy provider in the municipality of Crevillent (Valencian Community), accounting for 30.000 inhabitants. Today, ENERCOOP produces, supplies and distributes through its own networks renewable and locally produced electricity to its around 16.000 members

[61] www.recocer.eu
[62] https://erigrid2.eu/ - H2020 research project on smart grid and smart energy systems research, technology development, validation and roll out
[63] Italian National Agency for New Technologies, Energy and Sustainable Economic Development
[64] https://www.eranet-smartenergysystems.eu/Partners/Living_Labs
[65] Chapter 5.2. is based on the contributions made by COME RES partner ECORYS, as well as a presentation given by ENERCOOP’s CEO, Joaquin Belso, at the AEEC Autumn Conference on 4 November in Barcelona

in and around town, both from PV and hydropower. 100% of ENERCOOP's benefits are redirected into improving and extending Crevillent's energy infrastructure and renewable generation sites.

COMPTEM was initiated on and is financially supported by the Horizon 2020 project Merlon, that covers 75% of the total investment of 400.000€, with the remaining 100.000€ contributed by ENERCOOP. Since September 2021, this first REC has started operating in Crevillent's El Realango district and is located adjacent to a public school, with the installation of solar panels on a roof covering (see picture above) that can generate 180.000 kWh per year, covering 50% of the electricity needs of the surrounding 65 residential buildings and its 250 inhabitants and with the objectives to result in energy cost savings by 15 to 20%. The installation is combined with a 240kWh battery and 2 charging points for e-vehicles, and can be used to test and improve technologies and innovation related to micro and smart grids, aggregation and demand side flexibility, P2P trading as well as optimised energy flows through advanced energy distribution models among the REC's members, in order to maximise energy and cost savings. Within the 2030 time horizon, ENERCOOP is planning to expand this pilot and turn the traditional electricity cooperative it has been since many decades into a REC, planning to cover Crevillent's entire municipality by 2030 with installations providing for collective self-consumption. Mainly due to Spain's regulatory requirements limiting the distance between generation and consumption units to a maximum of 500 meters, Crevillent's RECs will be built and replicated in form of cellular modules, each of which providing renewable energy to the consumers within its radius. Further green electricity is supplied by the renewable generation plants that are connected to ENERCOOP's own distribution networks outside the urban area.

COMPTEM is led and organised by ENERCOOP, which has based the pilot on its regular cooperative "As a service model". This model consists of offering to either pay for the self-generated energy supplied - in exchange for not making any investments - or else benefit from self-consumed electricity that is free of charge in case the consumer decides to invest. This model is available to all ENERCOOP's members, who live in the El Realango district, able to benefit from reduced energy cost (financial savings are shared among members and the facilities' owner, who is ENERCOOP and reinvests benefits into the community), but do not receive any redistribution of profits. CONPTEM is expected to be continued until after the end of the H2020 project, with the intention to extent this model on other districts in Crevillent.

5.3. The Pilot Site Hacendera Solar[66]

Copyright © 2020 Red Eléctrica de Espana

Operating since 2020, Hacendera Solar was Spain's first rural REC. Set up by the Spanish Transmission System Operator (Red Eléctrica de Espana, or REE) and the Mergara energy cooperative as a pilot project, the REC is located in the small village of Castilfrío de la Sierra. The prototype for a rural energy community is based on a participative model that involves the town hall and the local population (of 37 inhabitants), and is meant to test the viability of RECs in rural areas, based on collective self-consumption in combination with network backup. The two solar installations (combined 13kWp) on the roofs of municipal buildings as well as a 200W mini wind turbine supply electricity to the town hall, the social centre, the doctor's clinic, a refurbished building and the laundry-room, as well as the water pump systems. The local government is expecting to achieve a self-consumption rate of 76% for the buildings connected, which would translate into energy savings of 13.64 MWh per year and reduce the carbon footprint by 6.98 tons of CO2 per year. Hacendera Solar also has installed and supplies electricity to a charging point for e-vehicles, and further analyses energy needs of government buildings and their complementarity, with the overall purpose to stimulate investments in low-carbon economies that reduce CO2 emissions and expenditures of municipalities.

In 2021, Hacendera Solar approved its statutes as non-profit association and established the governance body that is in charge of managing the REC. The organisational form of the REC consists mainly of a core group of interested citizens of the town who are in interested in the initiative and willing to dedicate time. The core group has been set up by the local authorities and is in charge of assessing the further potential of the REC and of exploring previous community participative initiatives that have been carried out, such as the "hacendera", which refers to traditional community works in Spain's rural areas with regards to constructing and maintaining bridges, roads and buildings. The core group further identifies relevant stakeholders and facilitates creating a network of allies, and assesses potential citizens' resistance to the REC's implementation. It further established

[66] Chapter 5.2. is based on the contributions made by COME RES partner ECORYS

a dialogue with those inhabitants of the village who not engaged in the REC, in form of information material and a launch event (which was done with support from REE and other community energy representatives from Spain). Thus, the REC in Castilfrío de la Sierra was co-created by the core group and the professionals installing the renewable technologies, meant to increase citizens' acceptance and tailor it to local circumstances.

The REC's total cost amounts to €29,990, most of which has been financed by REE, with a local bank (Caja Rural de Soria) covering the engineering costs. A source of permanent income stems from financial compensation received in return for feeding excess electricity into networks. In a second phase, it planned to connect and integrate further buildings into the REC, foreseeing to reinvest the rebates on the energy bills (by now for the municipal government) and extend the REC's roll-out across the village. The ambition to create a model in Castilfrío de la Sierra that can be replicated in the region's other municipalities is hindered by the fact that the support provide by REE was required to develop and implement the REC. In general, it is considered unlikely that there will be many system operators, in Spain or elsewhere, to initiate and sustain the implementation of RECs on a larger scale.

5.4. The "Community of Communities" of Pinerolese (in planning)[67]

The Pinerolo area is located in the center-west part of the Piedmont Region and neighbours the Metropolitan City of Turin, extending to 1,348 km² and includes 47 municipalities and a population of about 150,000 inhabitants. In this region, the Pinerolo Energia Consortium (CPE) represents around 130 entities which include SMEs, larger companies and multinationals, municipalities who are interested in the project, as well as associations and the Politecnico university of Torino. In cooperation with the university as well as ACEA[68], the CPE has been laying the foundation for building a "Community of Communities" between the area's municipalities which are involved in the project "Oil Free Zone Sustainable Territory" and have already reduced fossil fuel based electricity generation by increasing their self-consumption capacity to 42%. In the longer term, the consortium plans to reach 100% - in order to get there, the intention is to establish as many RECs as possible in the municipalities[69] of the region, and federate these into the Pinerolese energy community. In this context, the final transposition of RED II which is foreseen by May 2022 should extend the regulatory requirements of restricting a REC's member from the current 200kW within RECs to 1MW, and remove the legal requirement to have RECs connected to the same medium or low voltage substation – all of which is largely expected to facilitate its implementation. Therefore, RECs are now being set up in local municipalities such as Villar Pellice and Scalenghe, starting with PV systems and a biogas plant.

Within participating municipalities and districts, it is planned to install a total 162 renewable generation units that are capable of providing renewable energy of approx. 16.9 GWh per year, incl. from a 450 kW hydropower station as well as a biogas plant that can provide for about 80% of the community's energy needs. From the approx. 10 million cubic meters of biogas produced per year, it is foreseen to generate 17.1 GWh of electricity.

[67] Chapter 5.3. is based on the contributions made by COME RES partner ECORYS
[68] ACEA is a Italian renewable electricity and gas supplier – www.acea.it
[69] As facilitated by recently adopted Italian legislation, as well as through available funding programs, see chapter 4.3.

On the PV side, there will be 144 installation of 3kW for residential use, in combination further 13 units on public and private property with a power ranging from 8.4 kW to 62 kW, as well as an additional 113kW PV system that can generate 114 MWh per year (a further 2MW plant is currently in permitting procedure).

Due to the currently still persisting regulatory barriers as described above, the Pinolerese energy community still hasn't adopted any specific legal form but plans to start running operations in form of a "Temporary Association of Purpose", which is to be later transformed into a cooperative. This is according to Italian rules on establishing energy communities' initiatives, incl. on criteria for financial aspects (i.e. energy costs, energy prices, taxes and duties) related to self-consumption and energy sharing within the REC. By now, the "Comunità energetica del Pinerolese" is represented by the CPE, which was kick-started in 2018 among public and private users, and in particular by the municipal authorities of Frossasco, Roletto, San Pietro Val Lemina, Scalenghe and Vigone.

Financial support is expected to stem from the Italy's extensive funding schemes (see chapter 4.3.), and complemented by active research and participation in regional and European programs, which extend to feasibility studies, surveys, support to regulatory and legal framework developments, as well as capacity-building and dissemination activities.

6. Conclusions

The assessment of RECs from across Europe shows that the development of citizens-based, decentralized, democratic and digital forms of producing and consuming (renewable) energy is about to spread out wide and likely to see rapid growth throughout the upcoming years. As set out in this report, this is mainly triggered by increased EU and national policy ambitions to decarbonise faster and further, and getting many more citizens to start playing an active role in the energy transition. Existing and well-established community energy models have been demonstrating, some of which throughout decades, that collective energy actions are among the most useful instruments for fostering sustainable development, in particular at local level. This encompasses active citizen contribution and inclusion in local initiatives, increased climate change awareness, decarbonisation and environmental benefits, as well as improved expertise and resilience through shorter supply chains and better labour market opportunities. Every community energy model identified and assessed within COME RES responds positively to all or almost all of the criteria that can be applied when assessing the exploitation of the above described sustainability potentials.

Climate action and energy stakeholders keep reminding decision-makers to increase efforts of how important a more consequent and complete transposition of EU legislation on collective and active customer empowerment into national laws is. This includes in particular the provisions on RECs and CECs, but also the implementation of market designs that allow for applying models that are financially viable and enhanced by progress in technology and digital innovation. We can observe plentiful and substantial activities being set off in those countries where national authorities have introduced definitions and enabling frameworks for RECs – even when the transposition is still incomplete. Yet, much stronger policy and regulatory support is needed, if

we are to turn collective energy actions into one of the central instruments of climate change mitigation and sustainable development. This also refers to current legal developments at EU level that are in the adoption process[70], as well as the transposition of RED II provisions that are not directly related to energy communities but would largely help the development of RECs if measures were tailored to their needs[71]. Future legislation reviews should also consider to include all project sizes.

Support clearly extends to the need of providing financial means, in particular to nascent RECs that require upfront investments in renewable technologies and instalments done by engineers and IT professionals. Also, existing energy communities can use funding programs and subsidies to develop new activities and create additional economic, social and environmental benefits to its members. In particular, national governments would be well advised to thoroughly assess, as done for instance by Italy, to dedicate resources that stem from the EU's considerable recovery and resilience fund to the further establishment and improvement of RECs across Europe. The fund was designed to allow member states to rebuild the EU's economies after the devastating impact caused by COVID-19. Allocating support to REC initiatives contributes to reaching a number of the EU's overarching policy objectives, such as a sustainable economic recovery and reaching climate-neutrality by 2050. We can also conclude that REC initiatives are greatly driven, especially those in early development stages, by taking part in national and EU research and innovation programs (such as COME RES), as well as in stakeholder networks and alliances.

The progress made in regions that are more advanced with respect to supportive frameworks and the operation of recently established RECs (and the many that are in planning) demonstrates early and yet considerable levels of success. This is reflected in the high interest shown by citizens and local authorities in replicating RECs model in their municipalities and regions. Across a number of countries, we can notice the early signs of what could become veritable boom in this regard, with high degrees of commitment to deploy REC models and take advantage of the many benefits they offer. It is therefore essential to extend communication and dissemination channels, and to keep benchmarking functioning models and better connect relevant stakeholders at all levels, as it evidently leads to more and improved REC development in Europe.

In the next step, COME RES will - under Task 4.2 - build on the information published in this report, and take a closer look at novel financing instruments that could help setting up and sustain RECs in Europe. In this context, COME RES will assess advantages and disadvantages of potential and existing instruments that can be used to finance community initiatives in renewables. This a more detailed analysis of national and EU funding programs (incl. each COME RES country's recovery and resilience plan), as well as market premium-scheme rules auctioning, tax incentives, subsidies, renewable energy certificates, crowdfunding and specific local bond mechanisms. The instruments identified will be then promoted also in developing tailored business models for 4 COME RES target regions under Task 4.3.

[70] Such as the reformed Climate, Energy and Environmental Aid Guidelines (CEEAG) and the General Block Exemption Regulation (GBER)
[71] In particular Art. 15 on administrative procedures and Art.16 on the organization and duration of permitting procedures

Abbreviations

CEC – Citizen Energy Communities

CEP – Clean Energy Package

COMPTEM - Comunidad para la Transición Energética

CPE - Comunità energetica del Pinerolese (Energy Community of Pinorelese)

CSC – Collective Self-Consumption

DSO – Distribution System Operator

EV – Electric Vehicle

IEMD – Internal Electricity Market Directive (2019/944/EU)

JRC – Joint Research Center

PPA – Power Purchase Agreement

P2P – Peer-to-Peer

REC – Renewable Energy Communities

RED II – Revised Renewable Energy Directive (2018/2001/EU)

REE - Red Eléctrica de Espana

RES – Renewable Energy Sources

TSO - Transmission System Operator

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