



European Energy Network

A voluntary network of European energy agencies

Energy Agencies and Renewable Energy Communities A new path for energy decentralization

*Comparative analysis of the current status of Renewable Energy
Communities in EⁿR member countries and the role of EⁿR energy
agencies in policy and implementation*

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About the Study

This publication is an EnR study produced under the 2022 Presidency by ADENE, the Portuguese Energy Agency. It aims at providing the best available knowledge based on policy implementation across EnR member countries. The expressed conclusions do not imply policy positions of individual countries. The European Energy Network (EnR) or any person acting on behalf of EnR is not responsible for the use that might be made of this publication.

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Institute for the Diversification and Saving of Energy, Spain



National Agency for the Promotion of the Transition to Sustainable Energy, Luxembourg



Motiva, Sustainable Development Company, Finland



Slovak Innovation and Energy Agency



Swedish Energy Agency



Sustainable Energy Development Agency, Bulgaria

Executive Summary

The present study was carried out by the European Energy Network, EⁿR, under the Presidency of ADENE in 2022. The study, lead by ADENE under the direction of its Steering Committee, composed of six other EnR member agencies (AEA, ADEME, dena, EST, CRES, RVO), focused on the role of national energy agencies in the deployment of Renewable Energy Communities.

Energy Communities are defined in two separate legislative acts of the Clean Energy Package – the revised Renewable Energy Directive (EU) 2018/2001 and the revised Internal Electricity Market Directive (EU) 2019/944. With the transposition to national law of the first of those Directives, there was an expectation of growth in the share of Renewable Energy Communities (REC) in the European energy systems and an increase of their contribution for the boost of the renewable energy market to meet the national and EU energy & climate targets.

The objectives this study were:

- to know the current legislative and regulatory status regarding REC, as a result of the transposition of the RES Directive into national legislation (or by national initiative in the case of non-EU member states), in the sample of countries from which EnR Member Agencies participated;
- to identify the main actors involved in policy implementation;
- to identify the main obstacles or barriers that hinder REC development;
- to identify solutions for the removal or mitigation of such barriers;
- to identify the role of national energy agencies in REC policy and implementation and how this role can be improved for an added value in this field;
- to collect and process existing information on good practices and case studies of specific REC, identifying possible replication opportunities in the different sectors of activity; and,
- to propose monitoring tools and/or changes in the legislative frameworks for the evolution of the REC market, with a particular focus on the role that EⁿR Member Agencies may have in these projects and in the desired REC implementation.

The study involved the participation of 13 countries (12 EU-member states + 1 non-EU member state) - Austria, Bulgaria, Finland, France, Greece, Italy, Luxembourg, Netherlands, Portugal, Slovakia, Spain, Sweden and United Kingdom. The information for the study was gathered through a 1st survey carried out with the EⁿR Member Agencies of these countries (AEA, SEDA, Motiva, ADEME, CRES, ENEA, Klima-Agence, RVO, ADENE, SIEA, IDAE, SEA and EST), followed by a collection of fact sheets on specific projects/good practices (case studies) developed in these countries.

The information gathered in the survey included details about:

- transposition of the Renewable Energy Directive 2018/2001, specific legislation on REC and its revisions and details;
- the working definition for REC in the current legislation;
- characteristics of REC in each country (actors that can participate as members in a REC, details regarding REC management, services provided, licensing procedures and entities involved, operational aspects of the licensing process and restrictions/obligations imposed by the existing legislation);
- the existing facilitating instruments for REC implementation;
- the existing barriers to REC implementation, as identified by the EⁿR Agencies;
- the current role of the EⁿR Member Agencies in REC policy and implementation; and,
- the solutions proposed by EⁿR Agencies to overcome existing barriers.

The information obtained from the case studies, complemented as much as possible, with collection of data from other sources, allowed to produce a benchmarking analysis that is presented in chapters 3, 4, 5 and 6 of the report.

The collected information about specific case studies included:

- legal structure (ownership model), number of members and year of implementation;
- the objectives and drivers associated to the REC creation;
- the types of REC projects in terms of complexity and services provided;
- the sectors of activity involved and types of renewable energy / technologies;
- the perceived socio-economic benefits;
- the role of the EⁿR Member Agencies in the implementation of the project.

The study allowed for a general overview of implementation of REC in the analysed countries and to recommend pathways to improve it. Main conclusions and recommendations are summarized below:

- The current geopolitical and energy market contexts require a drastic acceleration towards clean energy. Renewable Energy Communities present an excellent opportunity to deliver affordable zero carbon energy.
- Renewable Energy Communities can have a wide application, covering practically all sectors of activity, which is an inspiring motivation and opens multiple replication opportunities.
- However, there are still several bottlenecks in the countries involved in the study, which create relevant difficulties or barriers for a wider deployment of Renewable Energy Communities. Many of these barriers are related to the existing legislative frameworks (with significant differences between countries) but there are also other issues hindering wider adoption.

- EⁿR Member Agencies propose several solutions to overcome identified obstacles and promote Renewable Energy Communities on a larger scale, in order to have a more meaningful impact on the energy transition goals, with all the inherent socio-economic and environmental benefits.
- So far, the contribution of the EⁿR Member Agencies for REC policy development and implementation, is not significant. But, EⁿR Member Agencies have the expertise to assist in the promotion/implementation of REC creation in the 13 countries analysed and could have a more proactive role in this process.
- EⁿR Member Agencies, as pivotal organizations in the energy sector, can be enablers of REC. Several recommendations are presented to strengthen national agencies' participation in the promotion/dissemination of REC, thus fostering their increased adoption as a powerful tool for the energy transition.

1. Framework and objectives

Framework

Energy Communities are defined in two separate legislative acts of the Clean Energy Package. The revised Renewable Energy Directive (EU) 2018/2001 sets the framework for 'Renewable Energy Communities' (REC). The revised Internal Electricity Market Directive (EU) 2019/944 introduces new roles and responsibilities for 'citizen energy communities' in the energy system covering all types of electricity.

However, in July 2021 the European Commission proposed a revision of the directive, as part of the package to deliver on the European Green Deal. The proposed revision aims to ensure that renewable energy fully contributes to achieve a higher EU climate ambition for 2030, in line with the 2030 Climate Target Plan. It seeks to convert into EU law some of the concepts outlined in the energy system integration and hydrogen strategies.

In line with the EU Climate Law, the targets and measures set in the revised directive should be ambitious enough to reduce greenhouse gas (GHG) emissions by at least 55% by 2030. This includes raising the overall renewables' target (proposed to increase by 40%), but also strengthening measures for transport or heating & cooling (Source: energy.ec.europa.eu).

To contribute towards the targets established in the European Green Deal and the implementation of the Clean Energy Package, the present study will focus on Renewable Energy Communities and how their implementation can be fostered by energy agencies on the ground, both at policy making and project implementation levels. The study is being coordinated by the Programs and Initiatives Department (DPI) at ADENE, under the direction of the EⁿR Steering Committee, composed by ADENE, ADEME, AEA, CRES, dena, EST and RVO.

Objectives

Renewable Energy Sources (RES) have experienced significant growth in the EU over the last few years, with a continuous increase in their share in the total energy consumption (from 9,6% in 2004 to 19,7% in 2019, according to Eurostat), achieving a total installed capacity of approximately 1,5 GW (Source: International Renewable Energy Agency, IRENA). This is due not only to energy policies that encouraged RES deployment, but also because of increased public awareness from both an environmental and social perspective. Thus, EU countries are encouraged to cooperate to boost the renewable energy market to meet national and EU targets.

Estimates suggest Renewable Energy Communities (REC) could represent 17% of installed wind capacity and 21% of solar (European Commission, 2016¹). By 2050, almost half of EU households are expected to be producing renewable energy (Kampman, Blommerde, and Afma, 2016²).

To contribute to better policy making, it is critical to understand how implementation of REC is being done on the ground and what are the bottlenecks and success factors that can increase the effectiveness of this tool in delivering on the ambitious RES targets established. The present study aims to contribute to the knowledge of the current status, by proposing to:

- Characterize the state of the art of REC implementation in the EU, identifying barriers in the legislation, and potential policy measures to address them;
- Propose possible solutions to increase investment and dissemination of REC, with the objective of promoting energy production decentralization;
- Characterize current grid obstacles and propose solutions to leverage the implementation of REC in the different sectors (public administration, industry, services, residential);
- Present different good practices and business models, through case studies, highlighting their goals, results, and possible replication opportunities in the different sectors of activity, with a particular focus on the role of energy agencies;
- Characterize and benchmark current REC implementation status in the different countries.

The foreseen actions within this study can contribute positively to clarify the way in which Renewable Energy Communities can be fostered. The main target of the study is public administration (central and local), but also the private promoters of REC, including business parks, business associations, energy agencies, equipment's suppliers and installers, owners and users, ESCOs and financing entities.

¹ European Commission, 'Staff Working Document Impact Assessment Accompanying the Document Proposal for a Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from Renewable Sources (Recast)', 2016.

² Kampman, B., J. Blommerde, and M. Afma, *The Potential of Energy Citizens in the European Union* [Report Commissioned by Greenpeace], 2016.

2. Methodology and list of countries/agencies involved

The study was divided into 2 phases, with the following objectives:

1. **Phase 1:** analysis of the current state of REC implementation regarding existing legislation and the transposition of the Renewable Energy Directive 2018/2001 into national legislation; identification of the main market actors; identification of the main barriers and opportunities for REC promotion; development of proposals for the removal/mitigation of the obstacles identified and a wider implementation of REC; and, analysis of the role of the EⁿR Energy Agencies in the REC's policy and implementation process.
2. **Phase 2:** collection and processing of existing information on good practices and case studies in specific REC projects (under planning or implemented), with possible replication opportunities in the different sectors of activity; and, proposal of monitoring tools/frameworks for the evolution of the REC market, with a particular focus on the role that EⁿR Agencies may have in these projects and in the desired REC implementation.

A survey prepared by the survey's Steering Committee was sent to the EⁿR Member Agencies in May 2022, and a total of 13 countries/Energy Agencies (Table 1) contributed to the present study with information (12 EU Member States and 1 non-EU member state, United Kingdom). The data of individual country answers is presented in **Annex 1** of this Report, in **section 10.1**.

The results of the analysis of data collected in the survey are included in chapters 3, 4 and 5 of this Report.

Table 1 – List of countries / EⁿR Energy Agencies involved in phases 1 and 2 of the study

Country	E ⁿ R Energy Agency
Austria	AEA - Austrian Energy Agency
Bulgaria	SEDA - Sustainable Energy Development Agency
Finland	Motiva Oy
France	ADEME – Agency for Ecological Transition
Greece	CRES – Centre for Renewable Energy Sources and Saving
Italy	ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development
Luxembourg	Klima-Agence G.I.E.
Netherlands	RVO - Netherlands Enterprise Agency
Portugal	ADENE – Portuguese Energy Agency
Slovakia	SIEA - Slovak Innovation and Energy Agency
Spain	IDAE - Institute for Diversification and Saving of Energy
Sweden	SEA - Swedish Energy Agency
United Kingdom	EST - Energy Saving Trust

For phase 2 of the study, individual projects/good practices (case studies) developed were collected to identify predominant types/technologies and sectors covered by REC implementation, as well as the participation of EⁿR Agencies in these projects.

Data collection was done through a “Project Fact Sheet” sent to the EⁿR Agencies. The Fact Sheets of individual REC projects are presented in **Annex 2** of this report, in **section 11.1**. These include projects of REC already implemented or in preparation.

This information was complemented as much as possible with collection of data from other sources (mainly other reference studies), so that the benchmarking analysis could be carried out. The results are synthesized in **chapter 6** of the present document.

3. Characterization of existing legislation on Renewable Energy Communities per country

3.1. Legislative framework

The Renewable Energy Directive 2018/2001 was transposed into national law in 8 countries – Austria, Finland, France, Italy, Luxembourg, Portugal, Slovakia and Spain (only partially transposed), and, therefore, these have legislation defining Renewable Energy Communities. Some countries have in fact already undergone one or two revisions of the legislation, as it is the case of Portugal and France. In Portugal, that revision concerned details of the REC definition, like the ranges of installed capacity requiring licensing and distance from production to consumption, and, in France, the revision allowed for changes in precise criteria (full details in the Annex, section 10.1.7).

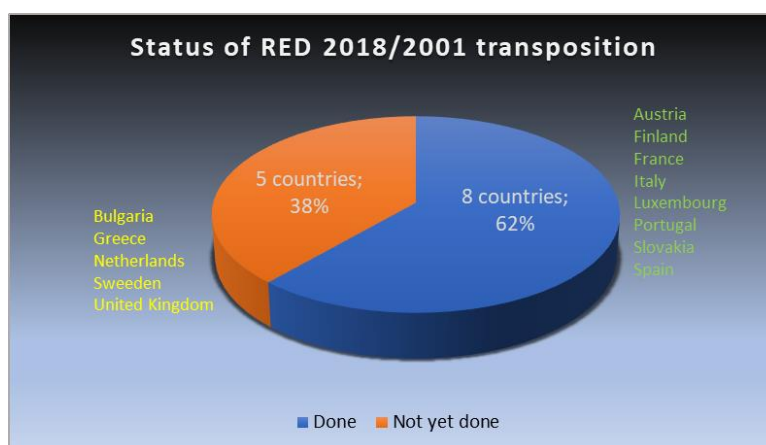


Figure 1 - Status of RED 2018/2011 transposition in the sample of countries that participated in the study

In three countries (Austria, Luxembourg and Portugal), the **transposition** of the Directive was **included in the revision of legislation concerning the electricity market system**. In the case of Austria, the European legislation, i.e. the RED II and the Electricity Market Directive (EMD), have been implemented to a high degree regarding energy communities, and, as a result of that, two types of new energy market actors, REC (Renewable Energy Communities) and CEC (Citizens Energy Communities) can be created since the end of July 2021, when the corresponding national legislation (EAG and EIWOG) entered into force. In some countries, like Portugal, the transposition was only partial.

In Finland, France and Italy, the Directive **transposition** was carried out **into specific legislation** guiding REC implementation. In France, for instance, the general definition through the framing law is completed by a specific application decree. In Slovakia, although the Directive transposition has been included in the revision of electricity market system, it also led to specific legislation about REC.

Spain has not transposed the Renewable Energy Directive 2018/2001 into specific legislation on REC, either as standalone legislation or integrated into the revision of the electricity market system. The transposition was done differently: The definition of Renewable Energy Community is included within the sectoral legislation, regarded as a subject to develop activities for electricity supply, in article 6.1. of Law 24/2013, on the Electricity Sector (modified by article 4 of Royal Decree Law 23/2020, of 23 of June).

But comparing the 2 countries with a partial transposition of the Directive 2018/2011, whereas Spain has reached a definition of Renewable Energy Community, foreseeing the possibility of its implementation, but lacks specific regulation, Portugal has published detailed legislation concerning implementation.

In Greece, the Renewable Energy Directive 2018/2001 was not fully transposed into national law. A partial transposition was done and it is expected that full transposition will take place in September 2022. In spite of this, Greece has specific legislation (Law L4513/2028) oriented to the concept of 'Energy Community' which interprets all provisions of Article 22 of RED. Since 2018 there have been some small changes or legal improvements, as well as related Ministerial Decrees implementing incentives.

Also Finland, in its legislation, refers to 'energy communities' providing both renewable and non-renewable energy. Therefore, REC are included in this concept.

Sweden and Bulgaria have not yet transposed the Directive and have no specific regulatory framework for REC. The same applies to the United Kingdom and Netherlands: no specific legislation about REC as of yet. Regarding the Netherlands, energy communities are not specifically mentioned in current legislation (from 2001) and a new energy law is in preparation and will be published soon (announcing possibilities for consumers and companies to participate in the energy market by providing energy services).

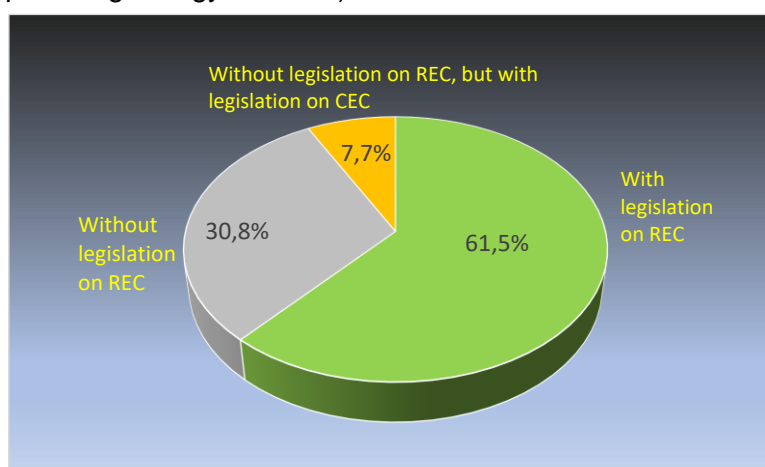


Figure 2 – Status of countries with specific legislation on REC (REC – Renewable Energy Communities; CEC – Citizen Energy Communities)

The publishing of legislation about REC is very recent in all countries that already have it, ranging from 2019 to 2022, including revisions. Current legislation revisions have been approved as recently as 2021 (in 4 countries). The legislation of Greece, not specific for REC, is from 2018.

Bulgaria does not yet have legislation regarding REC in place (and therefore no REC initiatives in the country). For this reason, Bulgaria is not referenced regarding specific details of legislation or implementation status.

3.2. Definition of Renewable Energy Community (REC)

For the countries that already approved legislation on REC, the definition of “Renewable Energy Community” adopted is only slightly different (full information in different countries’ definitions in **Annex 1 - Table A1-1**, in **Section 10.2**). Those nuances mainly concern services that may be offered by the REC, aside from the generation of energy from renewable energy sources and the consumption, storing, sharing and selling of this energy. For example, not all countries include the provision of energy services in the definition, including electric mobility/EV charging. Another set of differences concerns operational details, such as distance between energy generation and consumption sites, location, connection to Distribution System Operator (DSO)’s distribution network (as is the case in Portugal, Luxembourg or Finland, with different conditions). Also in Luxembourg, changes operated by DSO in its distribution system may imply changes in the composition of a certain renewable energy community, and this peculiar aspect was not reported by any other country.

An important difference should be noted in Slovakia, as the REC concept is used not only for the supply or sharing of electricity generated from renewable energy sources or biomethane, but also for the supply of gas, and the members of the REC are authorized to carry out inspections in the community producing energy, if they have permanent residence or headquarters in the territory in which the equipment for production of electricity or biomethane owned by the community is located.

A differentiating aspect between country definitions concerns the ability to produce, consume, store and sell energy and if this is done only between the members of the REC or if it may involve third parties. There are countries like Portugal in which it is clear that both ways are possible (only REC members or third parties), but in others, through the information collected in the questionnaire, it is not possible to conclude that the involvement of third parties is not allowed.

In the remaining aspects, the definition of REC is quite similar in all countries, i.e. in what concerns:

- the legal status for creation;

- the type of members allowed: natural persons, local authorities (including municipalities), SME and other legal persons (public and private);
- the type of participation: open and voluntary;
- the purposes or primary objectives of the REC: not founded on the basis of pursuing financial benefits, but instead providing environmental, economic and social benefits;
- the type of control by shareholders;
- the access to energy markets: directly or by aggregation in a non-discriminatory manner.

Countries with no specific legislation on REC obviously do not foresee this type of entity in their legislative frameworks. United Kingdom, for instance, does not have this type of definition (or has preferred not to adopt this descriptor), and instead preferred to develop other definitions for specific pieces of legislation, such as the Feed-in Tariff. In any case, there is not an agreed universal definition laid out in law. The United Kingdom has traditionally focused on small to medium scale solar PV and onshore wind projects, and there are a few third sector organizations focused on collecting information of potential ‘community energy groups’ in their jurisdictions, namely in Scotland and Wales.

In the Netherlands, REC are not defined in the national law. However, this type of community is possible (and Netherlands has already some case studies). Currently, REC are organized as cooperatives, and the REC definition will be included in the revision of the energy law.

Greece, as already mentioned, only partially transposed the RED, and therefore does not yet have a REC definition, but in the current main piece of legislation of that country (Law L4513/2018), a specific legal type called ‘Energy Community’ is defined, which includes the REC concept. But comparing the definition adopted for Energy Communities with the common aspects for REC definition followed in almost all countries, we detect some differences, like the legal status (it must be a cooperative), the Locality Criterion and the type or purpose of the Energy Community, which may accept an exception to the ‘non-profit driven’ norm, as well as a cap on the maximum cooperative shares per member allowed in the Energy Community governance.

3.3. Membership and management options

As already mentioned, the types of actors that can participate as **members** in a Renewable Energy Community are practically the same in all countries, as shown in Table 2. These possible participants are natural persons, local authorities (that may include municipalities and even regions in certain countries, like Slovakia or Greece) as well as enterprises (micro, small and medium sized) for all countries. There are also a few exceptions in countries like Austria and France, which permit the participation of other organizations governed by public law, and also Italy, which foresees other

possibilities like research and training institutions, third party sector and environmental protection bodies.

As relevant differences/exclusions, in Austria large companies of different sectors, as well as electricity and natural gas companies are not allowed to be members of a REC. In Greece, for Energy Communities, private companies of any size are permitted.

Table 2 includes information from some countries without specific legislation on REC, since this is no obstacle to implementation.

Table 2 – Possible members in a REC per country

Participant	AT	ES	FI	FR	GR ¹	IT	LU	NL	PT	SE ³	SK	UK ²
Natural persons	X	X	X	X	X	X	X	X	X	X	X	X
Local authorities	X	X	X	X	X	X	X	X	X	X	X	X
Micro-sized enterprises	X	X	X	X	X	X	X	X	X	X	X	X
Small-sized enterprises	X	X	X	X	X	X	X	X	X	X	X	X
Medium-sized enterprises	X	X	X	X	X	X	X	X	X	X	X	X
Other	X ⁴			X ⁵	X	X						

NOTES:

1. Greece does not yet have legislation on REC. The above indicated possible members are for “Energy Communities”. In ‘Other’, Greece includes legal entities governed by public law and any legal entities under private law (enterprises of any size).
2. In the United Kingdom there is not an agreed legislative basis for what constitutes a REC. The above indicated possible members are based on the real examples of projects which describe themselves as ‘community energy’ projects.
3. In Sweden, as REC are not specifically implemented in the legislation, ordinary regulations for economic associations apply. Thus, more or less anyone may be “member” in an economic association for energy sharing (and storage) purposes.
4. For Austria, the participation of other legal persons governed by public law is allowed. However, large companies and, in general, electricity and natural gas companies, as well as large commercial and industrial companies are excluded from participating in a REC.
5. France also foresees the participation of ‘Other public local companies’, even though not considered as SME according to the EU definition.

Regarding the **possible management options of the REC**, 3 different options were identified, as shown in the following Table:

Table 3 – Management options for REC

Management Option	AT	ES	FI	FR	GR	IT	LU	NL	PT	SK	UK
Mandatory to be done internally by REC members		X			X						
Done internally within the members of the REC or by third parties as a service			X	X		X	X	X	X		X
Operative tasks can be done by third parties. Legislative tasks have to be done by the legal entity of the REC.	X										
Not specified in the legislation										X	

The preferred management option, representing 70% of the alternatives indicated and followed by Finland, France, Italy, Luxembourg, Netherlands, Portugal and United Kingdom, is that management may be done internally to the REC, but can also be outsourced to third parties. In France this is possible as long as the local shareholders keep the voting rights and effective control over the REC.

In Austria it is not possible to have an integral separation between “internal tasks” and “external or third-party tasks”. Third parties can only carry out operational tasks, related with the operation of the energy generation units. The legal entity of the REC (and therefore its members) may not be excluded of taking part of the management process.

In Spain and Greece, it is mandatory that its management is exclusively done internally by the members of the community.

3.4. Services provided

Almost all countries allow REC to provide a wide range of services: energy generation, energy supply, energy consumption and sharing, energy distribution, energy services and other activities (which, in 4 countries, include electric mobility).

A few exceptions were found, with some of these services not indicated for some countries, like energy distribution (not foreseen in Austria, Finland, France, Italy, Luxembourg and Netherlands), or energy services (for Luxembourg). In the Netherlands (that does not have specific legislation on REC), energy distribution is not possible, unless it is a private network, e.g., district heating or a local micro grid.

United Kingdom and Italy also do not indicate ‘energy supply’ as a service that can be provided, although in the United Kingdom this might be related to the absence of a legal definition for REC. In United Kingdom the community energy sector is very diverse and various groups which self-

identify as community energy groups perform a range of functions, but in general small scale energy generators are not able to supply local households or businesses directly.

Sweden, with no legislation on REC, pointed other type of legal status (economic associations) that may be created with similar purposes to a REC, but with limitations on the services which may be offered.

Table 4 summarizes the possible services provided by REC in each country.

Table 4 – Services provided by REC

Type of Service	AT	ES	FI	FR	GR ^b	IT	LU	NL	PT	SE ^a	SK	UK ^b
Energy production	X		X	X	X	X	X	X	X		X	X
Energy supply	X		X	X	X		X	X	X		X	
Energy consumption and sharing	X		X	X	X	X	X	X	X		X	X
Energy Distribution (local electricity grids, small scale heating, biogas networks, etc.)					X				X		X	X
Energy Services (energy audits & other technical assessments, energy efficiency measures application, buildings renovations, energy storage, smart grid integration, etc.)	X		X	X	X	X		X	X		X	X
Other Activities (consultation for new initiatives, awareness campaigns, energy poverty measures, etc.)	X			X ^c	X ^c	X		X ^c		X	X ^c	X
Not yet defined		X										

NOTES:

- Sweden has no specific regulatory frameworks for REC, but that doesn't prevent the creation of economic associations with similar purposes to REC. The services selected refer to this type of legal status.
- In the United Kingdom and Greece there is no specific legislation concerning REC. Services mentioned refer to the ones provided by the more general 'energy communities'.
- In France, Greece, the Netherlands and Slovakia 'Other Activities' include electric mobility.

Regarding energy services and other activities that may be provided by REC, the existing legislation in Austria is quite broad, mentioning that "REC may also act as an aggregator or provide other energy services, and in doing so, it must comply with the rules and regulations applicable for each type of activity".

On the contrary, for Italy, these services are very well defined. The legislation foresees that REC can provide the installation of PV plants and heat pumps, perform energy audits in buildings and district heating services, help members to monitor their energy consumptions through smart meters,

support the creation of EV-charging stations and can also be involved in supporting awareness programs with the aim of producing information for citizens and other stakeholders about the significance of their projects, promoting energy efficiency and supporting strategies to tackle energy poverty.

In France, although no REC have been formally created in this country so far, a REC can provide all types of energy services, including electric mobility, energy efficiency, etc. The expected complementary legislation will bring more precise details. Also in Spain, the services that a REC can provide are not yet defined.

In general, for the majority of countries that have already defined these services, the mandatory or interdependent nature that these services may assume is not established. For example, energy generation may be mandatory for the definition as a REC (such as the case of Austria, Luxembourg, Portugal or Slovakia) but it may also only manage supply, consumption, sharing or other services without energy generation. Full information is presented in Annex 1.

3.5. Licensing and operation procedures

The licensing process for REC may be very different from country to country, from a simple notification to the DSO and no licensing or permit required (Finland and Luxembourg), to a quite complex and bureaucratic process, or still not clear for some countries. The full comparison of countries regarding the type of licensing can be found in section 10.2 (**Annex 1 - Table A1-2**). Countries which do not have legislation for REC, such as Sweden or the United Kingdom, are not referred, since there are no specific authorities mandated to handle licensing or permits for REC. Also Spain is not included, in spite of having legislation on REC, because the licensing process is not yet defined in the existing legislative framework. The Netherlands, in spite of not having specific legislation on REC, allows the implementation of communities through cooperatives, with a registration procedure (detailed in Annex 1).

3.6. Other important aspects

Besides the licensing process, other aspects of the creation of REC considered relevant in the existing legislation are discussed in this section, such as the distance between energy production and energy consumption, energy sharing coefficients, equipment restrictions, monitoring/inspections, mandatory insurances, etc.

3.6.1 Maximum distance allowed between energy generation unit(s) and energy users' installations

Some countries, like Portugal, Finland or Greece, have a clear definition for this aspect (albeit different among them), but others are still defining or deciding it in new legislation or through the

licensing authorities), as is the case for France and Slovakia. However, for other countries there isn't any type of restriction, as in Austria, Italy and Luxembourg, although other conditions may apply.

Existing limitations in Portugal concern either a very short maximum distance (2 km) or common transformer substation, for low level voltage; or a common substation connection which, depending on the type of grid (medium, high or very high voltage), may allow distinct distances (4km, 10km or 20km, respectively) between generation and consumption. In Finland, generation-consumption distances are currently still limited to the same real estate development (supplied by the same electric connection). Finland expects to enable some cooperation between neighboring real estate developments in the upcoming revision of the Electricity Market Law. The final criteria set established can be found in Greece, which has defined that REC can be created within the same NUTS II level location.

The full description of conditions applied can be found in Annex 1, Table A1-2.1.

3.6.2 Energy sharing with members of the REC

Energy sharing among REC members may involve fixed or dynamic coefficients, as is the case of Portugal and Austria (depending on the decision of the REC members), dynamic sharing coefficients like in Finland and Italy, strictly fixed ones as in Greece (but that may be changed periodically), or a mix with different levels, as in Luxembourg. As was the case for maximum generation-consumption distance, France and Slovakia have not yet fully defined this issue.

The full description of conditions applied can be found in Annex 1, Table A1-2.2.

3.6.3 Other relevant aspects like equipment restrictions, monitoring/inspections and mandatory insurances

Further aspects regarding equipment restrictions, monitoring and insurances vary greatly from country to country. Table 5 below summarizes relevant specificities. A full description can be found in Annex 1, Table A1-2.3.

Table 5 – Situation per country for other relevant aspects of REC implementation

Equipment restrictions	
Type of restriction	Countries where is applicable
Allowed maximum capacity of equipment	Finland
Metering device only provided by the grid operator	Austria
Certified equipment as a requisite for REC operation approval / Equipment connection according to technical codes	Portugal, Netherlands
Not defined or no restrictions in the current legislation	France, Greece, Italy, Luxembourg, Slovakia, Spain, UK
Monitoring / Inspections of REC installations	
Type of monitoring / inspection	Countries where is applicable
General monitoring through smart meters Inspections of generation plants depending on technologies / Periodic workplace (electrical system + equipment) inspections – each 5 years (with a few exceptions from 0,5 to 10 years)	Austria
Mandatory smart meter (for the interconnection point between the IU (energy user installation for self-consumption) and the internal grid or the public grid, with the purpose of measuring the IU consumption and the exceeding energy injected in the grid) and totalizer bi-directional meter (for the measurement of energy produced by the generation unit (UPAC), if installed power of UPAC > 4 kW and the IU associated to UPAC is connected to the public grid). Inspections of REC installations every 8 years	Portugal
Monitoring by GSE of the evolution of energy subject to payment of general system charges and other tariffs, complemented by other monitoring by RSE on technical and economic effects of used REC configurations and their impact in the electrical system. All this is reported to the Ministry of Ecological Transition, to ARERA and also to the correspondent Region and Municipality.	Italy
Not applicable / Recommendations only for safe usage	Finland
Not defined (or no relevant) or no need in the current legislation	France, Greece, Luxembourg, Slovakia, Spain, UK
Insurance	
Type	Countries where is applicable
Mandatory	Portugal and Netherlands
Not mandatory or not defined in the current legislation	Austria, Finland, France, Greece, Italy, Luxembourg, Slovakia, Spain, UK

3.7. Involvement of EⁿR Agencies in policy and implementation

Regarding the **role of EⁿR Energy Agencies in the licensing processes of REC, with direct or indirect participation on these processes, or carrying out activities related with the promotion of these energy communities**, only 6/13 Agencies report that they develop activities of this type:

- **ADENE**, in Portugal, is responsible for the promotion (fostering/incentivizing) of REC and a biannual progress report, in close collaboration with DGEG (Directorate-General for Energy and Geology), which is the licensing authority in Portugal, and with the national government. ADENE is tasked, under the Electricity Market legislation, with promoting self-consumption, providing information and support on REC creation, and it also supports the Environmental Fund, in the preparation of calls promoted for co-financing REC projects. Within the activities of promoting REC, ADENE provides clarifications to potential promoters and is currently developing a support manual for the REC implementation in Portugal, including information on legislation and technologies, but also templates for internal regulations and specifications to assist the different sectors of activity, public administration, citizens, industry and services, in the creation of a REC.
- **ENEA**, in Italy, **promotes renewable energy communities, awareness campaigns and co-design of solutions.**
- **RVO**, in Netherlands, **contributes with education and acceleration of roll-out and information dissemination.**
- **Klima Agence**, of Luxembourg and **CRES** from Greece, **develop some activities of dissemination of information related to REC**, but that seem to be integrated in the normal activities of an energy agency and not specifically mandated by existing legislation. **Klima-Agence** is about to prepare **templates for internal regulation of REC** in order to facilitate potential REC to start the implementation process, while **CRES**, within its role as a promoter of Energy Communities, has **produced a step-by-step guide for the establishment of an Energy Community**, which, albeit not exclusively renewable and not deriving from the transposition of the Renewable Energy Directive, are the legal entity that Greece has in place and is considered as interpreting all provisions of Article 22 of RED, that foresees the REC creation. CRES also facilitates **information, knowledge and best practices' exchange, and it has proposed new financial supporting measures.**
- Spain's **IDAE** has **produced a guide for REC promotion and is involved in the management of a financial support program for REC promotion.**

As mentioned, **IDAE** has **produced in 2019 a Guide for the Development of Instruments for the Promotion of Local Energy Communities.** Other Spanish entities have also produced similar

documents, like the Provincial Councils of Barcelona and Valencia, the Regional Government of Navarra and the Council of the Region of Osona (in Catalonia).

The remaining EⁿR Agencies have stated that they are not involved in the licensing process. However, from an analysis of the responses, several other agencies seem to provide a range of services that contribute to REC promotion and dissemination.

In the **United Kingdom**, although the **Energy Saving Trust (EST)** has not stated any particular role in REC implementation, it appears evident from the case studies presented, that this EⁿR Agency **provides an important contribution** to this goal, by managing the ‘Let’s Do Net Zero Community Builds Fund’ and forming part of the Scottish Government’s Community Renewable Energy Scheme (CARES), which is also managed by this Agency on behalf of the Scottish Government, and is intended as a relevant support for new Energy Performance Certificates. The EST is also taking over the management of the Energy Efficiency Support Service, now called Business Energy Scotland. **With these instruments, EST provides free impartial support and access to funding to projects of this type in Scotland. It also has a similar role in Wales, delivering the Welsh Government Energy Service**, in which it provides technical support (scheme design, planning and grid connections) and support with development finance via a preparatory grant fund and an application for capital funding to the Local Energy Loan Fund, administered by the Development Bank of Wales.

In Austria, although it does not involve the **Austrian Energy Agency (AEA)**, there is a federal one-stop-shop acting as a facilitator of the creation of REC (Austrian coordination office for energy communities).

3.8. Synthesis of the most relevant aspects

Taking into account the information of the previous chapters, we conclude that the main relevant aspects of the current status of REC implementation, regarding existing legislation and main market actors involved, are the following:

- The Renewable Energy Directive 2018/2001 was transposed into national law only in 8 countries of the analysed sample (13) – Austria, Finland, France, Italy, Luxembourg, Portugal, Slovakia and Spain.
- Only 8 countries (the same that have transposed the RED into national law) have specific legislation on REC; 4 other countries (Bulgaria, Netherlands, Sweden and United Kingdom) have no specific regulatory framework for Renewable Energy Communities, and, Greece has specific legislation guiding to the concept of ‘Energy Community’ (EC), which also includes renewable energy sources.

- The definition of ‘Renewable Energy Community’ is almost the same for all countries that have specific legislation on REC, with slight differences regarding generation-to-consumption distance, the connection points to the DSO grids, etc. In general, **a REC is a legal entity, constituted by open and voluntary adhesion of its members, controlled by them, that must have as main objectives to provide environmental, economic and social benefits to the members or the location where the community operates, rather than financial profits.** The REC may have the ability to produce energy from renewable energy sources (through generation units owned by it), store, consume/share the produced energy within the energy community and sell the excess of the energy produced, and, in this way to access all energy markets, directly or through aggregation.
- The possible members in a REC are almost the same for all countries, including natural persons, local authorities, micro-, small- and medium-sized enterprises. Four countries (Austria, France, Greece and Italy) also allow the participation of other legal entities governed by public or private law (of any size, in some of them), but one of these countries (Austria) explicitly does not permit the participation of electricity and natural gas companies and large commercial and industrial companies.
- The preferred management option for REC (70% of the answers) is that management may be done either internally to the REC or by third parties. However, there are exceptions: in Austria, third parties can only carry out operational tasks related to the energy generation units, and in Greece and Spain management is mandatorily done internally by REC members.
- In almost all countries the services that may be provided by the Renewable Energy Communities are the same – energy generation, energy supply/distribution, energy consumption/sharing, energy services and other activities. A few exceptions were found with some of these services, mainly energy distribution and energy services or other activities (like electric mobility, consultancy, awareness campaigns, etc.), not specifically included in some countries (e.g. Italy, Luxembourg, Netherlands, Portugal, etc.).
- The licensing process for REC exhibits significant differences between countries. It may be not clear yet or enclose a few uncertainties (e.g. in France), and it may vary in complexity. It may be a simplified process, with no licensing and simple notification to the DSO, like in Finland and Luxembourg, there may be a registration with additional permits in the case of some energy services, as is the case of the Netherlands), or it may be a complex/bureaucratic process in most countries (Austria, Greece, Italy, Portugal and Slovakia), not only due to the procedures, but also because of the high number of licensing authorities involved, and other existing constraints (grid connection barriers, response time of licensing authorities, etc.).

- Apart the mentioned uncertainties, lengthy processes in general associated to the licensing processes of REC and respective administrative time-consuming tasks required, there are also specificities in the REC legislation of some countries that still impose additional restrictions (and in some cases significant barriers) to REC implementation. Aspects like the maximum distance allowed between energy generation units and energy users' installations and grid connection conditions, seem to be significant obstacles that hinder a wider expansion of REC development in some countries.
- It is also implicit from the collected information, that in some countries the difference between collective self-consumption projects and Renewable Energy Communities is not yet very clear, which also may contribute for some indecision in getting started.
- Certification of REC equipment, smart meters, allowed maximum capacity, monitoring procedures, mandatory inspections or insurances are some of the other aspects that present difficulties/restrictions imposed by the legislative frameworks, although this is very different from country to country.
- Only 6/13 EⁿR Energy Agencies expressed having a role in the policy and implementation of REC – ADENE (PT), ENEA (IT), RVO (NL), CRES (GR), Klima-Agence (LU) and IDAE (ES). But, from the analysis of the responses, the Energy Saving Trust (EST, UK) also has an important role in the development of energy communities, namely in Scotland and Wales.

4. Facilitating instruments (taxes, tariffs, subsidies, tools, guidelines, etc.) for REC implementation

Existing instruments

In the present report, we have identified a few instruments that can assist REC implementation, but in general the scenario is not yet satisfactory, mainly because the existing REC legislation is recent and there are still a lot of uncertainties. Existing instruments are not included in concerted policy actions but appear usually as single measures, without focusing on the causes of the main barriers that hinder the expansion of the development of Renewable Energy Communities and, therefore, with very limited results.

The identified facilitating instruments, variable from country to country, are the following:

Economic Type (applicable to 10 countries, only BG, SL and SE without instruments of this type)

- Reductions or exemptions of taxes and tariffs applicable to REC operation;
- Reduction/Exemption of administrative or licensing costs;
- Special conditions for grid access and simplification of the offer of certain services;
- Special conditions for selling surplus electricity generated by REC in the market;
- Tax benefits associated to REC projects;
- Subsidies, grants and loans for REC investments, including those not specific for REC but applicable to RES projects (on a national or regional basis);
- Variable market premiums for electricity production by REC.

Technical Support Type (applicable only to 7 countries - AT, GR, IT, LU, NL, PT and ES)

- Creation of “one-stop shops” to facilitate the uptake of REC;
- Freely available cost-benefit tools for calculation of the financial benefits for REC members;
- Production of guides and manuals for the promotion/establishment of REC, that may also include simple guides to interpret existing legislation;
- Helpline dedicated to stakeholders, with possible connection to licensing authorities and financial support schemes;
- Information exchange / Transfer of experience and best practices;
- Consultancy services;
- Production of contracts between the ‘energy communities’ and the grid operators;
- Production of templates for REC statutes and internal regulations.

In **Annex 1, item 11.2, Table A1-3** shows the details of these instruments in each country.

5. Barriers to REC implementation identified by EⁿR Agencies

5.1. Main barriers per country

Luxembourg, Finland and Austria point out that their legislative frameworks and licensing processes, related to REC implementation, are clear and that responsibilities are well defined. Also, Greece, did not identify problems with existing legislation and licensing procedures regarding energy communities.

However, there are countries in which legislation and licensing seem not to be entirely transparent, in spite of some improvements. This creates doubts regarding certain steps for REC implementation. This is the case of Portugal, Italy, Slovakia and Spain and, also for countries without specific regulatory frameworks for REC like the Netherlands and the United Kingdom. In France, it is not clear whether there will be a “licensing” process, but REC already need to fulfill the same licensing processes relevant for the different activities (RES generation, sharing, selling, etc.), regardless of the type of entity.

Nevertheless, in almost all countries, with or without legislation on REC, EⁿR Agencies identify several barriers to REC implementation, as detailed in **Annex 1, section 10.2, Table A1-4**.

We can summarize the 23 identified barriers into 4 main categories of obstacles - Legislative, Behavioural / Organisational, Economic and Technological Barriers, as follows.

Main barriers to REC implementation:

Legislative Barriers (7 occurrences)

1. Several aspects of legislation still not clear (5 countries)
2. Bureaucratic and time-consuming licensing process (1 country)
3. Grid connection barrier – Type of services offered by a REC (1 country)

Behavioural / Organisational Barriers (16 occurrences)

4. Complexity and understanding of REC concept – How to start? (4 countries)
5. Finding the adequate energy community (1 country)
6. Information on network area of REC location (1 country)
7. Inexistence of a one-stop-shop approach for administrative tasks (1 country)
8. Lack of templates for statutes or typical articles of association in a REC creation (1 country)
9. Lack of awareness and capacity building / Information dissemination (2 countries)
10. Grid connection barrier – Lengthy processes (5 countries)

11. Grid connection barrier – REC not possible in all distribution grids due to a necessary (but not mandatory) DSO intervention (1 country)

Economic Barriers (10 occurrences)

12. Lack of competitive and transparent energy tariffs (2 countries)
13. High cost of storage (1 country)
14. Poor knowledge of financial benefits associated to REC (1 country)
15. Penalisation on market premium (subsidy) to electricity generated by a REC and fed to the grid (1 country)
16. Grid connection barrier – Access costs / Lack of transparency (2 countries)
17. Financing barriers when self-consumption schemes/REC are implemented (2 countries)
18. Grid connection barrier – DSO investments not aligned to REC implementation investments (1 country).

Technological Barriers (9 occurrences)

19. Market difficulties – equipment supply and installers availability (1 country)
20. Market difficulties – communication material availability (1 country)
21. Need of adaptation of IT processes on the DSO side (1 country)
22. Smart metering – installed and operating smart meters required (1 country)
23. Grid connection barrier – Low capacity / Congestion of grids (5 countries).

The following Figure shows the relative weight of each of these categories of barriers in the total number of barriers reported by all countries.

Share of each obstacles category

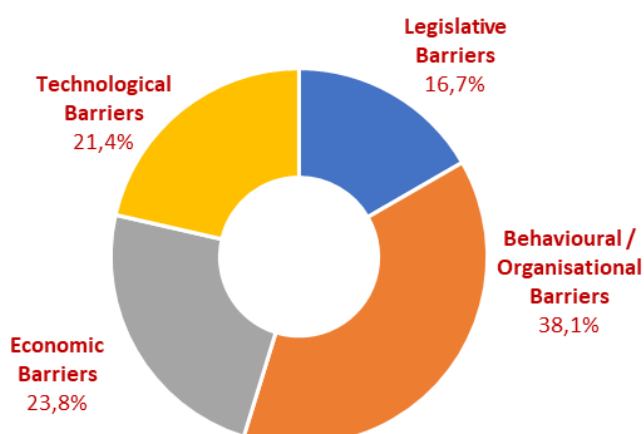


Figure 3 – Percentage breakdown of barriers categories in the total occurrences reported

We conclude that the “Behavioural / Organisational Barriers” are the most important, representing approximately 38% of the total reported occurrences (or identified barriers, covering all countries). The other categories of barriers – “Economic Barriers”, “Technological Barriers” and “Legislative Barriers” represent, respectively, 23,8%, 21,4% and 16,7%.

In Figure 4 the relevance of each identified barrier is emphasized (12/13 EⁿR Agencies responded). The most relevant barriers pointed out by EⁿR Agencies were some grid connection barriers - “Lengthy processes” and “Low capacity / Congestion of grids”, and the barrier of unclear legislation “Still not clear several aspects of REC legislation”. The number of EⁿR Agencies that pointed out these barriers represent 42% of the total sample of countries which have identified barriers (12/13).

The following barriers by order of relevance were:

- “Complexity and understanding of REC concept – How to start?”, with a share of 4 out of 12 of the responding EⁿR Agencies;
- Four other barriers - “Grid connection – Access costs / Lack of transparency”, “Financing obstacles for REC implementation”, “Lack of competitive and transparent energy tariffs” and “Lack of awareness and capacity building / Information dissemination”, each of them pointed out by 2 out of the 12 responding EⁿR Agencies;
- All the remaining barriers, each pointed out by 1 of the responding EⁿR Agencies.

A relevant conclusion is that the several types of grid connection barriers (of various categories) are the most relevant barrier reported by 10 out of 12 of the EⁿR agencies which responded, which is an opportunity to recommend regulatory improvements.

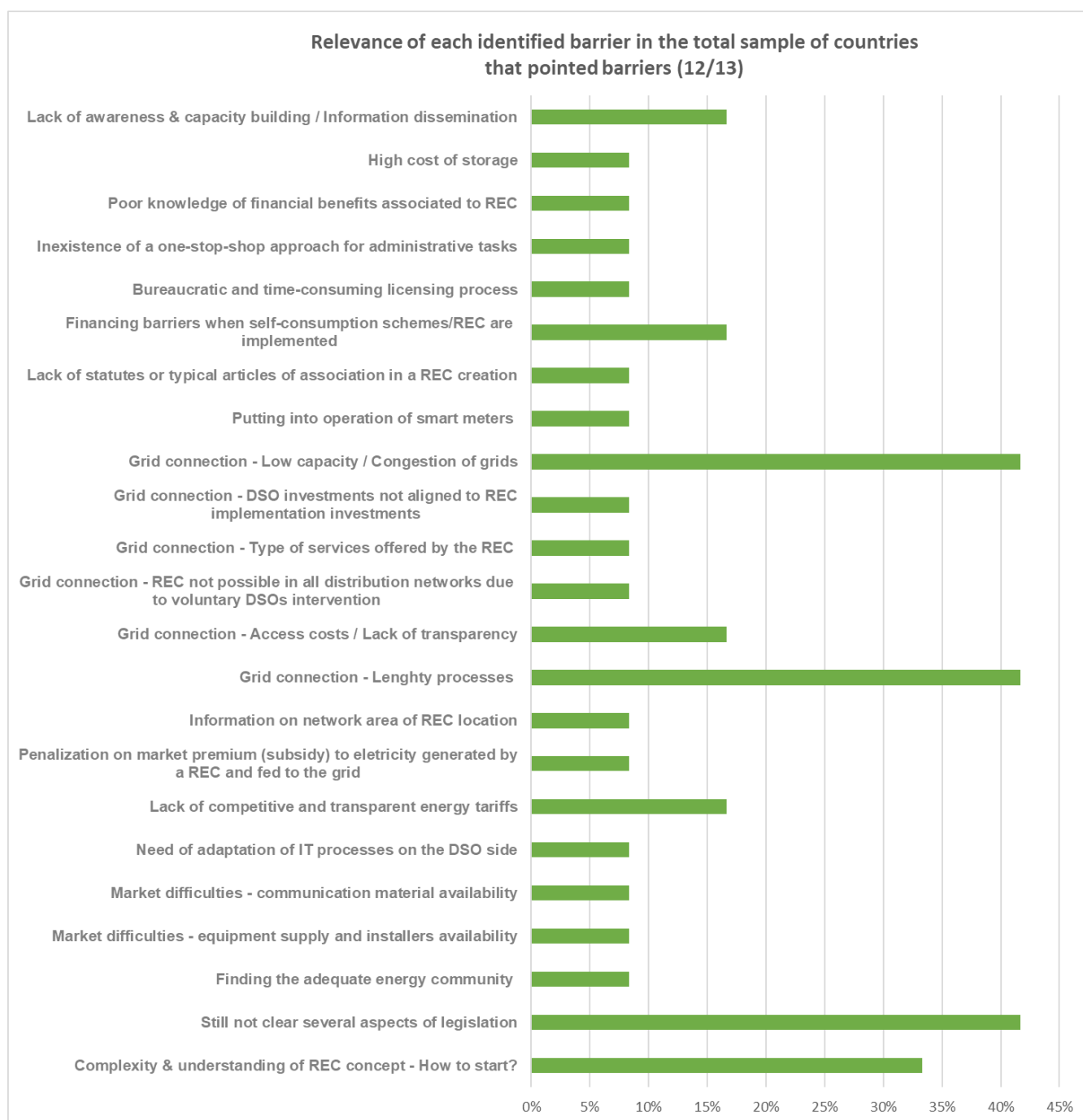


Figure 4 – Impacting barriers to REC implementation

5.2. Aspects not controlled by the REC (grid connectivity, smart meters, etc.)

There are some aspects that may be seen as technical requirements that are not controlled by the REC promoters, which contribute for a few of the identified barriers to REC implementation. These were pointed out by several EⁿR Agencies, namely:

- Grid connection barriers in general
- The need of smart meters for all energy consumers of a REC and that may only be installed by the DSO.
- Some peculiarities in one country (Austria), regarding smart meter installation and the connection between REC members in terms of operability: the local grid operator (DSO) is required to provide end consumers with a smart meter upon request in connection with the establishment of an energy community, within two months; but the DSO is only required to install the smart meter but not put it into operation, resulting in delays the establishment or participation in an energy community.
- Austria only allows the establishment of a REC in terms of voltage level operation through a local or regional connection between all members (mixed forms are not possible, as detailed explained in Table 6), and all (generation & consumption) installations must be within the concession area of the same DSO, presenting restrictions to implementation.
- Software for the REC management must be compatible and connected to the DSO software.
- Other technical requirements as the end user feedback, the automated decentralised control of distributed generation and demand response, the control for grid stability and islanding operation, and the access and connection agreements lead to some obstacles (lack of capacity and/or long periods to get them granted).
- The high number of DSO in some countries, which may be an additional interference in the REC implementation process (implicit from some answers).

5.3. Proposed solutions by EⁿR Agencies to overcome barriers

EⁿR Agencies that participated in the questionnaire, presented suggestions to remove or alleviate the barriers identified in section 5.1. The full set of suggestions, presented by country, are included in **Annex 1 – Table A1-5**, in **section 10.2**.

A total of 43 solutions were proposed to tackle some of the barriers previously identified. Those solutions, divided by category of barriers, may be grouped as follows:

Solutions proposed by category of barriers:

For Legislative Barriers

1. Legislation clarification about procedures for REC implementation, including details from DSOs and regulatory entities (e.g. provisions of local grid connection capacity to REC projects). As much as possible, definition of overall regulatory frameworks at national level, that could break down regional differences.

For Behavioural / Organisational Barriers

2. Public awareness campaigns and information actions, for a better knowledge on REC principles, cost-effectiveness and benefits of balancing mechanisms for potential REC operators.
3. Development of specific communication strategies.
4. Assessment of existing barriers and potential of REC development, particularly for countries which don't have specific legislation yet (important to properly design frameworks to facilitate the development of REC, learning from experience of countries that have already overcome initial barriers).
5. Production of templates for statutes and internal regulations for REC.
6. Well established national action plans, concerning REC implementation, with clear indications of adequate/possible locations and available technical support.
7. Development of online tools to answer to the question “How to start a REC implementation?” and to help identify the optimal REC type and collective actions, to provide relevant information about potential and existing energy communities per location, potential members, local grid conditions and relevant contacts (DSO, licensing authorities, technical support, etc), and specific information on distribution network area.
8. To give more autonomy to Public Administration for REC implementation.
9. Reduction of the response time for issuance of REC licenses and administrative tasks in general, mainly related to the several DSO.
10. Grid congestion – shorten planning processes and provide geographical information system and data.
11. Creation of supporting structures for establishment of REC at national and regional/local levels (on technical and operational issues, including networks, associations and one-stop shops).
12. Creation of a centralized/dedicated registry for REC, to monitor project implementation and their impacts (environmental, economic and social benefits at local level).

For Economic Barriers

13. Specific and attractive financial support schemes for REC implementation, such as exemptions of national tendering schemes, additional subsidies for legal and technical studies, financing

facilities, non-discriminatory market premium or subsidies for electricity generated by REC and fed to the grid, reduction or exemption of other taxes (e.g. exclusion of grid access tariff during a certain period), etc.

14. Development of a tariff calculator to compare costs.
15. Reduction of taxes and increase of the percentage of flexible tariffs.
16. Reduction of the cost of storage.
17. To privilege business models for REC with different types of stakeholders, namely including vulnerable and energy poor citizens as participants of REC, a fair division of responsibilities and benefits between all members and respect for the RED II governance requirements.

For Technological Barriers

18. Adaptation of legislation, concerning smart meter operation.
19. Information campaign on data transmission to increase acceptance.
20. IT solutions' implementation process closely monitored by political decision-makers, with the recommended adoption of a unified data communication standard and a solid IT architecture.
21. Counteracting the shortage of skilled workers with specific training programs.
22. Increase of grid capacity.
23. To encourage complementarity amongst renewable energy sources.

Some of these solutions are very specific of some countries, but the majority seem to be of wide or general application (like solutions 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 17, 22 and 23).

6. Case study analysis

6.1. Case study sample

- **Bulgaria** – No case studies presented, as it still lacks legislation about REC.
- **Luxembourg** - As the regulatory framework for REC is just about to be put in place, there are currently no examples that could be documented.
- **Finland** – To the best of Motiva’s knowledge, no practical applications as of yet.
- **Slovakia** – With a legislation on REC needing clarification of several aspects, this country does not yet have any projects implemented.
- **France** – As mentioned in section 3, France is still awaiting the approval of legislation that is blocked. However, as much as we know there are a few examples of REC case studies in France, like:
 - Enercoop (founded in 2005 and with 70,000 members)
 - Mobicoop (founded in 2011 and with 20,000 members)
 - SAS Ségala Agriculture et Energie Solaire (founded in 2008 and with 180 members)
 (according to a recent JRC report by Caramizaru and Uihlein, 2020), or
 - Énergies Citoyennes en Pays de Vilaine (EPV) (1st Energy Community based on wind turbines in France - planned in 2003, only started its operation in 2014; with over 2,000 members)
 (according to Bonifazi, 2022).

Therefore, **only 8 countries** (from the sample of 13 involved in the study) **presented case studies of REC**, that are detailed in Annex 2 of this Report. These countries and the number of case studies presented by each one, were as follows:

- **Sweden**, with 9 case studies;
- **United Kingdom**, with 4 case studies;
- **Greece**, with 2 case studies;
- **Austria**, with 1 case study;
- **Netherlands**, with 3 case studies;
- **Spain**, with 14 case studies;
- **Italy**, with 1 case study; and,
- **Portugal**, with 2 case studies.

Some of these countries are well known in Europe as having a high number of energy community initiatives, as are the cases of the Netherlands, United Kingdom and Sweden. Curiously, these correspond to countries without specific legislation on REC (Sweden, United Kingdom, Greece and Netherlands).

From this sample of 36 case studies, about 53% (19) concern REC projects that are not yet implemented, i.e. are still in a preparation stage, but will be implemented by 2023 (14 in Spain and 1 in Italy) or soon (date to be defined, as is the case for 3 from Sweden and 1 from United Kingdom).

It should be noted that regarding Portugal, in spite of the 2 case studies presented, these REC have not yet had their licensing processes completed. The first one is waiting for a decision from the DSO and the second still needs the approval by the licensing authority. General overview and main characteristics of the presented REC examples.

The information received from the 36 above-mentioned case studies lacks details in several cases, which might reflect difficulties in obtaining such information by the EⁿR Energy Agencies that presented these examples.

With the information presented, the main characteristics of these 36 case studies are summarized in the following paragraphs. In this analysis no distinction will be made between REC already implemented or under development (i.e. in preparation, but with an expected implementation soon).

6.2. Legal structures of REC and number of members

Several governance models that enable individual citizens and certain entities as participants in a REC exist. Depending on the legal form chosen, these projects can differ in terms of governance structure, decision-making and liabilities, as it is shown in Table 6. The prevailing legal structures may differ from country to country.

Table 6 – Possible legal structures for REC

Legal structure	Main characteristics
Energy cooperatives	This type of ownership, that primarily benefits its members, is the most common form and with the fastest growing for REC. It is popular in countries where renewable energy sources and REC implementation are relatively advanced.
Non-profit housing associations	These associations can offer benefits to tenants in social housing, although they may not be directly involved in decision making. It is an ideal form for addressing energy poverty.
Community trusts and foundations	This form aims 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 don't have the means to invest in these projects.
Limited partnerships	A partnership may allow individuals to distribute responsibilities and generate profits by participating in the REC. Governance is usually based on the value of each partner's share, meaning they do not always provide for a one member – one vote.
Non-profit customer-owned enterprises	This legal structure may be used by communities that deal with the management of independent grid networks. It is adequate for community district heating networks in certain countries.
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. This form is less common, but it is particularly suited for rural or isolated areas.

Source: Caramizaru and Uihlein, 2020.

Out of the 36 case studies, we have access to the information of the **type of organization or legal structure of the REC** for 26 of them. The remaining 10 are unknown or not defined properly. Out of the presented case studies the prevailing legal structure for the REC are the **cooperatives**, representing 50% of this sample. This type of organization is found in countries like Austria, Greece, Netherlands and Spain.

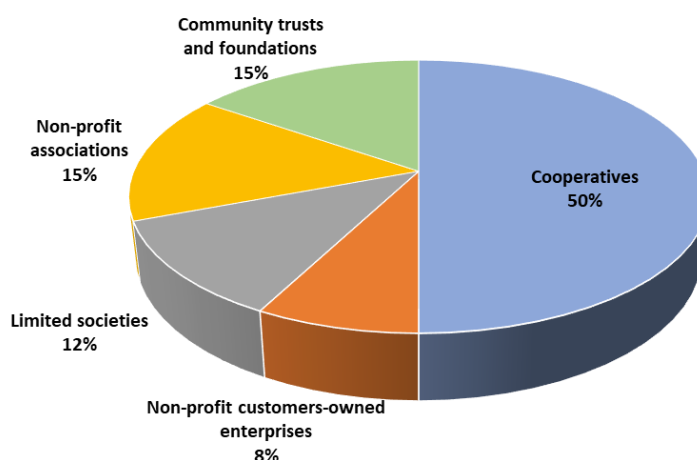


Figure 5 – Legal structures of REC of 26 case studies presented

Following cooperatives, the legal structures by order of relevance are community trusts/foundations (very common in the United Kingdom, but also found in Sweden) and the non-profit associations (present in Spain), and the limited societies (from Spain, Sweden and United Kingdom). Other possible structure is the non-profit customers-owned enterprises (in Netherlands and Sweden).

Regarding the **number of members** that participate in the REC included in the case studies presented, they range from just a few participants (less than 10, with 2 as the minimum example) to a maximum of 600. Nevertheless, there are known examples of REC in several European countries that include thousands of members, as it is the case of the examples mentioned for France in section 6.1 of this report.

Figure 6 presents the distribution per number of members of this report's case studies' sample, where this information was available (28/36).

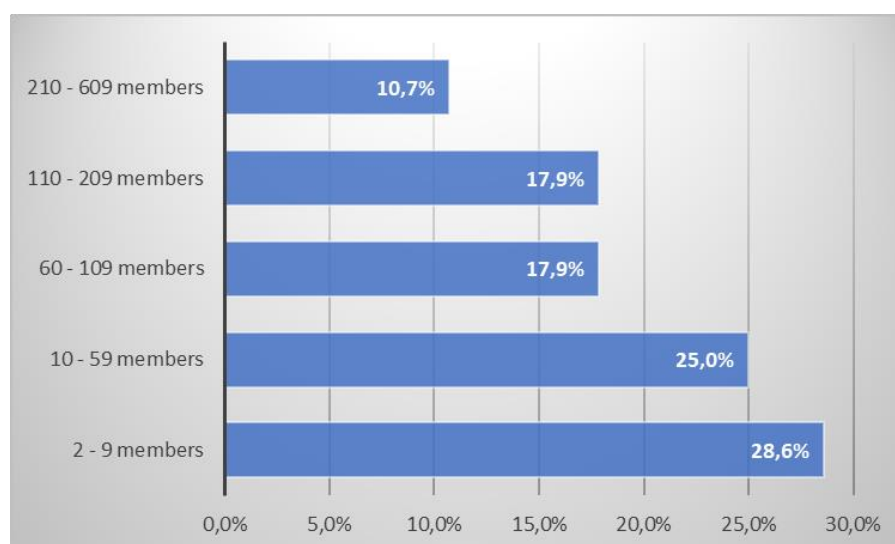


Figure 6 – Number of REC members of 28 case studies presented

Most case studies analysed had 2-9 members, but the total number of case studies with over 60 members represents almost half of the sample. Larger REC with 600 and 400 members, in this particular group of case studies, are located in Austria and Greece. The selected 2 cases from Greece could be characterized as very good examples considering that:

- The members represent all types of stakeholders: households, SMEs, local and regional authorities.
- Their projects are already in operation phase.
- The number of members is significantly higher than the minimum number needed to establish an energy community in Greece according to the Greek Law (5-15 members).

- They are very active in pursuing their goals (i.e. organize awareness raising events, participating in EU funded projects, using the know-how of their expert members).

The presented case studies confirm the information from the characterization of the existing legislation (Section 3 of this report): the most common participants as members of a REC are natural persons (as property owners), local authorities/municipalities (as is the case of case study no. 10 from Spain and in the above-mentioned Greek case studies) and SMEs of various sectors/activities.

6.3. Implementation stage of the presented REC and objectives

As already mentioned, 19/36 case studies are REC which have yet to be fully implemented (14 in Spain foreseen for 2023, 3 in Sweden, 1 in Italy and 1 in United Kingdom).

Regarding the other 17/36 case studies, the ones already implemented, the majority are very recent, resulting from the last developments of legislation in the various countries (mainly in the last 3-4 years).

With only 1 exception (and 3 unknown cases), 13 of these REC have only **5 or less years of existence**, as shown in Table 7.

Table 7 – Registered implementation of REC

Country	Year of REC implementation
AUSTRIA	1 REC in 2018
GREECE	1 REC in 2017 1 REC in 2022
NETHERLANDS	2 REC in 2017 1 REC in date unknown
PORTUGAL	1 REC in 2018 1 REC in 2021
SWEDEN	1 REC in 2010 1 REC in 2017 2 REC in 2019 2 REC in dates unknown
UNITED KINGDOM	1 REC in 2018 1 REC in 2020 1 REC in 2022

The oldest REC included in this list, which is a case study of Sweden from 2010, has 12 years of existence.

Regarding the motivations for the creation of these REC, we confirm the conclusions obtained in other studies, i.e. that they are of different types, as it is shown by the objectives pointed for each REC of the 36 case studies presented, that are summarized in **Annex 2, section 11.2, Table A2-1**.

In general, the drivers that shape the emergence and success of REC include socio-economic factors, energy policy orientations, particular project related factors and actors' characteristics. Also the heterogeneity of participants in these REC and their individual motivations and level of engagement, their geographical location and the interdependency of economic benefits, social goals and environmental concerns seem to be important drivers.

Figure 7 summarizes the objectives of the REC case studies presented by EⁿR Agencies (full information on Annex 1, Table A2-1), presented by specific drivers of interests and motivations to engage in REC, which are implicitly or explicitly referred in the objectives.

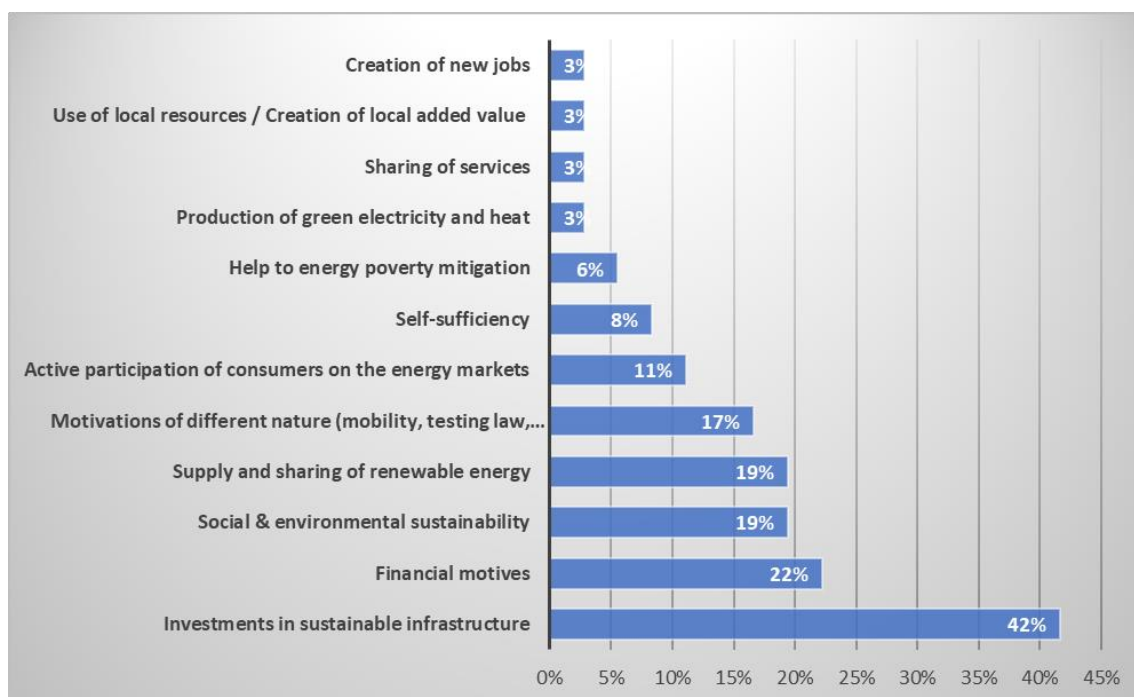
The drivers range from the wish to invest in sustainable infrastructures to other motivations, like financial reasons, social and environmental concerns, desire to produce green electricity or heat, to get citizens to actively participate in the energy market, and others. The shown percentages reflect the weight of each of these drivers in the total of 36 case studies analysed in these particular sample and are therefore not necessarily reflective of national or European trends, but are definitely an indication to further look into this topic, as it can help develop the campaigns and tools to increase adoption of REC.

In this sample, the most common driver is the motivation to invest in sustainable energy infrastructures, which 42% of all case studies mention as a major driver.

The second most relevant reasons appear to be financial motives and benefits (resulting from energy costs reduction from participating in REC, but also other economic advantages which may be connected, like an added value associated to the property or using the savings obtained for other purposes). Together, these factors are present in 22% of the total case studies. This information was gathered in May-September 2022 and REC tend to take a long time to be planned and established, the motivations related with financial and economic benefits may not yet reflect the current energy crisis due to the war in Ukraine and the trend of increasing energy costs over the last few months.

In our opinion, taking into account this reality, it should be expected that this driver assumes a higher importance in the near future. However, as we can see in **Annex 2, section 11.2, Table A2-1**, analysing the details of the case studies, the concern to reduce costs is present in most projects, although it was not expressed explicitly in the objectives.

Figure 7 – Drivers of motivations for REC implementation in the 34 case studies



Following sustainable investments and financial reasons, the strongest drivers are social and environmental motivations and the supply and sharing of renewable energy, which are present in 19% of all case studies. Also, the willingness to actively participate in the energy markets or being self-sufficient in terms of energy needs are relevant drivers (11% and 8% of the case studies refer to these, respectively).

Other motivations are stated for 17% of the case studies, but individually, each of the “other” stated is negligible and none stood out as major motivations. These may include issues of mobility and other motivations (Full answers available in **Annex 2, section 11.2, Table A2-2**).

In the analysed sample of projects, the connection of REC with mitigation of energy poverty seems is still not fully realized, and this driver is only referred by 6% of the case studies, in spite of the general recognition that this connection is fundamental in scientific publications, statements from potential stakeholders or political decision makers. In fact, existing legislation already considers that REC are an excellent opportunity for the participation of vulnerable and energy poor citizens.

6.4. Types of REC projects and services offered

The 36 case studies of REC that were analysed show that there may be significant differences in the type and complexity of projects that are implemented, from the services offered, the collective benefits to the local community (connected to the already analysed motivations), to the priorities defined by the stakeholders.

In **Annex 2, section 11.2, Table A2-2** the full information regarding the 36 REC case studies is presented (main characteristics, services provided, sectors, perceived socio-economic benefits). The benefits derived from a REC may be of different nature, from community engagement through participation/ownership, local value, lifestyle/wish to become more independent from fossil fuels, social cohesion, low-cost energy bills, tackling energy poverty, acceptance and awareness (mainly related with environmental issues), etc.

At a glance, several case studies presented are probably not REC, taking into account the definition of REC according to the recent developments in legislation, but rather are probably RES projects with more than one participant or simple collective self-consumption cases. This might occur since an important part of case studies presented are from countries that still do not have specific legislation on REC. which explains some singularities and discrepancies from the generally accepted definition, such as some energy communities almost dedicated exclusively to selling energy produced outside the community or for purposes of financial gains, on top of the those that are exclusively created for the reduction of energy costs for the REC members, providing no other services.

Nevertheless, the presented project examples show that solar PV is the most common used technology for electricity generation, representing 75% of all energy sources/technologies involved in these REC, as illustrated in Figure 8. Following solar PV, the most prevalent energy sources, albeit much less relevant, are biomass and wind, with shares of 7% and 5%, respectively. The production of heat is only reported in 12% of the total sample.

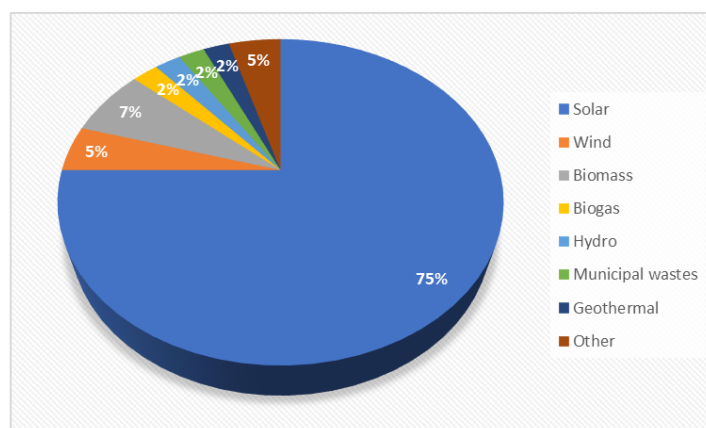


Figure 8 – Types of renewable energy / technology involved in the case studies

Regarding the sector, 76% of these case studies are residential. But it is relevant that almost 80% of the total sample of projects, also involves local and regional authorities/municipalities, which are therefore very relevant actors promoting REC creation.

It is clear that municipalities have an important role in REC development, but private initiative will play a significant role in this process. Most likely, a successful deployment of REC in order to increase adoption towards impactful global results, will depend on cooperation between public and private players.

The tertiary sector (mainly services) and industry are also included in the case studies (24% and 9% of the projects include these sectors, respectively). From the analysis of the information from all the case studies, we infer that almost 60% of this sample may involve other sectors not explicitly mentioned like trade and services.

Also the rural communities may represent an important opportunity for REC implementation. In the case studies analysed in this report, 6% include rural communities.

Renewable Energy Communities have a **wide application, covering practically all sectors of activity**, and this is clear from the case studies analysed, which shows that there are ample replication opportunities.

Regarding the services that REC may provide, synthesized in Figure 9, a very wide range is possible and many are already implemented, putting in practice almost all that are foreseen in the existing legislation. All case studies report several concomitant services provided by REC projects. The most important are, unsurprisingly, energy generation and supply, as well as energy sharing and self-consumption, which are present in 100% and 97% in the case studies analysed.

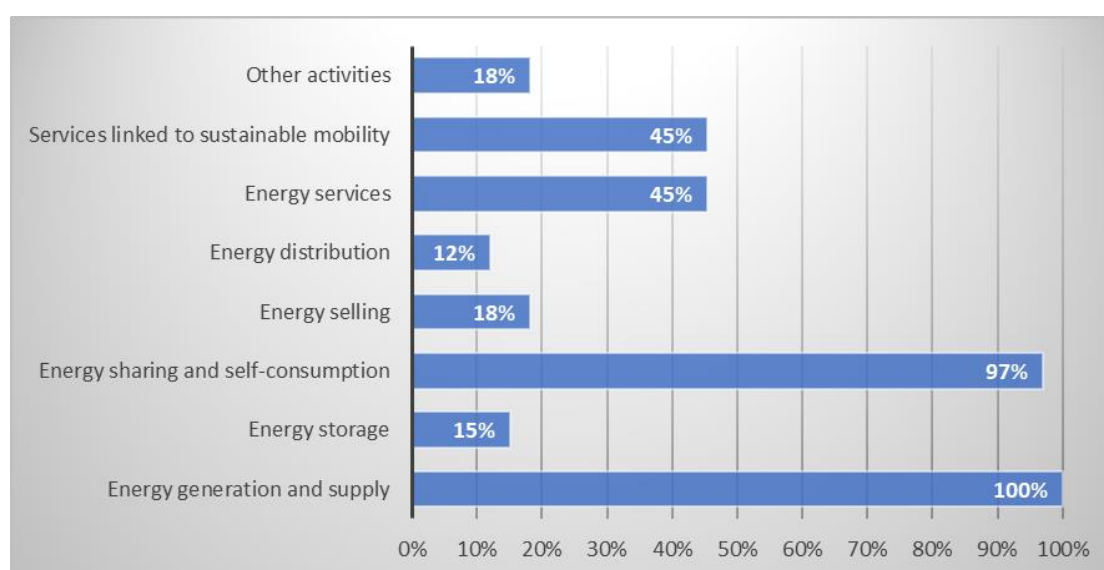


Figure 9 – Types of services provided by REC of the case studies

Following these most widespread services, the most prevalent examples are energy services and services linked to sustainable mobility, each one present in 45% in the case studies analysed. Other services like energy selling, storage or distribution are reported in 18%, 15% and 12% of the case studies in this sample, respectively. Other activities (found in 18% of the analysed projects) not related to energy services or electric mobility may be indirect consequences of the main services provided and savings obtained (Case studies no. 2, 3, 30, 31, 32, and 33).

6.5. Benefits from REC implementation

Regarding the perceived socio-economic benefits from these examples of REC, the analysis shows 4 dominant aspects. As shown in Figure 10, the 4 main aspects of these benefits, that are referred in 70% to 88% of the case studies, are: the “participation/ownership”, the “acceptance of changes and awareness”, the “associated low-cost energy bills” and the “local value brought to the communities”. Other benefits like “social cohesion”, “generation of other financial returns for the community”, “lifestyle” and “education”, are also quite prevalent, with 39% to 21% of case studies characterized as providing them as benefits.

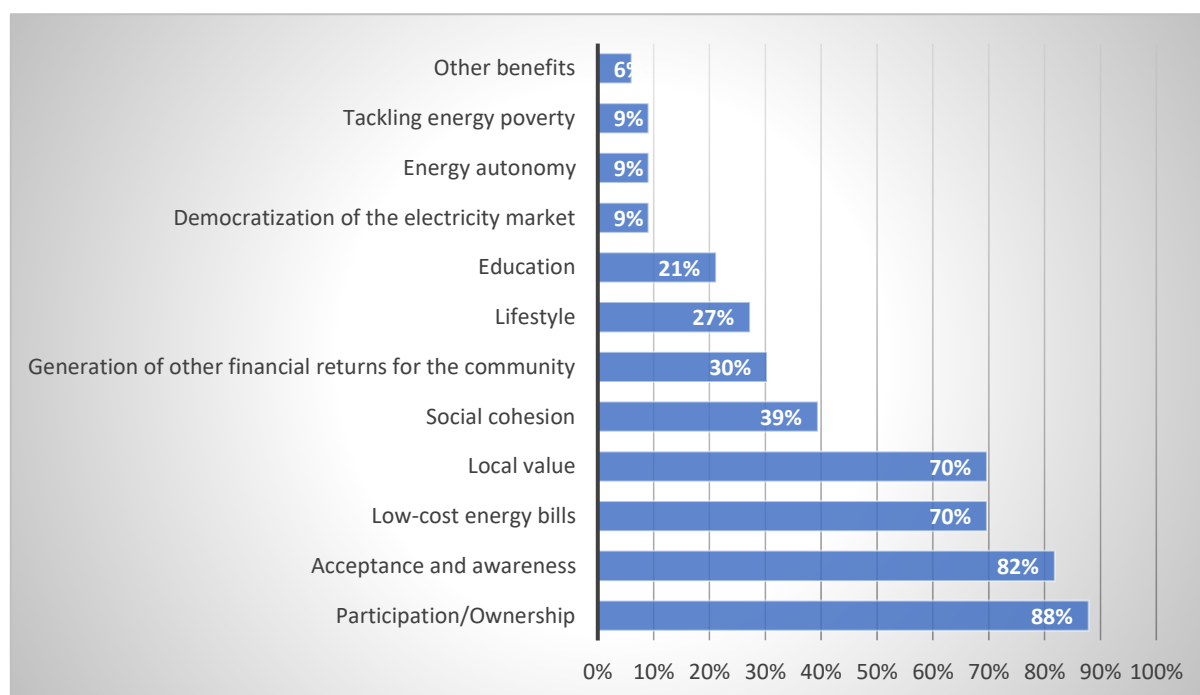


Figure 10 – Perceived socio-economic benefits from the case studies analysed

Regarding the potential benefit of “using these energy communities to tackle energy poverty problems”, it was only referred in 3 case studies from Spain. This may reflect that despite REC being recognized as a high potential tool for this objective, there are still not many projects designed to provide this as a direct, immediate benefit, which leaves room for improvement.

This is also a conclusion of a parallel study conducted by EnR in 2022 on the connection between REC and energy poverty mitigation. Therefore, this seems to be an issue that must be put on the political agenda, in the legislative frameworks. Specifically, it would be important that some stakeholders, particularly Local Public Administration / Municipalities that are driving projects to directly participate in REC, and are also uniquely positioned to identify and engage with energy-poor households, start addressing this connection in a more systematic way. Participation of EnR Energy Agencies in the presented case studies

6.6. Role of EnR Agencies in case study implementation

The information gathered about the role that the EⁿR Agencies in the implementation of these REC and the added value transferred to the projects by their participation is in line with how these Agencies contribute to the promotion of the development of REC in their countries. According to what is presented in these 36 case studies, EⁿR Energy Agencies may have varying levels of intervention from no direct actions (CRES, ADENE, although promotion and implementation of REC are in the scope of their missions), to participation through partnerships under H2020 projects (like SHAREs for AEA and LIGHTNESS for ENEA), to technical/procedural roles (RVO with a role on the licensing process for a private grid), funding and financing (SEA, IDAE, EST), and technical and administrative support (IDAE, EST).

The case studies illustrate, to different levels, examples that are within the roles and missions of EⁿR Energy Agencies and which can help disseminate tools to increase adoption of this mechanism. In the next section, we will discuss potential actionable recommendations for individual energy agencies, for EⁿR as a network and for national and European policy makers.

7. The role of EⁿR Agencies in the implementation of REC and the European policy context

On sections 3.7 and 6.6 of this report we have seen that the role of EⁿR Agencies in the implementation of REC until now is limited and varied, from a more general communication and dissemination role, to participation through European projects, licensing roles, funding and financing, and/or technical and administrative support.

In Portugal, **ADENE** has intervened, under its assigned missions by the Secretary of State for Energy and Environment, in different capacities: in a direct cooperation with the licensing authority for REC projects; directly approaching potential REC promoters for clarification about how to start a REC; drafting documents and creating tools for a better understanding of the existing legislation and available technologies or for assessment of the viability of REC project, which help start/operate and manage a REC (like information about legal ways to constitute a REC and templates of statutes and internal regulation); collaborating on proposals for financial support to REC projects.

In Greece, the role of **CRES** is similar in several aspects – in terms of tackling the lack of awareness and capacity building on the REC topic, by producing information and a guide for the establishment of an energy community, facilitating the exchange of this information and transfer of experiences and best practices to the interested stakeholders and also working on proposals for financial supporting schemes, but all of this apparently integrated in the mission of the Energy Agency and not linked to any specific legislation.

Also in Italy, the role of **ENEA** has common aspects to ADENE (PT) and CRES (GR), with activities of REC promotion, awareness campaigns and design of solutions for REC implementation. And the same happens in Netherlands, where **RVO** has a relevant role in the education and acceleration of the REC roll-out and information dissemination about these energy communities.

In Spain, **IDAE** contributes for REC promotion with the production of a Guide and the management of the “CE Implementa” Program for REC pilot projects.

In Luxembourg the role **Klima Agence** seems to be restricted to the production of templates for internal regulations for REC.

In United Kingdom, the **Energy Saving Trust** has an important role in the implementation of energy communities in Scotland and Wales, providing technical support and access to funding, which is also the case of the **Swedish Energy Agency**, which participates in the financing of some REC projects or facilitates the access to funding for these projects.

It is important to mention the **Austrian Energy Agency** by its role as Coordinator in the Horizon 2020 project SHAREs, that aimed to support the establishment or expansion of energy communities by the creation of specific platforms and a great diversity of collective actions, contributing to increased energy efficiency and optimised energy management as well as a higher share of renewables. The term energy communities in SHAREs refers to all forms of collective actions by and for consumers such as cooperatives, collective purchase groups or other consumer-driven collective actions. In countries that have already implemented European law regarding energy communities, the focus lied on Renewable Energy Communities (REC) and Citizen Energy Communities (CEC). This project also supported a few emerging energy communities (pilots) in the six participating countries in setting up their energy community or collective action.

The actors involved in the energy policies associated to the REC area, and their tasks are seem similar in a significant number of countries and can be summarized as:

- The Government, defining and superintending all policy aspects;
- The Regulator of Energy Services / Electricity and Gas Market Systems, independent from Government, with very specific and non-transferable tasks concerning supervision, operation and management of the electricity and (natural & LPG) gas market systems, definition of the applicable regulations (grids operation, access to grids and interconnections, service quality, commercial relationships, energy tariffs, smart grid services, etc.), specifications of instruments for monitoring (e.g. smart meters) and IT communication ways. For the operation of REC in particular, they define the energy sharing types that are possible (fixed, dynamic or a mixture of both types) and technical details/specification for dynamic systems, etc.;
- The DSO (Distribution System Operators), responsible for the operation and management of the electricity distribution grids (at distinct voltage levels), as most of the REC will be interconnected to these grids;
- The entity responsible for the licensing process of REC, usually a Governmental authority. There are countries in which no licensing for REC is required. In these cases, like Luxembourg, Finland and Austria, there is of course no licensing authority for REC and only an interaction with the grid operator, that may include only a notification/registration or the establishment of a grid access contract is needed. This licensing exemption only applies to REC, since, in Austria the plant licensing is a separate matter and is independent of REC legislation. In some countries this process may involve several entities, as is the case in Greece, where the licensing procedures for RES projects from Energy Communities is governed by the same entities regulating all RES market (Hellenic Regulatory Authority for Energy, grid operators and Regional Authorities);
- The electricity (and eventually also gas) consumers and potential members of a REC; and,

- The Energy Agencies, with several, distinct roles, but with a common task of tackling the lack of awareness about promotion of RES and REC as a potential tool for that, through dissemination of information, drafting templates and information documents, creating tools, and eventually helping in the design and roll-out of financial support schemes, etc.

Some of the roles of these actors are mutually exclusive and well delimited, like those ones of Government in drafting and approving legislation (although they may be assisted by Energy Agencies or others in the process), the Electricity Market System Regulator (considering that the majority of REC projects will produce electrical energy) and the DSOs, and, in part, the entity responsible for licensing (where applicable). Despite this narrow framework, EⁿR Energy Agencies can leverage their existing missions in order to further support the promotion of REC.

Under the current energy crisis in Europe as a result of the war in Ukraine and the need to strengthen security in energy supply and, in particular, to reduce European dependence on Russian fossil fuels (particularly on natural gas), the European Commission responded with the REPowerEU plan to implement measures to achieve energy independency and combat the rising energy prices in Europe. The plan aims to drastically accelerate the transition towards clean energy and REC can be an important contribution towards the goals of this plan, in delivering affordable zero carbon energy and with expected lower energy costs. EⁿR Energy Agencies could play here a decisive role in this process.

In the EU Solar Strategy and RES policy in general, self-consumption and REC are mentioned quite extensively as important tools to achieve the goals. Solar PV the most prevalent technology for REC. Therefore, promoting and pushing for an acceleration of REC deployment is an important contribution for the EU Solar Energy Strategy, as part of the REPowerEU plan. But, to promote quick and massive PV deployment, is is important to make licensing processes shorter and simpler, adapting of current legislation, if necessary. This may be critical to quickly achieve some of the objectives of this strategies, such as the increase of the 2030 target for renewables share to 45% and the ambition to set up at least one REC in every municipality with a population larger than 10,000 by 2025.

As stated in the Solar Strategy report, “Solar energy, combined with energy efficiency, protects European citizens from the volatility of fossil fuel prices. EU citizens appreciate this autonomy to produce their own energy, either individually or collectively”. Citizen involvement will certainly speed up REC implementation, but there is a need for assistance in the process and this is where the role of the EⁿR Energy Agencies may be pivotal. As also stated in the Solar Strategy report, this represents “a huge opportunity for whole cities and regions, especially those transitioning to a new energy and economic model” and therefore REC implementation must be facilitated, mainly through local authorities and SME. EⁿR Energy Agencies can support REC members directly, but also address local authorities and SME, widening their influence capacity. Additionally, the solar PV

deployment also creates jobs, new business models and start-ups, and a wider development of REC will be an important contribution for all these benefits.

Nevertheless, although solar energy is currently (and likely will continue) the focus for REC, wind and other technologies should be explored, and there are already interesting and valuable examples, for instance in UK.

Important European associations like Energy Cities and FEDARENE, the first one of local authorities and the second one as a network of regional and local organizations (including energy agencies), also recognize the REC as an excellent opportunity for regional and local authorities, together with the energy agencies, to play a prominent role in the European sustainable energy transition. But this role will depend on the capacity and political will of each country to set up enabling national frameworks that may provide capacity-building support to citizens that want to set up REC, as well as adequate financing and technical information support, and to ensure that vulnerable and energy poor citizens are able to participate in REC. Regulation also needs to ensure equal and proportionate treatment of REC, simplifying and streamlining procedures and requirements whenever possible.

8. Conclusions

The information gathered in the present study, based on 13 European countries (Austria, Bulgaria, Finland, France, Greece, Italy, Luxembourg, Portugal, Slovakia, Spain, Sweden and United Kingdom), permitted to have a picture about the current status of specific legislation on Renewable Energy Communities (REC) in these countries, for non-EU member states such as the UK and as a result of the transposition of the RES Directive into national legislation. It also allowed to identify the main actors involved in the policy implementation and how they currently collaborate.

One of the main objectives of the present study was to gather the energy agencies' perspective on the main obstacles or barriers that hinder the development of REC, as well as the solutions that were proposed by the EⁿR Energy Agencies. The barriers found (as well as solutions proposed) are generally not country specific and potentially replicable in other countries.. The role of EⁿR Agencies in REC policy and implementation was analysed and a discussion on proposals to increase its participation, with clear added value is presented.

Case study analysis clearly highlights that REC may have a wide application, in different scales, sectors and geographical scopes. Its potential is even greater considering current geopolitical circumstances. Decentralised energy production is a high priority in political agendas, to cope with the current energy crisis in Europe, as a result of the war in Ukraine and the increase of energy prices, which started before the war, but was aggravated by the conflict. Decentralised energy production is achieved by several different ways, but the creation of REC is becoming an increasingly important one, with several additional benefits, from community engagement to fighting social inequalities. . Renewable energy systems under new community ownership structures, instead of the traditional energy production systems, involving the imports of large quantities of oil and natural gas from a small number of suppliers, will change the future of the energy sector. There are already good examples pioneering the field all over the Europe, with the goal to develop cheap, clean and secure energy by bringing power generation closer to the people who need it. However, there are still significant barriers that hinder a greater development of REC, and so an effort must be done to remove these obstacles for a wider development of these systems, and studies like the present one may contribute for a higher visibility of these possible alternatives to traditional energy production, highlighting its merits and feasibility.

The new geopolitical and energy market realities require a drastic acceleration for a clean energy transition to increase Europe's energy independence from unreliable suppliers and volatile fossil fuels. REC are critical in the European strategy towards this end. The European Green Deal's set of proposals for the decarbonisation of energy production in the European Union has been strengthened by the REPowerEU Plan to reduce dependence on Russian fossil fuels. It is expected that this combination will accelerate the energy transition. In this context, the current energy crisis can be a catalyst for renewable energy transition. A response to the global energy challenge at

local and regional level through clean-energy communities is being developed, involving groups of people and/or entities that voluntarily pool their resources to produce, store or distribute energy together. These REC contribute to make citizens more aware of energy issues and, as long as they receive adequate support, can provide them with the tools and power to act and reap collective benefits. The awareness levels and cultural habits differ greatly between the various European countries, which presents challenges for the creation of support policies and laws in EU Member States.

But the immediate and future commitment that has to be made is clear - REC are important vehicles, not only to cope with current difficulties, but essentially to reduce greenhouse gas emissions in the long term as a major environmental impact, and to provide additional positive social and economic impacts, as well as fostering regional and rural development. The vision is the evolution from the current energy system, based on large centralised power plants, towards a citizen-led distributed energy production model based on renewable energy sources, which still represents a socio-political and regulatory challenge in most European countries.

The REC have a huge potential and their development will have a profound impact on the energy transition and daily life of European citizens. Although there are some weaknesses in the legislation on REC in several countries, along with other barriers that hinder its development, as we detail throughout this study, there are already good examples of REC in several countries, which can and should be inspiring for replication across Europe.

The main conclusions of the study are summarized in the following sections of this chapter of the report.

8.1.REC implementation status and main difficulties

The analysis of case studies of REC from several countries involved in the study demonstrates that REC are already a reality and should be a strong commitment in the future. The examples allow for the following main conclusions:

- Legislation is important but not impeditive: Several well established case studies can be found in countries that do not have specific legislation on REC. This may indicate that it is not imperative to create extremely elaborated legislative frameworks to start project implementation and that there is indeed a willingness of all stakeholders and policy makers to initiate individual and collective action and commitments, towards the necessary energy transition, with REC presenting themselves as a good opportunity for all.
- However, several EⁿR Agencies report that lack of legislation on REC, or the need for clarifications on existing legislation, is still preventing the deployment of REC projects.

- Regarding the **main characteristics** of the presented REC examples in the sample of this study, the findings were:
- The prevailing legal structure for REC are cooperatives, primarily benefitting its members.
 - Most REC comprise a significant number of members (more than 60), which is very a relevant information for policy making and strategy design.
 - The most common driver for REC creation is the motivation to invest in sustainable infrastructures, followed by financial reasons. Mitigation of energy poverty is not yet very relevant, in an apparent paradox with the generalized opinion that REC could be an excellent opportunity for the participation of vulnerable and energy poor citizens. This issue is worth exploring to adjust or design policies specifically targeting this goal.
 - Solar PV is the most commonly used technology for electricity generation, representing 75% of all energy sources/technologies involved in the REC analysed in this sample, distantly followed by biomass and wind and with no relevant other renewable energy sources presented.
 - Regarding services provided, energy generation and supply, as well as energy sharing and self-consumption are the most prevalent, present in virtually all case studies present. Energy services and sustainable mobility are also present in almost half of the case studies analysed (both in 45% of the case studies), followed by “energy selling” (18%), “energy storage” (15%) and “energy distribution” (12%). Other activities not related to energy services or electric mobility, with many of these being indirect consequences of the main services and savings obtained, may also have a relevant weight (18%).
 - The most dominant perceived socio-economic benefits, reported in 70% to 88% of the sample of case studies, are related to “participation/ownership”, the “acceptance of changes and awareness”, the “associated low-cost energy bills” and the “local value brought to the communities”. Other benefits like “social cohesion”, “generation of other financial returns for the community”, “lifestyle” and “education” seem also to be relevant. By opposition, the benefit of “using these energy communities to tackle energy poverty problems” seems not to be very relevant, only 3 case studies in Spain report this as a perceived benefit.
 - Tackling energy poverty through REC is an important area to develop, adapting legislative frameworks- and engaging the right stakeholders, particularly Local Public Administration / Municipalities. The lack of importance this aspect seems to have as a driver and perceived benefit of REC, may also reflect the relative significance given to

energy poverty in different countries, with an apparent higher priority in Southern European countries.

- Most presented case studies (76%) are in the Residential Sector, and 80% involve local and regional authorities/municipalities, which help promote REC. It is clear that municipalities have an important role in REC development, but private initiative will play a significant role in this process. Most likely, a successful deployment of REC in order to increase adoption towards impactful global results, will depend on cooperation between public and private players.
- **REC may have a wide application, covering practically all sectors of activity** (as all sectors were reported in case studies, urban/rural, residential/industry/services) and existing examples can be inspiring motivation for replication opportunities.

Despite the high potential that is recognized for REC, we have seen that there are still several obstacles preventing further development of REC, namely:

- **Lack of legislation on REC.** Although countries with no legislation also have well established REC examples, clear legislation is an important tool to promote their creation. The transposition of the Renewable Energy Directive 2018/2001 is an important step and lessons learnt from countries that have already transposed and revised legislation could prove useful for countries starting the process. The present study presents a detailed analysis of differences which can assist that.
- **Complex licensing process for REC** may present significant differences between countries and **may also be an obstacle** in some of them. A simplified process streamlines REC creation and therefore increases adoption, whereas lack of clarity, uncertainties or complex bureaucracy is time-consuming and creates a barriers. A high number of licensing authorities involved and other licensing related constraints, othergrid connection barriers, lengthy response time of licensing authorities, etc.
- **Additional restrictions** may create barriers for implementation. Not all countries impose such restrictions but this may be important to analyse for countries starting the process. This is the case of the limitations on maximum distance allowance between generation/consumption, maximum capacity allowed and also the requirement of metering device installation, certifications of REC equipment, or in terms of monitoring procedures, inspections and insurance.

It seems also that **in some countries is not clear the difference between collective self-consumption projects and renewable energy communities and what are the advantages and difficulties associated to each of these options** (e.g. Portugal, France, etc.), which may contribute for some indecisions in getting the first steps and how to start.

- **Unsatisfactory performance of facilitating instruments**, , mainly because existing REC legislation is recent, with a lot of uncertainties, and due to the lack of a concerted policy action, which hinders the ability to obtain more effective results.

From the analysis of the country status, EⁿR Agencies identify a set of **facilitating instruments**, that can foster the creation of REC, which were detailed in Section 4 of this report and which can be replicated by others. These instruments, either economic (taxes, tariffs, financing, market instruments) or technical (support, consultancy, templates), may be important to address the barriers that are already identified.

EⁿR Agencies also reported on the **several types of barriers to REC implementation**. In spite of having been reported by specific agencies, it is clear that most of them are common to several countries and not all related to the existing legislation. The summary analysis of barriers identified by EⁿR Agencies, is presented in Section 5 of the present report: Barriers can be categorized in 4 types, Legislative, Behavioural/Organisational, Economic and Technological., and relate to the current experience on the ground, which is affected by legislation and regulation in place (or lack thereof).

Behavioural/Organizational Barriers are the most important, representing approximately 38% of the total reported barriers and being present in all countries, but significant economic, technological and legislative barriers were also identified, which presents an opportunity for improvement and for EⁿR Agencies' to propose solutions, in accordance with the experience from other EⁿR members in their countries.

The most relevant **barriers can be addressed by EⁿR Agencies with concrete actions or proposals** as is detailed in Section 8.2 of this report.

REC implementation involves actors from national governments to the individual citizen, and including EⁿR Agencies, regional and local energy agencies, but also licensing authorities, DSO, municipalities, etc., as summarized in Section 7. The roles of these actors are well defined, but there is an opportunity for EⁿR Agencies to, within their missions, increase and improve the creation of REC, by acting in some of the barriers identified.

The **contribution of EⁿR Energy Agencies for REC policy and implementation is still limited**. But several agencies already play significant roles, from licensing, technical support, funding, etc.. These roles are detailed in Section 7.

8.2. Actionable recommendations to foster REC creation and prospective roles for energy agencies

The new geopolitical and energy market realities require a drastic acceleration towards clean energy and the EⁿR Energy Agencies could participate in this process with a more important role in the promotion/implementation of REC.

In order to foster REC creation, some barriers must be removed or minimized, and the EⁿR Energy Agencies could be proactive in this process. As seen in Section 7 of this report, their role is still limited, but taking into account the current energy crisis in Europe and the European policy response, REC can provide an important contribution. And, as is also clear from this report and the case studies presented, EⁿR Agencies can play here a decisive role, since they have a proven track record in the deployment of new solutions.

The EⁿR Agencies that participated in the study proposed a total of 43 solutions to tackle some of the barriers identified. Those solutions, which can be divided according to the category of barriers that they address (legislative, behavioural/organisational, economic and technological), are described in detail in Section 5.3.

Taking into account the existing legislation, facilitating instruments and their potential impacts, the identified barriers and solutions that EⁿR Agencies envision to tackle them, we proposed a set of actions that agencies could pursue in order to leverage their unique position to increase the adoption of REC as a tool to achieve environmental, social and economic targets of the historical moment we are witnessing.

The key role of EⁿR Agencies in this area can encompass:

- Mobilizing all interested stakeholders (including those currently not aware of the opportunities and can benefit from them) to implement REC projects, through **information dissemination and awareness-raising programmes**. These initiatives should aim to provide information adapted to each target group (types of REC members, e.g. public administration, central and local, residential sector, services sector, industry sector, etc.), as well as to emphasize the benefits and potential for each sector, in order to trigger investment decisions towards REC implementation. This information exchange can be based on EⁿR Energy Agencies, since they are uniquely positioned to draft guidelines and other basic documents or tools (like simple agreements, templates, etc.), with simple and clear information that can effectively drive a better understanding of the requirements for REC implementation and how to overcome the main difficulties associated.
- **Training and qualification of stakeholders' staff**, mainly targeted to the actors that may be drivers and have an important role in the boosting of REC implementation, like local municipalities. This should provide technical knowledge about the main aspects of the existing

legislation and the first steps on how to implement a REC. Recognizing the important driver that **municipalities** can be in the development of REC, another goal for the EⁿR Energy Agencies should be **strengthening special relations with these entities**, in order to help in the removal of some behavioural/organisational barriers and in the creation of favourable conditions (e.g. business models) for REC implementation.

- **Identifying good practices of REC projects among EⁿR Agencies** and dissemination of this information to all interested stakeholders.
- As a **challenge for EⁿR Agencies**, besides the usual information dissemination activities, there could be a varying degree of cooperation with other entities involved directly in the REC implementation process (like licensing authorities, DSOs, municipalities, potential energy consumers of the REC to be created or other), **depending on available resources, technical capacity and expertise**. This could be important to **streamline some procedures for REC implementation**, and EⁿR Agencies could be an asset in this value chain. As much as possible, EⁿR Agencies should **help in the removal of some barriers** that hinder the expansion of REC development and that are associated to the existing legislations, **alerting decision makers** to relevant obstacles **and influencing** Governments and legislative entities that can change/improve current regulation frameworks. This work with national, regional and local authorities is essential for the (re-)design of more effective energy policies, and is an added value for the relationship between EⁿR Agencies and municipalities.
- Providing (whenever possible) **technical assistance to stakeholders** in the design and implementation of REC projects (e.g. specifications' preparation, technical advice or specific consultancy for project improvement, preparation of REC internal regulation templates, definition of the type of services that the REC can offer, etc.). This support could also include economic issues, like suggestions for business models and/or advice for the best option in terms of power purchase agreements that could be beneficial (PPAs, which are long-term contracts established between the energy generator - the REC - and a power purchaser - e.g. a city - to buy electricity generated by the renewable energy installation). The possible actors in REC implementation (potential members) are not experienced in these matters and this support could prove critical to start and develop such a project. As with other complex subjects, leaving the initiative exclusively to individuals, which usually do not have the expertise and knowledge to do it, proves not only inefficient but can also cause frustration on engaged citizens that want to start a project. Adequate training is essential to overcome this barrier and EⁿR Agencies can play a role in this.
- Assisting in the **design of financial support schemes**, taking into account the identified barriers for REC development.
- **Fostering stakeholder networking between existing REC projects**, to promote sharing of knowledge, expertise and best practices, which can facilitate decisions for other potential

promoters. The creation of some small ecosystems of REC examples could function as a gateway to this networking assistance.

- Contributing for the **development of national strategies or programmes for REC implementation**, to drive the goal of “one REC per municipality”, working with regional and local Energy Agencies. Given the importance and need for this type of program across Europe, it would be recommended that this is the subject of specific support from the European Commission for EU member states.

The **EⁿR Network as a privileged channel for access to information and to influence transnational policies, to support implementation and provide advice** on REC, taking into account the field experience of its members. This could be leveraged by the **creation of an observatory for monitoring of the development of REC across Europe**, ideally with the support of the European Commission or by a more active engagement of EnR with the Energy Communities Repository and the Rural Energy Communities Advisory Hub.

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ANNEXES

Sections 10 and 11, containing the full versions of the answers to the questionnaires by EnR Agencies can be found at

<https://enr-network.org/publications/energy-agencies-and-renewable-energy-communities-a-new-path-for-energy-decentralisation/>