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Collective self-consumption and energy communities: Trends and challenges in the transposition of the EU framework

Working paper, December 2020

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Collective self-consumption and energy communities: Trends and challenges

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I SUMMARY

With the “Clean Energy for all Europeans” package (in the following “Clean Energy Package”), the European Union (EU) introduced new provisions on the energy market design and frameworks for new energy initiatives. Specifically, the recasts of the renewable energy directive (REDII) and the electricity market directive (EMD) provide basic definitions and requirements for the activities of individual and collective self-consumption (CSC) as well as for renewable energy communities (RECs) and citizen energy communities (CECs). These concepts allow citizens to collectively organise their participation in the energy system and open the way for new types of energy initiatives. Thereby, smaller actors shall be empowered to participate in the energy market, contributing to an increased decentral renewable energy production and consumption (prosumption). The mandatory transposition into national law provides significant room for nationally specific provisions. The EMD, including the provisions on citizen energy communities, has to be transposed into national law by the end of 2020. A framework for collective self-consumption and renewable energy communities (as part of the REDII transposition) has to be established by mid-2021.

For a few years already, the discussion and first implementation of collective self-consumption schemes is ongoing in some EU member states and Switzerland while the legislative processes on energy communities in the EU are less advanced. 2020 saw a major progress of EU member states in implementing the European framework. Overall, member states focused on developing approaches for collective self-consumption and renewable energy communities, while CECs are addressed to a much lower extent so far. Member states often build on existing approaches and organisational structures in defining RECs.

Major elements of the transposition process include technical aspects such as the spatial limitation of CSC and RECs, allowed generation capacities, local grid tariffs, or the options to use the public grid. Additional, governance-related, elements include the eligibility and localisation of members and shareholders and their decisive power (“effective control” and “autonomy”).

CSC is in most cases limited to a multi-tenant building. The physical limitation of RECs, in some cases refers to the typology of the electricity grid (e.g. Austria, Slovenia or Italy). Other countries rather focus on geographical or administrative boundaries, such as municipalities (e.g. Lithuania), considering actual settlement structures. Belgium combines different approaches. CECs are not per se limited in geographical or system-related scope.

Several EU member states consider local electricity grid tariffs for RECs motivated by the need to set cost reflective tariffs and to stimulate self-consumption and the deployment of energy communities. Local tariffs mostly consist of reduced grid tariffs applied to the electricity shared via the public grid in a local area. This is partly combined with a reduction of other surcharges such as for renewables support. Due to their local character, reduced grid tariffs mostly apply to RECs and partly to CSC schemes where these are allowed to use the public grid. Flanders, Estonia and Slovenia are notable exceptions in implementing a local flexibility market in parallel to implementing energy communities. Thereby, they acknowledge the important potential of energy communities to provide flexibilities, next to increasing local self-consumption.

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The REDII requires that RECs are “effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects”. While this governance-related proximity is already dealt with in several frameworks, other governance aspects equally determine the effective control by the members. This includes the membership eligibility of different types of actors which is generally prescribed in the EU framework. Some countries further specify membership and shareholder conditions. Greece, for instance, set minimum numbers of members and a maximum share in the community’s capital depending on the involved types of actors. In other cases, the governance framework is linked to existing organization structures such as consumption cooperatives in Spain, energy associations in Estonia, or economic associations in Sweden.

The transposition process of the Clean Energy Package into national law is far from finished. Even if deadlines for the transposition are met, full implementation may include a stepwise implementation, learning, and potential adaptation over a longer timeframe as is specifically foreseen in, e.g., Portugal and Austria. The process can be regarded as a gradient from the simple “copy and paste” inclusion of EU definitions in national legislation to a detailed transposition of major technical and governance-related elements (e.g. physical expansion, effective control, proximity, or grid tariffs), as well as the full integration with national frameworks and the energy market. Some countries developed approaches addressing major national issues such as energy poverty and energy independence of islands (Greece), or closely integrate energy communities in existing national structures (e.g. Ireland). However, so far, most countries do not fully embed energy communities in the overarching aims of the Clean Energy Package. These include broad consumer empowerment and the reduction of energy poverty. Addressing these targets to an important extent requires specific measures and support, for instance in order to facilitate the involvement of citizens that are not professionals in the energy market. Required support includes information, facilitation of processes (e.g. one-stop-shops), and guaranteeing open participation. These elements are equally highlighted by the EU framework and can be expected to be highly relevant for a broad rollout of local initiatives and citizen participation in the energy sectors.

2 INTRODUCTION

With the “Clean energy for all Europeans” package (in the following “Clean Energy Package”), the European Union (EU) introduced new provisions on the energy market design and frameworks for new energy initiatives. Specifically, the recasts of the renewable energy directive (REDII)¹ and the electricity market directive (EMD)² provide basic definitions and requirements for the activities of individual and collective self-consumption as well as for two types of energy communities. “Renewable energy communities” (defined in the REDII) and “citizen energy communities” (defined in the EMD), allow citizens to collectively organise their participation in the energy system. These new concepts open the way for new types of energy initiatives aiming at, in particular, the empowerment of smaller actors in the energy market as well as an increased decentral renewable energy production and consumption (prosumption). The mandatory transposition into national law provides significant room for nationally specific provisions. The EMD includes the provisions on citizen energy communities and has to be transposed into national law by the end of 2020. Frameworks on collective self-consumption and renewable energy communities have to be established by mid-2021 as part of the REDII transposition. For a few years already, the discussion and first implementation of collective self-consumption schemes is ongoing in some EU member states and Switzerland while the legislative processes on energy communities in the EU made a major progress in 2020. Many member states, as well as Switzerland, have introduced a regulatory framework allowing collective self-consumption in, e.g., multi-apartment buildings, an activity that is also promoted by the REDII.

The main aim of this paper is to understand, compare, and assess the emerging regulatory concepts in member states and provide an overview of issues arising during transposition. It discusses some major developments in the transposition process that can be observed. This includes in particular concepts related to geographical, administrative, or system-related (e.g. electricity grid level) boundaries, specific grid tariffs for collective self-consumption and renewable energy communities, as well as questions of membership and governance in both types of energy communities.

¹ Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)

² Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast)

3 DEFINITIONS AND CONCEPTS OF THE EU FRAMEWORK³

The three concepts addressed in this paper, namely collective self-consumption, renewable energy communities and citizen energy communities are explained in the following according to the relevant EU directives.

At the outset, it is important to note the relationship (i.e. distinctions and similarities) between these concepts. A major characteristic of collective self-consumption schemes is that they constitute a specific activity while not explicitly focusing on the organisational format. In contrast, energy communities focus much more on organisational and market aspects. Nevertheless, activities such as energy generation and sharing, distribution, supply, and consumption are specifically included as possible activities in the energy community definitions. Consequently, self-consumption may well occur as a specific activity in the context of an energy community.

Next to specific articles on collective self-consumption and energy communities another important point to consider is the broader intention of the European policy makers in defining these legislative tools. The recitals 42, 43 and 44 of the recast EMD, as well as the recital 67 and 70 of the REDII, are delivering a clear message: A prime goal of both legislations is to expand the role of consumers in the energy market. Specifically, for energy community definitions, the aim is to promote the empowerment of European citizens in the energy market. The recital 43 of the EMD is tracing back the role of CECs to “recognizing certain categories of citizen energy initiatives”, referring to community energy initiatives. It is therefore important that the transposition of provisions relating CECs and RECs should have the broader goals in mind.

3.1 RENEWABLES SELF-CONSUMPTION

The REDII defines individual “renewables self-consumers” as well as “jointly acting renewables self-consumers” in article 21. The frequently used term collective self-consumption (CSC) corresponds to “jointly acting renewables self-consumers”. The definitions of the REDII are as follows:

Renewables self-consumer: “a final customer [...] who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity”.

Jointly acting renewables self-consumers: a group of at least two cooperating “renewables self-consumers [...] who are located in the same building or multi-apartment block” or, where permitted by a member state, within other premises.

In the following, due to its common use and for simplicity reasons, **we maintain the term collective self-consumption (CSC) for “jointly acting renewables self-consumers”**.

³ This chapter is an update from Frieden *et al.*, 2019

Renewables self-consumers shall be entitled to “**generate renewable energy**, including for their own consumption, **store and sell** their **excess production of renewable electricity**, including through renewables power purchase agreements, electricity suppliers and peer-to-peer trading arrangements”. Generally, no charges or fees shall be applied to self-generated electricity remaining within the premises of the self-consumers. For this electricity, no double charge, including network charges, shall be applied to electricity storage. For electricity fed into the grid, self-consumers shall receive remuneration, including through support schemes, “which reflects the market value of that electricity and which may take into account its long-term value to the grid, the environment and society”.

3.2 ENERGY COMMUNITIES

The Clean Energy Package contains two definitions of energy communities: The concept of citizen energy communities (CEC), which is contained in the recast of the EMD, and renewable energy communities (REC), a concept which is contained in the REDII. The Clean Energy Package frames energy communities as a non-commercial type of market actor. This is one of the major reasons why member states are required to ensure they have a level playing field to operate across the market without discrimination. This requirement is specifically embedded in both directives. Table 1 provides an overview of the definition, actors, purpose and potential fields of activity of the two types of energy communities according to the two EU directives. Theaw elements serve as the basis for transposition of new EU rules into national legislation. Note that the term “Local energy community” that was used during the creation of the Clean Energy Package was abandoned during the legislative process.

Table 1: Comparison of the “renewable energy community” and “citizen energy community” concepts according to the REDII and the recast of the EMD

Article 2(16) Recast Renewable Energy Directive “Renewable energy community”	Article 2(11) Recast Electricity Market Directive “Citizen energy community”
<p>A legal entity:</p> <ul style="list-style-type: none"> (a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity; (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities; (c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits. <p>The REDII further states that RECs shall be entitled to produce, consume, store and sell renewable energy, including through renewables power purchase agreements.</p>	<p>A legal entity that:</p> <ul style="list-style-type: none"> (a) is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises; (b) has for its primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than to generate financial profits; and (c) may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders.

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Despite their differences, the two types of energy communities have **major commonalities**. They:

- Require a legal entity as a community umbrella.
- Must be voluntary and open.
- Should be primarily value driven rather than focusing on financial profits.
- Require a specific governance (e.g. “effective control” by certain participants – see section on governance and ownership below).

According to the recast of the EMD, “**Citizen energy communities** constitute a new type of entity due to their membership structure, governance requirements and purpose” where the purpose is framed around the provision of services/benefits for members or the local community – as opposed to profits (as shown in the definitions above). The definition is therefore an acknowledgment that CECs organizational structure can be used by citizens, small businesses and local authorities to participate across the energy sector. Citizen energy communities have a strong emphasis on the non-discriminatory access to the electricity markets, either directly or through aggregation. At the same time, the overarching concept of the CECs definition is a specific way to organize an initiative – not an activity as such. However, the definition of CECs also identifies different types of activities that CECs could engage in.

In contrast, **renewable energy communities** have more stringent governance requirements, are limited to renewable energy sources, and are rooted in local communities. There is also a stronger obligation for member states to incentivize and support the development of RECs, not just to provide a level playing field in the energy market (as is the case for CECs). Renewables self-consumption should be seen as a potential activity of a renewable energy community among other potential activities it could undertake (e.g. sale of energy to the market).

Major **characteristics differentiating the two concepts** are:

- For citizen energy communities:
 - No geographic limitation (i.e. no proximity of the “effective control” to the energy project required). Also open to cross-border participation (optionally to be allowed by member states).
 - Large and medium size enterprises excluded from effective control.
 - Electricity only (according to the scope of the EMD).
 - Technology neutral (not necessarily renewable energy).
 - Major purpose of enabling frameworks: create a level playing field for the CECs as a new market actor.
- For renewable energy communities:
 - Proximity requirement of effective control (to be defined in national law).
 - Limited membership (shareholders or members do not include large companies).
 - Open to all sources of renewable energy (e.g. also heat), but renewable energy only.
 - Major purpose of enabling frameworks: to promote the development and growth of RECs as a way to expand the share of renewable energy at national level.

It is important to mention that these two types of organizational formats do not exclude additional alternatives defined on national level and that they allow for different legal forms of organization. While the REDII leaves this open, the recast of the EMD explicitly states that “the definition of citizen energy

communities does not prevent the existence of other citizen initiatives such as those stemming from private law agreements.” Therefore, if member states choose to do so, they can allow market actors not foreseen in the directive to establish, own and manage (local) energy systems. Indeed, this is also foreseen for industrial and commercial enterprises under Article 38 of the recast of the EMD on closed distribution systems. While the **right to manage distribution networks** is specifically included as optional for CECs, the REDII only states that “renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as [...] distribution system operators...”.

In addition, the recast of the EMD states that “it should be possible for member states to choose any form of entity for citizen energy communities, for example an association, a cooperative, a partnership, a non-profit organization or SME”. The legal format of an energy community is thus to be defined on national level or by the community itself.

The Renewables Directive, additionally, aims to foster the deployment of renewable energy sources and to raise public acceptance for renewable projects. Consequently, the membership in the communities is more limited – it excludes large professional entities, while the control is to be retained by those community members that are located in the proximity of the renewables projects.

3.3 MAJOR TERMS FOR ACTIVITIES OF COLLECTIVE SELF-CONSUMERS AND ENERGY COMMUNITIES

The following provides explanations of major terms and concepts applying to CSC and energy communities regarding their potential activities. These are not specific to these concepts but apply generally to the EMD and the REDII.

The used wording in the two directives partly differs. For instance, in the recast of the EMD, “**supply**” is defined as “the sale, including resale, of electricity to customers”. However, although the REDII adopts the definitions of the recast of the EMD, the term “**sale**” is used rather than “supply”. In addition, specific ways of sale are referred to in the REDII. For renewables self-consumers, next to the sale through renewables power purchase agreements, peer-to-peer trading arrangements are stated, while Article 22 on RECs does not specifically refer to peer-to-peer trading. We, however, assume that all activities referred to for renewables self-consumers equally apply to RECs and CECs as renewables self-consumption may well be carried out in the framework of an energy community.

A feature that appears in all three concepts is energy “**sharing**”, differing fundamentally from traditional supply. Even though this concept is not specifically defined, Article 16 of the recast of the EMD on CECs mentions, for instance, the need “to share electricity produced using generation assets within the citizen energy community among their members or shareholders based on market principles, for example by offsetting the energy component of members or shareholders using the generation available within the community, even over the public network, provided that both metering points belong to the community”. For RECs, the REDII states that “Renewable energy communities should be able to share between themselves energy that is produced by their community-owned installations”. Similarly, the REDII states for CSC that “Member States shall ensure that renewables self-consumers located in the same building, including multi-apartment blocks [...] are permitted to arrange sharing of renewable energy that is produced on their site or sites between themselves”.

The term **“generation”** is defined in the recast of the EMD as **“production** of electricity”. Again, the two directives use both terms, generation and production. According to the nature of the directive, the REDII refers to renewable energy while the recast of the EMD refers to electricity only.

In addition, the recast of the EMD provides following definitions that are equally adopted by the REDII:

“Distribution”: the transport of electricity on high-voltage, medium-voltage and low-voltage distribution systems with a view to its delivery to customers, but does not include supply;

“Aggregation”: a function taken by a natural or legal person that combines multiple customer loads or generated electricity for sale, for purchase or auction in any electricity market;

“Peer-to-peer trading” is defined by the REDII as “the sale of renewable energy between market participants” by specific means including “the automated execution and settlement of the transaction”. This may occur “either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator”.

3.4 GOVERNANCE AND OWNERSHIP IN ENERGY COMMUNITIES

The REDII states that the specific characteristics of renewable energy communities in terms of size, ownership structure and the number of projects can hamper their competition on an equal footing with large-scale players, namely competitors with larger projects or portfolios. Also the EMD mentions the need for citizen energy communities to be allowed to operate on the market on a level playing field. Decision-making powers should be limited to those members or shareholders that are not engaged in large-scale commercial activity and for which the energy sector does not constitute a primary area of their economic activity. Therefore, several provisions and concepts are introduced to allow energy communities to compete on an equal footing with other market participants. The eligibility of shareholders and members is generally set in the directives for both, RECs and CECs. In contrast, the directives only provide a rather generic definition of the concept of “effective control” which may be specified by member states. For RECs, the REDII requires “proximity” of the effective control to the renewables projects as well as “autonomy” of the REC from individual members and traditional market actors. These two requirements are equally not defined in detail in the EU framework, but general indications are provided as described below.

Shareholders or members: Only for RECs limitations apply, excluding large enterprises. For renewables self-consumption, as it represents an activity rather than an organizational form, this criterion is not of relevance.

Effective control and autonomy: The recast of the EMD includes a definition of **“control”** referring to the possibility of “exercising decisive influence on an undertaking, in particular by (a) ownership or the right to use all or part of the assets of an undertaking; (b) rights or contracts which confer decisive influence on the composition, voting or decisions of the organs of an undertaking”. The effective control of CECs is explicitly limited to natural persons, small and micro enterprises, as well as local authorities for which “the energy sector does not constitute a primary area of economic activity” (the latter limitation refers to “decision-making powers”). For RECs, the exclusion of large enterprises as shareholders or members equally implies exclusion from the effective control. In addition, the majority of voting rights should be held by “shareholders or members that are located in the **proximity** of the renewable energy projects”.

Furthermore, RECs are required to be **autonomous**. As described in the recitals of the REDII, this means that RECs “should be capable of remaining autonomous from individual members and [...] traditional market actors that participate in the community as members or shareholders, or who cooperate through other means such as investment.” The concepts of proximity and autonomy are interrelated as both address different aspects of power distribution. The openness of these concepts allows member states to consider national circumstances and existing approaches and to fit them into their national legal systems.

3.5 OVERVIEW OF MAJOR CHARACTERISTICS OF RENEWABLES SELF-CONSUMPTION AND ENERGY COMMUNITIES

Table 2 below provides a summary of major characteristics of renewables self-consumption, including CSC, and energy communities. The table covers activities, eligible shareholders and members, as well as the entities that may exercise “effective control” as foreseen in the REDII and recast of the EMD.

Table 2: Activities and actors foreseen for renewables self-consumption energy communities

Activity	REDII		EMD
	RSC	REC	CEC
Production (REDII: renewables) / Generation (EMD: electricity)	✓	✓	✓
Consumption	✓	✓	✓
Storage	✓	✓	✓
Sale (RSC: excess electricity), e.g. via:	✓	✓	(✓)
- Renewables PPAs	✓	✓	(✓)
- Electricity suppliers	✓	✓	(✓)
- Peer-to-peer trading	✓	(✓)	(✓)
Sharing	✓	✓	✓
Supply		✓ ⁺	✓
Aggregation (RSC: “through aggregators”)	(✓)	✓ ⁺	✓
Energy Efficiency Services			✓
EV charging services			✓
Other energy services (RED: “commercial”)		✓ ⁺	✓
Shareholders or members			
Natural persons	n.a.	✓	✓
Small and Medium Enterprises (SMEs)	n.a.	✓	✓
Large enterprises	n.a.	X	✓
Local authorities incl. municipalities	n.a.	✓	✓
Effective control (RED: proximity requirement, EMD: membership in general is restricted, energy sector no primary area of economic activity)			
Natural persons	n.a.	✓	✓
Micro enterprises	n.a.	✓	✓
Small enterprises	n.a.	✓	✓
Medium enterprises	n.a.	✓	X [§]
Large enterprises	n.a.	X	X
Local authorities incl. municipalities	n.a.	✓	✓

⁺ Reference to “the provisions relevant for such activities”

(✓) Not explicitly stated but assumed to apply

[§] However, the CEC as such can be organized as an SME (EMD, recital 44)

4 OVERVIEW OF THE DIFFERENT FRAMEWORKS IN EU MEMBER STATES AND SWITZERLAND

In the following, the status quo of the legal framework for collective self-consumption, energy communities and similar concepts in all 27 EU member states and Switzerland is described. The chapter starts with a brief overview on the transposition process in the EU. In the subsequent sections each country is described in more detail. Where not stated differently, the information is based on legislative texts and an exchange with national experts. The sections on Croatia, Slovenia, Greece, Spain, and Portugal are based on a recent deliverable of the H2020 project COMPILE (Frieden *et al.* 2020).

4.1 OVERVIEW OF THE TRANSPOSITION PROGRESS

In 2020, most EU member states made major progress towards the implementation of collective self-consumption (CSC) and renewable energy communities (RECs). For CSC, the national approaches mostly refer to multi-apartment houses. In a few member states, such as Spain, France, and Italy, the use of the public grid is also allowed for CSC.

Some countries introduced national frameworks focussing on CSC already before the finalization of the Clean Energy Package. For instance, in 2016/2017, important legislative changes were introduced in Austria, France, and Switzerland related to the direct use of locally generated electricity by the tenants in multi-apartment houses or commercial buildings via a private grid.

Regarding the legislation on energy communities, Greece was a frontrunner; in 2018 already, Greece passed a corresponding law. Portugal, Wallonia, Flanders, Lithuania, France, Austria, the Czech Republic, Luxembourg, Estonia, Ireland, Italy, Sweden, and Slovenia recently adopted laws or legal proposals on renewable energy communities, fully or partially transposing the EU framework. Citizen energy communities have received less attention so far in the national legal processes, despite the earlier deadline for transposition of the EMD recast as compared to the REDII. However, legislative proposals for CECs were emerging such as in France, Flanders, Austria, and Denmark, while the Greek framework does not differentiate RECs and CECs.

A range of countries have not yet presented concepts for collective self-consumption and energy communities according to the EU framework, such as Croatia, Cyprus, Latvia, or the Netherlands. Germany, Bulgaria, Romania or Slovakia have introduced local self-consumption approaches which, however, do not yet consider to the key concept of energy sharing of the Clean Energy Package. Poland has introduced the concept of energy clusters in 2015. We are not aware of recent developments in Poland that would correspond to the requirements of the Clean Energy Package. Since 2013, the Netherlands grant tax reliefs for electricity generation by a cooperative or by an association of homeowners, applicable to members living in the same or adjacent postcode areas to the generation plant (see, e.g., Kausika *et al.* 2017, Kooij *et al.* 2018). Croatia plans to transpose the concept of energy communities in 2021 in the national regulatory framework.

Table 3 gives an overview of the current legal/regulatory basis for CSC and energy communities in the EU member states considered in this report and in Switzerland. The case of Switzerland is specific as the EU

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definitions and regulations do not apply. Not all of the listed approaches correspond to the current EU provisions.

Table 3: Overview of national legislation on collective self-consumption and energy communities in selected EU member states and Switzerland

(n.a.=Information not available, NECP: National Energy and Climate Plan)

Country	Collective self-consumption	Renewable energy communities	Citizen energy communities
Austria	EIWOOG 2017 (electricity act)	Draft Renewables Expansion Law (EAG) presumably to enter into force beginning 2021	Draft CEC definition published as amendment of the electricity act (EIWOOG)
Belgium: Wallonia	Decrees 2018, 2019	Framework legislation; decree 2019	-
Belgium: Flanders	Draft legislation, adoption of legislative framework foreseen in December 2020	Draft legislation, adoption of legislative framework foreseen in December 2020	Draft legislation, adoption of legislative framework foreseen in December 2020
Belgium: Brussels Capital Region	2018 definition	Currently exceptions, framework foreseen for early 2021	Currently exceptions, framework foreseen for early 2021
Bulgaria	Self-consumption framework	-	-
Croatia	Closed distribution grid by industrial and commercial prosumers	-	-
Cyprus	-	-	-
Czech Republic	n.a.	Draft energy act (general definition covering RECs and CECs)	Draft energy act (general definition covering RECs and CECs)
Denmark	Private grid (internal metering and billing)	n.a.	Proposed amendment of Electricity Supply Act
Estonia	Electricity Market Act	Draft legislation	Draft legislation
Finland	Private grid (industrial or real estate)	General proposals, study commissioned	General proposals, study commissioned
France	Law 2017-227, decree 2017-676	Draft legislation	Draft legislation
Germany	Tenant power model 2017	-	-
Greece	2016 law on virtual net metering	Law N4513/2018 on energy communities	Law N4513/2018 on energy communities
Hungary	Support for pilot projects	Priorities stated in NECP /Support for pilot projects	Priorities stated in NECP
Ireland	-	Renewable Electricity Support Scheme including a REC definition	-
Italy	Law N8/2020, Consultation document by Energy Authority	law N8/2020 (general framework), Consultation document by Energy Authority on detailed provisions	law N8/2020 (general framework), Consultation document by Energy Authority on detailed provisions
Latvia	-	-	-

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Lithuania	n.a.	New law on renewable energy (2020)	n.a.
Luxemburg	Draft electricity market bill 2020	Draft electricity market bill 2020	n.a.
Malta	-	-	-
Netherlands	Post code approach	Post code approach	-
Poland	Energy cluster concept	-	-
Portugal	Decree law 162/2019 on self-consumption	Decree law 162/2019 on self-consumption	-
Romania	Prosumer model, Law no. 184/2018	-	-
Slovakia	Act 309/2018 (local renewable energy sources and efficient co-generation)	General concept defined in NECP 2020	n.a.
Slovenia	Regulation on renewables self-supply 2019	First framework within regulation on renewables self-supply 2019	Draft electricity supply act 2020
Spain	Royal Decree 244/19 (including use of public grid)	First mentioning in decree law 23/2020	First mentioning in decree law 23/2020
Sweden	Private grid (internal metering and billing)	Legislative proposal	Legislative proposal
Switzerland	Energy law and decree 2016/2017	Energy law and decree 2016/2017	n.a.

4.2 AUSTRIA

Collective self-consumption was already introduced in Austria in 2017 as part of an amendment of the electricity act (EIWOG) (Government of Austria 2020a). The act supports private and commercial CSC (in e.g., multi-apartment buildings), including electricity sharing, which previously was hardly possible. So far, the use of the public grid for energy sharing is not permitted. The amendment defined specific aspects of these models such as the role of the different involved actors and the required contractual relationships between them. The costs to be charged by the distribution system operator (DSO) for its services (measurement, attribution of electricity to participants) were defined by the Austrian regulator E-Control. With respect to support schemes, during the last years, some municipalities and federal states moved from general PV support to specific support for either company-based (larger scale) installations or CSC. On federal state level, this was the case in, e.g., Styria (Land Steiermark 2018). On municipality level, for instance, the city of Graz implemented a CSC support in 2016 that currently applies until the end of 2020 (Umweltamt Graz 2018). In addition, since 2017, a support scheme for subsidizing CSC projects is also available on national level (KLIEN 2017, 2020).

In September 2020, a legislative package on the expansion of renewable energy was published for public consultation (Government of Austria 2020b). The package establishes the Renewables Expansion Law (Erneuerbaren-Ausbau-Gesetz, EAG) and will amend a number of existing energy related laws, including the above mentioned electricity act EIWOG. The new EAG establishes a framework for RECs, while provisions on CECs are introduced to the EIWOG, in addition to the existing CSC scheme that will not be

modified. By the end of 2023, the Federal Minister for Climate Protection, Environment, Energy, Mobility, Innovation and Technology has to carry out an evaluation of the EAG, also covering RECs, CECs, and CSC. The evaluation shall include an analysis of the status quo, obstacles and barriers, suggestions for improvement, and requirements for adaptation.

The provisions of **RECs** currently primarily focus on electricity. According to the current draft law, RECs will not only be able to generate, store and supply renewable energy but can also act as an aggregator and provide energy services. RECs can be organized as association, cooperative, partnership or corporation, association of housing owners or a similar legal body. They can own and operate electricity grids but need to fulfil the same obligations as other DSOs. Even though the current provisions primarily focus on the electricity sector, the technology neutrality of RECs is taken into account by foreseeing the possibility to operate district heating grids. Specific provisions for monetary support of heating grids in RECs are introduced.

RECs in the electricity sector need to be located within one network area and are limited either to the LV (local REC) or MV level (regional REC). No additional governance-related proximity requirement is included in the draft law. Reduced grid tariffs are foreseen for electricity sharing in RECs at MV and LV level. In principle, fees for using grid levels that are superordinate to the grid level in which the REC is located will be deducted for electricity exchanged within the REC. The tariff reduction will be defined on national level for LV and MV communities applying to all network areas (in Austria, different tariff structures apply to the network areas). For the capacity-based share of the network usage fee, the power drawn from the public network will be reduced by the power in the respective quarter-hour drawn from the renewable energy community.⁴ In addition, the volumetric tariff element for renewables support is supposed to be deducted from the grid tariff.

A REC needs to be located within the territory of one DSO and the DSO is made responsible for the metering and the attribution of the generated electricity to the community members, following either a static (fixed share) or a dynamic (consumption-related) approach. The time interval for metering and the electricity attribution is set at 15 minutes when using smart meters. The DSO is obliged to communicate the relevant data to the electricity supplier(s) and the REC. The share of the electricity generated within the REC that is attributed to a consumer has to be stated separately on the electricity invoice.

Citizen energy communities can be established over the entire territory of Austria. Besides electricity generation, storage, sale, and aggregation it can provide services to its members such as energy efficiency services or EV charging services. The effective control is, in line with the EMD, limited to natural persons, local authorities, and small companies. Metering and electricity allocation obligations of the DSO are largely similar to those of RECs. However, as CECs may be located in the area of several DSOs, the draft law requires that metering data is shared between the concerned DSOs.

⁴ For households, the capacity-based tariff element is currently low. However, a new tariff system is under discussion, including a shift to a more capacity-based tariff.

Both, the draft provisions for RECs and CECs include a list of elements that are at least to be included in the funding documents and/or contracts with the individual members. These build on the previously established elements for CSC schemes defined in 2017.

The programme of the current government (2020-2024) foresees the establishment of a one-stop-shop for the support of energy communities (Federal Chancellery of Austria 2020).

4.3 BELGIUM

Due to the regional government structure in Belgium, different frameworks are developed in Wallonia and Flanders. Also the Brussels Capital Region foresees a separate framework.

In **Wallonia**, in October 2018, a framework for **CSC** was adopted. This was followed, in May 2019, by the adoption of a decree defining **RECs** with reference to the REDII (Gouvernement Wallon 2019). According to this framework, the purpose of a renewable energy community is to produce, consume, store and sell renewable electricity for the benefit of participants at the local level using the public network or a private grid. The REC should further balance consumption and production flows in the community grid. Several entities (natural or legal persons), within a “local perimeter”, can agree to share and store their production and electricity consumption based on electricity exclusively produced from sources of renewable energy or quality cogeneration (co-generation with an increased efficiency compared to dissociated production).

The law defines a “local perimeter” as a grid segment whose connection points are located downstream of one or more stations of public electricity transformation of medium and / or low voltage. Thus, as opposed to spatial boundaries by distance, local perimeters can have differing extents. The definition of local perimeter refers to a “technically, socially, environmentally and economically optimal” section of the grid to promote local self-consumption. It can therefore be differentiated by taking into account the technical constraints of the network and the characteristics of the participants. In fact, according to the decree, the government determines the local perimeter after consulting the Wallonian Energy Commission (CWaPE) and the network operators.

According to the law, any natural person, local authority or small or medium company located in a local perimeter can participate in a renewable energy community. Participation is free and open. The specific conditions will be defined by future pieces of legislation. So far, the law defines the technical requirements for energy communities, while governance aspects are not yet addressed. The Walloon government has the right to review the list of eligible participants. Corporate participants must not have energy as their primary professional or commercial activity. The procedure to create a REC requires the approval of the regulator and the DSO. This authorisation is provided for a set time and can be renewed. The government also foresees, in concertation with the DSOs and the regulator, measures to facilitate the growth of RECs.

The renewable energy community can delegate the management of its activities to a third party. The REC does not require a supplier licence, except if it is mandated by its participants to sell the excess energy to actors outside of the local perimeter. The law defines “network managers” that implement, according to the regulated tariffs, the technical, administrative and contractual conditions necessary, in particular with regard to electricity metering. The DSO can be mandated by the REC to manage its closed distribution network. Grid tariffs for the use of the public grid will be determined by the regulator, taking into account

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the benefits brought forward by the REC (loss avoided, investment avoided and development of renewable energy). The participation in a REC excludes self-producers from the net-metering regime accessible to private self-consumers.

The **Flemish** government, in November 2020, published a draft legal framework for transposing the EMD and partially transposing the REDII (Flemish Government 2020).

The draft law states that **energy communities** can carry out activities in the areas of production, distribution, consumption, supply, aggregation, flexibility, energy sharing, storage, electric vehicle charging services, energy efficiency services or other energy services and proposes the introduction of local flexibility markets.

The law groups the concepts “active consumer” and “self-consumer of renewable energy” into one combined concept of “**active consumer**”⁵. No separate concept is created in the Flemish regulations for “jointly acting renewables self-consumers”. In the foreseen framework, multiple users or residents of the same (apartment) building can share locally produced energy.

An active consumer can also

- store energy;
- participate in the provision of energy services;
- act as a service provider of flexibility or as a participant in flexibility provision or aggregation;
- sell energy, including via power purchase agreements

While the transposition of RECs and CECs generally corresponds to the EU directives, some specific provisions for energy communities are introduced. These include that the participation in a renewable energy community is based on technical or geographic proximity, also taking into account activities that the renewable energy community wants to achieve. The Flemish Government can determine criteria for the concept of technical or geographical proximity (Flemish Government 2020).

The Flemish government plans a cost-benefit analysis to be carried out by the regulator to investigate potential benefits of energy communities for the distribution network. This would include avoided investments in the network. Based on this assessment, specific tariff reduction may be applied to RECs and CECs. In addition, the Flemish Government may allow RECs or CECs to manage distribution networks within their area (Flemish Government 2020).

The **Brussels Capital Region** currently has no specific framework but it is foreseen for early 2021. Until then, the regulator is allowing for exceptions related to the new provisions of the Clean Energy Package. This includes several “energy community related” pilot sites. The DSO is involved in a majority of those pilots. The regional government also has awarded a subsidy to the renewables association of the

⁵ According to the EMD an ‘active customer’ is a final customer, or a group of jointly acting final customers, who consumes or stores electricity generated within its premises located within confined boundaries or, where permitted by a member state, within other premises, or who sells self-generated electricity or participates in flexibility or energy efficiency schemes, provided that those activities do not constitute its primary commercial or professional activity.

federation Wallonie Bruxelles to support the development of the aforementioned pilot sites led by citizen-based initiatives. The corresponding *Ordonnance* (Région de Bruxelles-Capital 2018) is also defining the concept of collective self consumption – one or more producers with one or more final consumers under the same legal entity, whose meters are under the same MV/LV substation. Thus, the Brussels Capital Region is, besides France, one of the few exceptions where collective self-consumption requires a formal organisation as a legal entity.

4.4 BULGARIA

Bulgaria has implemented an enabling framework for self-consumption but no detailed legal framework yet. The “Energy from Renewable Sources Act” currently in force allows the producer to use generated renewable electricity for self-consumption when filing an application for connection to the electricity network operator (Bulgarian government 2020). Shorter time limits for connection are envisaged in case of self-consumption and no building and use permits are required for small systems with an installed capacity of up to 30 kW. The quantity of electricity that is not used for self-consumption shall be purchased by a supplier at a price set by the regulator, according to the conditions and the procedure laid down in the Energy Act (Bulgarian government 2020).

With a view to improving the enabling framework for renewables self-consumption, Bulgaria plans to streamline legislation and better regulate the rights of consumers. Support will be provided through the possibility to participate in the energy system, facilitating integration into the market, creating favourable conditions to raise public interest in the initiative and developing and putting in place improved administrative procedures that take into account the specific needs of renewable energy communities. During the period 2021-2030 opportunities will be sought to fund projects and measures undertaken to provide access to energy from renewable sources for low-income consumers or vulnerable households through the social assistance system (Bulgarian government 2020).

4.5 CROATIA

In Croatia, the term Energy Community is still not transposed in the national regulatory framework. This is planned for 2021. Also, the development of the regulatory framework for aggregators and self-consumption according to the provisions of the EMD, the recent regulation on the internal electricity market, as well as the REDII still has to be conducted in Croatia. So far, a community can manage a closed distribution system (as defined in the Electricity Market Act, Article 37). This option, however, only applies to industrial and commercial prosumers.

As stated in the NECP, “Energy communities will be promoted under the RES-1 measure, and the regulatory framework necessary for their functioning under the RES-4 measure.”:

- RES-1 measure “**Information, education and capacity building** for RES use” is an informational measure, where one of the envisioned activities is “capacity building and enhancement for all market players (active customers, energy communities, energy suppliers, aggregators, system operators, installers)”.

- RES-4 measure “Developing a regulatory framework for RES use” is envisioned to complement the existing legal solutions by the development of a regulatory framework for **active customers, aggregators, energy communities, and self-consumption**, following the relevant EU provisions. This framework is supposed to address the participation in local energy production, distribution, storage, supply, and energy and aggregation services. An action plan for the development of energy communities may be established. The RES-4 measure is supposed to be implemented in 2021-2022.

The Act on Renewable Energy Sources and High-Efficiency Cogeneration (Government of Croatia 2016) defines the term “**end customer with own production**”, which can be referred to as prosumer. Individual prosumers can sell their surplus energy to energy suppliers, but not to other consumers. Thus, peer-to-peer trading and power purchase agreements as foreseen in the EU framework for CSC schemes and energy communities are not yet possible.

The measure of the Integrated Energy and Climate Plan, “Elaboration of a regulatory framework for **active participation of customers** in the electricity market” (UET-3 measure), states that “In order to enable the active role of grid users in the electricity market, the existing regulatory framework should be appropriately amended, in particular by introducing an **aggregator** as a market player and by facilitating the launch of **ancillary service pilot projects**.”

Regarding practical implementation in terms of metering and sharing, the roll-out of smart meters is at its beginning. The plan is to install smart meters for over 95% of the customers by 2030. The data collected from the meters will be stored in the database of the DSO HEP. The right to access the data will be with the user, DSO, supplier, retailer, and electricity market operator (HROTE). However, the data stored at the DSO will not be suitable for use under peer-to-peer electricity trading because it is usually stored only once a day, sometimes even less frequently. Therefore, an additional communication infrastructure may be needed.

For prosumers, network costs are charged only for energy drawn from the grid. For household prosumers, this amount is decreased by the energy fed into the grid. This is not the case for commercial prosumers, leading to a more favourable framework for the household sector.

4.6 CZECH REPUBLIC

The draft of the new Czech energy act (Czech Ministry of Industry and Trade 2020) provides the basic framework for energy communities in the Czech Republic. It was submitted to the inter-ministerial comment procedure in June 2020. It also transposes other requirements of the Clean Energy Package such as the concept of the active consumer.

The draft legislation foresees a general basic definition that would be common to citizen energy communities and renewable energy communities. The law therefore uses the common term “energy community” for both types of communities.

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The common concepts of citizen energy communities and renewable energy communities is that:

- it is a legal entity within the meaning of the Czech Civil Code;
- the main purpose is not to make a profit, but to provide environmental, economic or social benefits to its shareholders or members or to the local areas where they operate;
- participation is based on a voluntary basis.

The law, thereby, adopts a minimum set of definitions in line with both the REDII and the EMD.

The new legislation proposes to leave it to the founders, shareholders or members, which specific legal form they adopt. However, not all legal entities in the Czech Republic fulfill the features of an energy community in line with the EU framework. For example, foundations and endowment funds cannot be energy communities. An Association of Unit Owners as such can only become an energy community if all members agree, as the ownership of housing units requires membership in the Association of Unit Owners, and the criterion of voluntary membership would otherwise not be fulfilled⁶.

The definition of "effective control" will still be developed in the future in order to guarantee consistency with the Commercial Corporations Act and the Civil Code.

Energy communities may be authorized to operate a local distribution system, provided that all the rights of customers connected to that system are maintained in the same way as for other distribution system operators. Energy communities will be required to pay appropriate network and similar charges under conditions still to be specified.

In the event that the energy community is interested in carrying out business activities, it needs to have an appropriate license from the energy regulator for these purposes. In any case, the defined conditions for energy communities need to be met, i.e., making a profit and entrepreneurship must not be its main purpose.

4.7 DENMARK

In **Denmark**, CSC is already allowed on building scale. All consumers as well as the generation plant have to be linked by a private grid and thereby have to be behind a common utility meter, covering all consumers who will use the electricity locally produced.

A proposal for the amendment of the Danish Electricity Supply Act has been published for consultation in 2020. The law is supposed to enter into force on 1 January 2021. The proposal defines CECs and addresses the rights and obligations of aggregators and active consumers (Danish Government 2020). The provisions include that:

⁶ The Association of Unit Owners is a term in Czech law that refers to the management of buildings, divided into legally separate parts (units).

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- Aggregators and CECs should be exempt from delivery obligations (deliver electrical products on equal terms for all customers). This would allow aggregators to offer specific tariffs for consumers with adjustable loads and grants CECs an exclusive right to consume the energy produced within the community.
- Citizen energy communities are not allowed to own, establish, buy or rent and independently manage distribution networks.
- The government is authorized to lay down rules on the acquisition of flexibility services by network companies to ensure cost-effectiveness.

The consultation document mentions the possibility that citizens energy communities may be entitled to special benefits or tariffs if their production and consumption leads to benefits for the operation of the public grid.

4.8 ESTONIA

In **Estonia**, apartment associations may divide and sell electricity to apartments, specifically as “a non-profit organization who sells and conveys electricity to its members solely for the purpose of supplying electricity to the apartments, cottages, garages or private dwelling houses which the members own or occupy” (Estonian Parliament 2019). Such CSC schemes are possible if apartment associations have just one contract and electrical connection with the DSO and divide the electricity internally by using sub meters.

In addition, the Estonian government is testing the concept of energy associations since 2013 and sees strong overlaps with the concepts of renewable energy communities, thus providing a basis for renewable energy communities (Estonian Government 2019). In Estonia, an energy association means a joint community activity with the purpose of generating, distributing or selling electrical energy and heat to their members through their own equipment for self-consumption, i.e., the electrical energy and heat is generated and distributed within the community. For the generation of decentralised renewable energy, the owners (at least to the extent of 50%) are operators or citizens, local initiatives, communities, local governments, charity or non-governmental organisations, agricultural producers, associations or SMEs that create local value that may remain in the region. Next to renewable electricity, Estonia mentions the high potential to create heating associations (Estonian Government 2019).

In May 2020, the Estonian government proposed a draft amendment to the Electricity Market Act, which promotes the creation of energy communities, obliges network operators to purchase flexibility services from the market and regulates the ownership relations of distribution network operators and electric car charging infrastructure. The bill is scheduled to enter into force at the end of this year (Estonian government 2020).

4.9 FINLAND

In **Finland**, collective self-consumption is currently only allowed in locations where the connections are under an industrial network or a real-estate network (private grid) that does not cross public land. The discussion on broadening CSC and creating energy communities has started. The Finnish Ministry of Economy proposed three different types of CSC and energy communities (Finnish government 2018):

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- Collective self-consumption within one property, typically a multi-apartment block,
- Energy communities crossing property limits via direct lines (e.g. to neighboring properties). To ensure electrical safety and fair treatment of customers, the connecting line must not connect metering points to each other and it must also not form a circular network parallel to the distribution network.
- Distributed energy communities. This includes using self-generated electricity in another location. This may, for example, include using electricity generated in summer houses in an own apartment at another location. The energy production and consumption is netted between the different involved consumption points.

The Government has commissioned a study on barriers concerning self-consumption and renewable energy communities (Finnish government 2020). It is expected that relevant legislation to the first two concepts will be passed before the end of the year 2020. The third concept is already now possible if the customer has the same supplier at both locations, but it will be further extended in the future.

4.10 FRANCE

Self-consumption in **France** is enshrined in law 2017-227⁷ and decree 2017-676 (French government 2017) which contain provisions for individual and **collective self-consumption**. These provisions are included in the section on renewable energy of the French Energy Code. According to the definitions, individual self-consumption does not involve the public grid for sharing the produced electricity while CSC does. This distinction provides the ground for different grid tariffs for these alternatives. Collective self-consumers can choose between the standard distribution grid tariff (TURPE – national Distribution Grid Utilization Tariff) and CSC TURPE (Enedis 2019). CSC is allowed if electricity is produced and consumed by several consumers and producers linked together through a legal entity. This need to be organized within a legal entity covers a basic requirement for energy communities according to the EU framework. To our knowledge, this is not foreseen in other national frameworks on CSC.

The DSOs (in France primarily Enedis) are required to equip each participant with a smart meter and implement necessary contractual and technical arrangements to facilitate self-consumption under transparent and non-discriminatory conditions. Individual self-consumption is limited to a single person with on-site prosumption. For CSC, a contract needs to be established between the DSO and the legal entity which identifies the different participants and determines the sharing scheme between the involved consumers. Net metering is not allowed for either scheme, avoiding that more electricity is treated as being self-consumed than the energy consumed within a short timeframe (Oriol 2018).

In 2019, CSC was extended to a geographic distance of 2 km between the injection and consumption points with a cumulative power of the production facilities below 3 MW on the continental metropolitan territory and 0.5 MW in non-interconnected areas (French Government 2019a). In a recent amendment, an exceptional increase to a 20 km distance between the two most distant participants is foreseen for isolated projects in areas of low population density (French government 2020).

⁷ LAW n ° 2017-227 of February 24, 2017 ratifying the ordinances n ° 2016-1019 of July 27th, 2016 relating to the self-consumption of electricity

In 2019 already, France provided a basic definition for renewable energy communities in Article L211-3-2 of the French Energy Code (French Government 2019b) generally taking over the definitions of the REDII. This definition is now further specified and complemented by a definition of CECs as part of a law on energy communities and self-consumption that currently undergoes a public consultation process. As a specification of the optional formulation in the EU framework, it is foreseen that RECs and CECs are not allowed to own or operate a distribution network (French Government 2019c).

4.11 GERMANY

Germany is a country with an already long tradition with **CSC** schemes on building scale. In 2017, the so-called “Mieterstrommodell” has been legally introduced (BMWi 2017). This model allows the plant operator in a multifamily house to sell locally produced electricity to the tenants in direct proximity. The unclear definition of proximity has led to a range of individual case-related legal decisions (Verbraucherzentrale 2018). The plant operator has the status of an electricity supplier. In case of multi apartment buildings, the plant operator receives a self-consumption support from the DSO of 2.1 – 3.7 Cent/kWh for PV electricity, depending on the plant size, for a period of 20 years (Bundesnetzagentur 2017). According to the law, the precondition is that the PV plant has a maximum capacity of 100 kW and is installed in a residential building. In order to receive support, the plant operator can sell the electricity to either: a) tenants of the building or b) owners of apartments in the building. The entire capacity supported per year is 500 MW. The German law explicitly states that, in case storage is used, the self-consumed electricity after storage rather than the stored electricity defines the self-consumption subsidy. For electricity fed into the grid, the plant operator still receives a feed-in tariff/premium. Collective self-consumers, as opposed to simple self-consumers, have to pay the “EEG surcharge”. This surcharge is part of the retail electricity price and finances the German renewables support scheme (EEG).

In a proposal for an amendment of the EEG in 2021, the self-consumption support and capacity limits would be increased to between 3.79 €Cent/kWh (up to 10kW) and 2.73 €Cent/kWh up to a size of 500 kW (Federal Government of Germany 2020).

4.12 GREECE

In 2016, **Greece** introduced a law on virtual net metering that was applicable to farmers and municipalities. Thereby, a first step toward collective energy sharing was undertaken. For net-metering and virtual net metering installations, charges for public service obligations are calculated according to the total consumption (sum of energy withdrawn from the network + consumption from behind the meter). Network charges, renewable energy levies, and other regulated charges are only charged for the energy physically withdrawn from the public network (excluding consumption behind the meter but also excluding energy netting) (HEDNO 2018).

In 2018, a **law on energy communities** (law N4513/2018) was introduced, which also expanded the scope of virtual net metering to energy communities. The law defines Energy Communities as urban partnerships with the aim of social and solidarity economy, and innovation in the energy sector. Energy communities are supposed to reduce energy poverty and to promote energy sustainability, production, storage, own

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consumption, distribution and supply, self-sufficiency and security in island municipalities. They are also expected to support the efficiency in end-use at local and regional level, cogeneration, rational energy use, energy efficiency, sustainable transport, and demand-side management.

For the case of energy communities, the right to be involved in virtual net metering can be provided to natural and/or legal persons that are members of the energy community. This particular right can also be provided to vulnerable consumers or citizens living under the poverty limit if the energy community wishes to include them in the relevant contracts for virtual net metering. These persons do not necessarily have to be members of the energy community but shall live in the same district where the energy community is established.

Energy communities can produce, distribute and supply renewable energy from installations of up to 1MW. The activities of the energy community can include:

- distribution of electricity,
- natural gas heating/cooling within the region where its headquarter is located,
- demand management to reduce the final use of electricity,
- representation of producers and consumers in the electricity market,
- network development,
- management and exploitation of alternative fuel infrastructure,
- installation and operation of desalination plants using renewable energy, and
- provision of energy services.

The law furthermore defines the organisation and governance structures of energy communities in Greece. Members of an energy community may be:

- natural persons with full legal capacity,
- legal persons governed by public or private law,
- local governments in the region of the energy community.

An energy community is to be organized as a cooperative. The law distinguishes two types of energy communities; non-profit and for-profit cooperatives. In non-profit cooperatives surpluses are not distributed to members, but remain in the energy community in the form of reserves and are distributed for its purposes by decision of the general assembly. The surplus of for profit cooperatives is permitted to be distributed to members under certain conditions and after deduction of the regular reserve. Each type varies in composition and minimum number of members. The law defines a minimum number of members depending on the type of members:

Table 4: Minimum number of members depending on the member composition in Greek energy communities

Non-profit cooperatives	Profit cooperatives
<ul style="list-style-type: none">• Legal entities and/or natural persons: 5 members• With a minimum of 2 local authorities: 3 members• Small island municipalities (max 3.100 inhabitants): 2 members	<ul style="list-style-type: none">• Minimum 15 members, 50% plus 1 of the members need to be natural persons• Minimum of 10 members for small island municipalities (max 3.100 inhabitants)

Regarding proximity, the law states that 51% of the energy community members must have local ties with the district in which the energy community has its headquarters. In case of individuals these local ties shall be demonstrated by a) ownership rights or b) by the right to use (usufruct) immovable property within the district of the energy community, or c) by being officially registered as residents in the concerned municipality. For legal entities, the local relation to the energy community requires the headquarters to be within the district in which the energy community has its headquarters (Douvitsa 2018).

The Greek law provides for a cap on the share of each member in the cooperative capital of 20%, with the exception of municipalities. Municipalities may generally participate in the cooperative capital with 40%. In island regions with a population below 3,100 inhabitants, municipalities may even participate with up to 50% in the cooperative capital.

At least five energy communities, which have their headquarters in the same region, may set up joint energy cooperatives for the purpose of coordination and the promotion of their activities.

The above shows that the Greek energy community law is different from other concepts in the sense that it addresses specific issues such as the independent energy supply of islands and energy poverty. In addition, it does not differentiate between RECs and CECs. Instead, the law distinguished a profit or non-profit nature. While the proximity requirements correspond to the local character of RECs, the broad range of activities rather resembles CECs. The inclusion of natural gas falls neither under RECs (renewables), nor under CECs (electricity).

4.13 HUNGARY

In Hungary, the legislative framework enabling and promoting energy communities and collective self-consumption is currently under development. The Hungarian National Energy and Climate Plan (Hungarian government 2020), which was published in the beginning of 2020, mentions a three-step community integration to support the goals of climate neutrality by the end 2050. A main priority is to extend net metering (or an equivalent incentive programme) to apartment blocks. Laying the groundwork for establishing communities within the transformer zones is a second-level goal. The option of managing “village heating plants” as energy communities is mentioned as a third step. Also, small-scale district heating zones are mentioned in the context of renewable energy communities. As regards the establishment of renewable energy communities, the question of vulnerable consumers and the security of supply is assigned a priority; the legal environment should allow even a miniature-scale district heating zones to fulfil these two criteria (Hungarian government 2020).

As for now, there are a few local municipal projects and attempts from civil organizations to create renewable energy communities. However, they still operate rather as an experiment since the concerning legislation is still unfinished. In order to accelerate the process, a national tender has been published in 2020 that is aimed to create more pilot energy communities and CSC projects. The provided subsidies will enable small regional entities to participate and are expected to generate useful information to support the definition of a suitable framework (Hungarian government 2020).

4.14 IRELAND

In Ireland, no framework for collective self-consumption in multi-tenant buildings exists yet as 97% of residential buildings are single dwellings (Irish Central Statistical office 2016). However, different types of interlinked concepts are developed that refer to, among others, local renewable energy generation. RECs are part of these concepts.

A new Renewable Electricity Support Scheme (RESS) was adopted in 2020 (Irish Government 2020). Within the RESS, so-called community-led projects are introduced which receive special privileges for renewable generation. The community led projects have to (see SEIA 2020):

- Be part of a “Sustainable Energy Community”, a concept that exists in Ireland for several years⁸. SECs are broader, regional initiatives, while community-led projects are more specific, local projects.
- The Declaration of community-led project must identify the SEC to which the project is correlated and the relationship between the applicant and the SEC.
- The majority ownership (51%) must be a Renewable Energy Community having as primary purpose community benefits (environmental, economic or social) rather than financial profit.
- At least 51% of all profits, dividends, and surpluses are returned to the REC.
- The project size for energy generation is limited to 5MW.

Ireland also adopted a new grid connection policy (ECP) in 2020 assisting community-led renewable energy projects to get a connection offer on a preferred basis, thereby reducing implementation barriers (Commission for Regulation of Utilities 2020). The Irish grid connection policy’s principal objective is to allow those projects which are ready for implementation to have an opportunity to connect to the network (ECP projects). Shareholders or members of a REC need to be located (in the case of SMEs or local authorities) or resident (in the case of natural persons) in the proximity of an ECP project.

4.15 ITALY

Italy has adopted a law on self consumption and renewable energy communities in February 2020 (law N8/2020), providing a general framework. Currently, there is a public consultation regarding details to implement the law and in particular on tariff setting (ARERA 2020).

Within the consultation document by the Italian Authority for Energy, Networks and Environment (ARERA), two actors are proposed to be introduced:

- Collective self–consumers of renewable energy with a focus on condominiums: natural persons or commercial actors, for whom generation and energy exchange is not the core business and that are located in the same building or condominium.

⁸ <https://www.seai.ie/community-energy/ress/>

Types of Sustainable Energy Community include small rural towns, Large urban centres, neighborhoods, residents' associations or county councils.

- Renewable energy communities involving natural persons, small and medium enterprises, local/regional authorities (e.g. municipal administrations), and private companies. This shall include low-income and vulnerable residents. Energy generation, supply etc. must not be the main commercial activity of these actors. Generation plants (individually not exceeding 200 kW) need to be located in the low or medium voltage network behind the same transformer station. The main objective of a renewable energy community is, similar to the EU framework, to provide environmental, economic, or social benefits to its shareholders/members or to the local area, rather than financial profits. A REC can carry out aggregation activities and act as a balancing service provider.

Collective self-consumption and renewable energy communities are transposed in the national legislation in connection to a “virtual model” called UVAM⁹. UVAM is a virtual aggregate of units, including consumption units, production units, energy storage and e-mobility with a minimum size of 1MW of modulation capacity and located in the same area. The UVAM concept was firstly introduced in Italy in 2017 and started at the end of 2018 in order to enable aggregators of consumers, producers and storages to participate in the balancing market. In 2020, Italy set up an incentive scheme based on the UVAM model targeting self-consumption of RES geographically limited to the same MV/LV cabin (REC, composed by consumers, RES producers, storage, EVs...) or at condominium level (CSC of RES). In both cases, within the virtual model, RECs and CSC schemes can join and exchange electricity through the public low voltage electricity network. For CSC and RECs, the self-consumption is calculated on hourly basis as the minimum of aggregate production and aggregate consumption. For the electricity shared through the public grid, members have to pay the ordinary grid tariff but receive a refund for the electricity exchanged within the community. This refund represents the consumption-based part of the transmission-related costs and amounts to 0,822€/kWh of self-consumed energy. For collective self-consumers, the tariff is further reduced by the grid losses charge (1,2% for MV and 2,6% for LV). This reduction is however not applicable to RECs (ARERA 2020).

In addition to the grid tariff refund, self-consumers receive a subsidy on the self-consumed electricity. This incentive will be 110 € for energy communities and 100€ for condominiums for each MWh self-consumed. This incentive will last 20 years¹⁰ and it is thought to payback the renewable plant investment.

4.16 LITHUANIA

In **Lithuania**, a new law on renewable energy has been approved which allows the establishment of renewable energy communities (Republic of Lithuania 2020). Members of energy communities include residents, municipal institutions, and small and medium-sized businesses. At least five members or shareholders have to be natural persons with voting right. Natural persons also have to hold at least 51% of all votes and have to live in the municipality of the production plant or a neighbouring municipality. A member or shareholder cannot have more than 20% of the votes in another energy producing company. If a REC is founded by already existing legal persons, the above mentioned preconditions have to be met by at least 51% of the members of these legal bodies.

⁹ “Progetto Pilota Per Unità Virtuali Abilitate Miste”

¹⁰ <https://www.espiu.it/comunita-energetiche-e-autoconsumo-collettivo/>

Renewable energy communities will be able to design and manage power plants, and to produce, consume, store, and sell the generated energy. The new law fosters the establishment of renewable energy communities by introducing a beneficial framework simplifying the purchase and sale agreements. In addition, prosumers with an independent electricity supplier will be reimbursed for excess energy. RES producers within RECs will further be exempt from the obligation to have a license as an independent electricity supplier and will be compensated if there is an interruption in electricity transmission for more than 336 hours in two years. Moreover, the spatial planning process is simplified for renewable energy plants below 500 kW (Ministry of Energy of the Republic of Lithuania 2020).

4.17 LUXEMBOURG

Luxembourg has published a draft law in 2020 modifying the 2007 law on the organisation of the electricity market. The amendment transposes the main framework for individual and collective self-consumption and renewable energy communities into national law (Government of Luxembourg 2020).

In the current text, the general definitions of **renewables self-consumers** correspond to the definition in the REDII, allowing the storage and sale of renewable electricity. For non-household renewables self-consumers, the corresponding activities may not constitute their primary commercial or professional activity. Both individual and collective self-consumption are limited to the same building or multi-apartment block. As a specification to REDII, renewables self-consumers are in addition limited to the area behind a single connection point to the public grid. Self-consumers of renewable energy are authorized to store and sell their excess production of renewable electricity through electricity suppliers or by renewable power purchase agreements. Renewable self-consumers have the right to organize the sharing of electric energy produced on their site themselves. The installations for collective self-consumption may be owned and managed by a third party as long as this party underlies the instructions of the self-consumers. Collective self-consumers need to conclude an agreement with the DSO including at least:

- the identity and address of the renewable energy self-consumers,
- the installation(s) concerned, and
- the distribution key applied for the sharing of the electrical energy produced.

The DSO establishes an energy balance with a quarter-hourly granularity according to a pre-defined distribution key for the shared electricity and communicates the total individual consumption as well as the electricity received from the public grid at least every month to the renewable self-consumers and their respective suppliers. A similar approach is foreseen for RECs.

Renewable energy communities are defined, in line with the REDII, as legal persons whose members or shareholders are natural persons, SMEs or local authorities, including municipalities. RECs are to be located in the same locality downstream from high or medium voltage to low voltage transformer stations. Other criteria such as the prime objective, voluntary participation and others correspond to the REDII. However, a possible minimum duration for the participation of one year is defined. The existence of a renewable energy community does not prevent the distribution network operator from making changes to the topology of its distribution network even when such a change implies changes in the composition

of the community in question. RECs have the right to access all energy markets to sell their excess electricity directly or through aggregation.

Unless the renewable energy community itself allocates the electrical energy to its members, this allocation is made by the DSO, following a “static and simple” distribution. The specific distribution model is to be developed by the regulator in concertation with the DSOs. If the sharing is undertaken by the energy community itself, it can freely define the distribution model while the required data exchange with the DSO needs to be specified. An agreement comparable to the one for collective self-consumers needs to be concluded between the REC and the DSO. The renewable energy community is authorized to delegate the organization of electricity sharing to a service provider that must comply with technical and organizational requirements referred to in the law. This service provider should not be a member of the renewable energy community. The sale of surplus renewable electricity fed into the grid can be done through individual suppliers of the members or shareholders of the renewable energy community, or, if foreseen by the statutes, through a common supplier. The energy community can also sell its excess electricity through renewable power purchase agreements, provided that it acts as a balance responsible party.

4.18 PORTUGAL

In Portugal, a law from October 25th, 2019 introduced a framework for self-consumption of renewable energy on collective level and by renewable energy communities (*Comunidades de Energia Renovável*) (Decree Law 162/2019). This law entered into force on January 1st, 2020 with a step-wise implementation of the included provisions. Thereby, the REDII was partially transposed, while the law does not yet include citizen energy communities defined in the EMD. Previously, self-consumption was limited to the individual level (Decree-Law No. 153/2014, of 20 October 2014). The 2019 decree law adopts the major lines of the EU REDII in terms of membership, possible activities etc. and the need to form a legal person. The following text primarily builds on that law 162/2019 and the corresponding regulation 266/2020. Regulation No. 266/2020 further specified the conditions for self-consumption of renewable electricity. This is, other forms of renewable energy (in particular heat) are not yet part of the framework and activities other than self-consumption and the treatment of potential surpluses are currently not yet established. Since January 1st 2020, individual and collective self-consumption projects and projects for collective self-consumption in RECs are possible as far as they have an intelligent counting system and are installed at the same voltage level. From January 1st 2021, other self-consumption projects will be possible.¹¹

Collective self-consumption schemes and RECs require registration and application on an online portal of the Portuguese Directorate General of Energy and Geology (DGEG). This portal serves to present and process applications for registration, licensing and other procedures for the management and control of self-consumption activities and energy communities. This includes the establishment of a register of existing production units for self-consumption. The interaction with this portal needs to be carried out by a management entity designated by the collective self-consumers. This entity is in addition responsible for the operational management, including the management of a potential internal network, the interaction with the system operators, the sharing of electricity production including respective coefficients, the

¹¹ <https://dre.pt/web/en/home/-/contents/125692189/details/normal>

commercial relationships to be adopted for potential surpluses, and the connection with the public grid. For the latter, a contract between the management entity and the DSO needs to be established. In the case of renewable energy communities, the REC itself can be the management entity. Self-consumers have the right to establish and operate internal networks and, when there is no access to the public network, to establish and operate direct lines.

The DGEG will assess the obstacles for and potential of RECs within two years after the entry into force of the 2019 decree-law and every three years thereafter. This assessment will be used to specify a framework that shall promote and facilitate the development of RECs.

So far, a specific **spatial limitation** for renewable energy communities is not yet finally defined. However, the terms of *close neighbourhood relationship* and *proximity* of the project are introduced and must be assessed, on a case-by-case basis, by DGEG, assuming the physical and geographical continuity of the project and the respective self-consumers or participants. Three elements are explicitly mentioned in Decree Law 162/2019 that may be taken into account for the assessment:

- The transformation stations to which the project is linked;
- the different voltage levels associated with the project;
- any other technical or regulatory element.

As stated above, until January 1st 2021 projects however need to be located at the same voltage level.

The case-by-case decisions provide for the flexibility to consider project-specific situations. Thereby, more projects might potentially be possible as compared to a strictly defined spatial limitation. At the same time, this approach is not fully transparent and projects may not be able to assess their chances for registration upfront, i.e., before submitting their application.

Supply: A supplier licence is not required for the sharing of electricity. The managing entity will need to coordinate the activities with the DSO and with the system operator(s) and take care of the implementation of the distribution between participants. For this purpose, corresponding supply contracts need to be established. The managing entity will also be billed for potential imbalances that the renewable energy community causes. All generation installations need to be registered as self-consumption installations. To fulfil its tasks, the managing entity is provided by the DSO with the relevant information on, e.g., the measured production and consumption.

Sharing and metering: In the current law, where a connection to the public network exists, the DSO is made responsible for the measurement and for the attribution of the generated electricity to the different participants. The measurement of the total electric energy produced by the installation for self-consumption shall be done by telecounting and the corresponding meters need to be bidirectional. Under specific conditions, also the electricity withdrawn from or injected in storage units needs to be measured. The costs associated with the acquisition, installation and operation of equipment related to the measurement of the total production are borne by the self-consumer. For the measurement of consumption, in areas not equipped with smart meters with remote counting, or in areas where their installation is not expected within a 3 month period, costs for the adaptation of the existing meters also need to be carried by the self-consumers. The metering system needs to be installed by the network

operator within four months after the respective request. Counting is done in a 15 minutes interval and includes the measurement and “netting” of the electricity production, the consumption of the involved self-consumers and the electricity fed into the public grid. On this ground, it is to be avoided that electricity from the self-consumption installation consumed by non-participants is counted as self-consumption of the participants.

Different distribution rules (“distribution coefficients”) may be defined to be taken into account by the DSO. These coefficients need to be communicated by the management entity to the DSO through the self-consumption portal and RECs and apply to the sum of the included generation installations. If no distribution coefficient is communicated, the DSO attributes the production in proportion to the measured consumption of each consumption unit in each 15 minute period. The potential types of distribution coefficients (static/dynamic...) are not specified in the relevant laws. The coefficients must not be changed earlier than 12 months after the last change.

Grid access and distribution/grid management: The use of the distribution grid for electricity sharing is foreseen as described above. In addition, self-consumers have the right to establish and operate internal networks and, when there is no access to the public network, to establish and operate direct lines.

Grid tariffs for self-consumption using the public grid are already in place (see next paragraph), currently regulated by Directive n.º 5/2020 of 20th March 2020¹². Collective self-consumption and energy communities have to cover the network usage tariffs when the generation plants and consumers are connected by the public grid; the tariff to be covered is calculated taking into account only the tension level used (e.g. a REC in LV will pay only LV grid tariffs). However, if the REC feeds in its generation into higher grid levels, a lower or no tariff reduction may apply.

In June 2020, a new law was published that exempts RECs and collective self-consumption schemes to different extents from paying an element of the grid charges called CIEG (*Custos de Interesse Económico Geral*). For individual self-consumption projects, 50% of CIEG costs are discounted, for RECs 100%. The reduction applies to initiatives registered until 2021 for the first seven years of their operation. The CIEG are the costs of energy policy, environmental or general economic interest associated with the production of electricity and the costs of sustainability of markets (Despacho n.º 6453/2020). The fee includes, among others, expenses from previous years that still need to be recovered, expenses associated with the purchase of the production from renewables and cogeneration, as well as charges for sustainability measures, for the guarantee of power, and for the Promotion Plan of Consumption Efficiency (PPEC).

Surplus energy from individual or collective self-consumption can be traded, including through aggregation and trade on a peer-to-peer basis:

- a) In an organized or bilateral market, including through a renewable power purchase contract;
- b) Through a market participant against payment of a price agreed between the parties;
- c) Through a market facilitator, subject to an acquisition obligation with market remuneration.

¹² <https://dre.pt/application/conteudo/130469271>

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If the sale from collective self-consumption or RECs is carried out directly by the managing entity (i.e. under point a) above), the managing entity must conclude a network use contract with the transmission system operator (TSO) applicable to producers and underlies the corresponding billings. The entity responsible for the integration of the surplus in the market is also responsible for deviations from the schedule.

When the sale of the surplus is not carried out through one of the modalities listed above, the concerned energy will be accounted for by the network operator and considered for reducing losses in the networks.

The government official responsible for energy is in charge of the design of a support scheme that takes into account the specificities of RECs according to the RED II. It is not allowed to connect generation units for self-consumption to the same point of consumption as electricity production units that are covered by a guaranteed remuneration schemes, unless the counting system allows differentiating the energy produced by the different installations.

Electricity market access: The major market activities as foreseen by the EU framework are included in the current Portuguese legislation on self-consumption including in RECs, namely the sale, aggregation, and peer-to-peer trading in particular of surplus electricity (see previous section). Generation installations of self-consumption schemes need to be registered on the national platform as described above.

Energy services: Similar to the REDII, the Portuguese framework refers to aggregation services and “other commercial energy services” by RECs. In the definition of “stored energy”, law 162/2019 refers to the storage in electric vehicles when bidirectional charging stations are associated with the consumption units of self-consumption schemes.

Further governance rules: In law 162/2019, RECs are defined as a legal person with the general characteristics regarding (voluntary) membership, autonomy, effective control and main purpose largely corresponding to the EU framework. Registration and application for recognition on the platform as described above is a prerequisite, also for other (non-REC) self-consumption schemes. While the REDII requires the participants exercising effective control to be in proximity of the renewable energy project, in the Portuguese framework, the members or participants of RECs are generally to be located in proximity of the renewable energy projects or to carry out activities related to the renewable energy projects of the respective energy community.

Law 162/2019 includes some details on the internal governance of collective self-consumers. For instance, the registration of generation installations or the passage of cabling or other components in a common part of a building requires authorization from the owner's assembly, decided by a simple majority (with reference to paragraphs 3 and 4 of article 1432 of the Civil Code). Collective self-consumers need an internal regulation that defines at least:

- the requirements for the adhesion of new members and the withdrawal of existing participants,
- the rules for electricity sharing and for sharing the payment of network tariffs,
- the treatment of self-consumption surpluses, and
- the commercial relationship policy to be adopted including the use of potential revenues.

4.19 ROMANIA

The regulatory framework for encouraging the participation of prosumers in the energy system was improved by Law no. 184/2018, ensuring a clearer definition of the concept of “Prosumer”, the simplification of authorization procedures, tax reliefs and promotion options of energy production from renewable resources (Romanian government 2018). The law defines a prosumer as a final customer who owns electricity generation installations, including cogeneration, whose main activity is not the production of electricity. A prosumer can consume, store and sell electricity from renewable sources produced in his building (including an apartment building), a residential area, a shared service location (commercial or industrial), or in the same closed distribution system. Prosumers get an exemption from the annual and quarterly purchase obligation of green certificates, but also from the payment of all related tax obligations for the electricity produced (self-consumption / surplus sold to suppliers). The units for the production of electricity from renewable sources can have an installed capacity of no more than 100 kW per location of consumption (originally this limit was 27kW but increased to 100kW in 2020). The prosumer may sell the electricity produced and delivered in the electricity network to the electricity suppliers with whom they have concluded a supply contract (Romanian government 2018, Romanian government 2020).

4.20 SLOVAKIA

The Slovak Republic has implemented legislation promoting self-consumption of electricity by introducing the “local source” concept through an amendment to the act on the promotion of renewable energy sources and high-efficiency cogeneration (Act No 309/2018) that became effective as of 2020. The amendment defines that local renewable energy sources with an installed capacity of up to 500 kW can be used for local consumption. Such sources shall have preferential access to the distribution network, and may deliver surplus energy to other market participants (from up to 10% of the total installed capacity), but shall not receive any feed-in-premium or feed-in-tariff. In addition, a producer of electricity from a local source is exempt from paying a tariff for the operation of the system for all the electricity produced that he consumes himself.

In its National Energy and Climate Plan (Slovakian government 2019) Slovakia presents basic ideas for renewables self-consumers and renewable energy communities focusing on renewable heat. Renewables self-consumers and renewable energy communities will be entitled to install their own equipment to produce heat from RES to provide heat for their own consumption, enable the storage of heat produced from RES and the sale of excess production. They will be subject to nondiscriminatory fees and payments to participate in the fixed costs associated with the operation of the district heating system including storage. The right of renewables self-consumers and RECs to set up a heat generation plant in a building to cover their own heat consumption, to use energy storage, and to sell excess heat will only be exercised at the level of the whole building (Slovakian government 2019).

4.21 SLOVENIA

Slovenia has adopted a bylaw (Regulation on self-supply with electricity from renewable energy sources) that entered into force on May 1st 2019 (Government of the Republic of Slovenia 2019). Slovenia treats the regulation not yet as a transposition of the Clean Energy Package but as a way to stimulate the private investments into renewable energy (RES) generation and an important step towards a later transposition. In addition to individual self-consumption of the owners of individual houses that was already in force, it allows for two forms of CSC:

- **CSC in multi-apartment buildings**, where the inhabitants can share energy from a RES-generation unit connected to the LV network of the building. All the consumption metering points (of the individual consumers and of the joint consumption) are connected to the LV network of the building. The RES production unit is located on the building and is connected through its own metering point to the point of common coupling of the building network with the LV distribution grid.
- **CSC in “RES communities”** that can be formed by customers in various types of dwellings. The RES production unit can be located at a separate building and is connected to a dedicated production metering point on the LV distribution grid. The consumers participating in the RES community can consume electricity through two or more consumption metering points that are connected to the LV distribution grid of the same LV transformer station as the metering point of the RES production unit. It is important that the RES production unit is not (and has never been) taking part in a RES support scheme. As opposed to the EU rules for RECs, no legal entity needs to be formed; only a contract must be signed between the members of the CSC scheme, defining how the RES production is divided internally.

When the RES production unit is connected to the LV network behind the consumption metering point of a consumer, it is considered individual self-consumption.

Several provisions are in common for multi-apartment CSC and RES communities (in the following we refer to “collective scheme” for both) including the following principles:

- A single metering point (of consumption and of the RES production unit) cannot belong to more than one collective scheme. Likewise, electricity from a single RES production unit cannot be used in more than one collective scheme.
- Several collective schemes can exist in the LV grid of the same transformer station.
- If the owner of the self-supply RES production unit is a third party, the electricity produced in this unit can only be used for self-supply of this collective scheme. The owner cannot market the energy produced in this unit, and any excess energy produced in this unit above the self-consumed energy in the collective scheme is turned over to the supplier. The level of remuneration is not determined, neither is specified as free of charge.
- If the net electricity produced by the self-supply RES generation unit (generation minus the consumed energy) is positive, the energy is turned over to the supplier. Also for these cases, the potential remuneration is not determined.

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- The customers who belong to the same collective scheme must sign a contract specifying the mutual relationships and the key for the division of the RES production among them. If the owner of the RES production unit is a third party instead of the collective scheme members, he must also be a party to the contract.
- The sum of all capacities of the RES production units used in a single collective scheme shall not exceed 0.8 times the sum of the coupling capacities of the consumption metering points included in this collective scheme. The aim is to reduce the potential RES electricity overproduction and its injection into the distribution grid. This provision replaces the previous 11 kW limit of the installed power of RES production used for a collective scheme.
- No balancing requirement is imposed on RES generation units for individual self-supply. The balancing is done by the supplier. However, no rules on balancing obligations are mentioned for the collective schemes.
- The annual limitation of the total amount of self-supply capacity in Slovenia (7 MVA for households and 3 MVA for small businesses) was abolished.

For all these schemes net-metering systems will be continued. The applied accounting interval remains one calendar year (or less if the contract starts after the beginning or ends before the end of the year).

The Slovenian government plans to prepare a new support scheme (2021-2023) that will introduce new forms of incentives including for RES communities (Slovenian Government 2020a). Also it has started with a public consultation process on introducing a local flexibility market.

In November 2020, Slovenia published a new draft electricity law introducing Citizen Energy Communities and local flexibility markets. The energy community shall be established as a cooperative in accordance with the corresponding law (Slovenian government 2020b).

4.22 SPAIN

So far, no detailed legislation on energy communities exists in Spain. The decree law 23/2020 of 23 June 2020 first introduces energy communities and aggregators, only defining their general purpose and nature (Government of Spain 2020). However, Spain has an advanced framework on self-consumption in place, allowing for the use of the public grid, which goes beyond the requirements of Article 21, REDII on CSC. This approach is explained in the following.

The Spanish government, on April 5th 2019, approved the Royal Decree 244/19 that regulates the administrative, technical and economic conditions of self-consumption in Spain. This Decree completes the regulatory framework on this issue, driven by Royal Decree-Law 15/2018, which repealed the so-called sun tax, and provides increased certainty and security to users. Among other measures, the Royal Decree enables individual and collective self-consumption by groups of apartment owners or in industrial estates, it reduces administrative procedures, especially in the case of small self-consumers, and establishes a simplified mechanism for compensation of energy fed into the public grid. Self-consumption previously was allowed with generation facilities located in the same dwelling only. According to the current rules, power surpluses may be shared with nearby consumers also in other buildings or fed into the grid.

Collective self-consumption and energy communities: Trends and challenges

Collective self-consumption using the public grid is physically and geographically limited by the following conditions:

- The participating entities must be located within the low voltage distribution grid derived from the same center of transformation.
- The maximum distance between the production and consumption meters is 500m.
- Participants are located in the same cadastral area.

The generation facilities are connected to the internal network of associated consumers (direct lines) or to the low voltage network. The right for feeding in electricity and receiving **compensation for surpluses** underlies several conditions. A general distinction is made between self-consumption with and without surpluses. The law distinguishes between:

- Modalities for self-consumption without surpluses. In these modalities, an antifouling mechanism must be installed to prevent the injection of surplus energy into the distribution network.
- Modalities of supply with self-consumption and surpluses. In these modalities, production facilities that are close to and associated with consumption facilities may, in addition to supplying energy for self-consumption, inject excess energy into the distribution networks.

For joining the surplus compensation system, the combination with other types of compensation schemes is excluded. Collective self-consumption schemes using the public grid are generally excluded from the compensation scheme. Non self-consumed energy would offset part of the energy that had to be purchased from the grid, at the freely agreed price with the chosen supplier or at the hourly average price of the electricity market. In any form of self-consumption, the consumer and the owner of the generating facility may be different natural or legal persons. Storage elements may be installed in all types of self-consumption.

Production facilities not exceeding 100 kW power associated with surpluses will be exempt from the obligation to register as an electricity supplier and will be subject only to technical regulations. Regulations may be developed for production facilities below 100 KW for a simplified compensation mechanism between deficits of self-consumers and surpluses from its associated production facilities. For installations above 100 kW, surplus energy is sold on the energy market. Regarding grid access, production facilities of up to 15 kW that are located on urbanized land and meeting the urban legislation requirements, will be exempt from the need for access and connection permits.

Besides the actual development of the legal framework for energy communities, also the Spanish tariffs for self-consumption regarding the use of the public grid and the compensation scheme are currently under revision. Given the expanded CSC scheme, the current Spanish framework may be interpreted as a hybrid model between collective self-consumption and renewable energy communities. Two major differences however remain; an energy community represents an organizational format that requires a legal entity underlying several governance-related rules and its potential activities go beyond self-consumption.

One supportive factor for implementing local RES projects in Spain is an existing framework for Energy Consumption Cooperatives (*Cooperativas de Consumo*). These cooperatives are entities in charge of

managing different activities within the local energy environment and can implement integrated RES projects. The cooperative framework is very suitable for energy communities as they work in different fields from distributed energy resources (DER) to citizen/end-user consumption with a legislation that enables and eases their operation. This cooperative framework may therefore set the ground for the organization of energy communities, shared ownership of assets and collective self-consumption (Frieden et al. 2020).

4.23 SWEDEN

In **Sweden**, comparable to Denmark, CSC in an apartment building is allowed if all apartments belong to the same grid connection. The general approach for such a solution is that the whole apartment building shares an electricity contract with the utility but electricity consumption is also measured internally by the housing company affecting the monthly rent. The right to object such an arrangement due to the free choice of the electricity supplier can be handled by representation (of the board, in case of housing associations - “bostadsrättsföreningar”, and by the tenants association “hyresgästföreningen” in case of rental apartments). CSC with electricity being transported over a grid covered by grid concession is so far not allowed. However, a governmental investigation was published in June 2019 that proposes to allow for interconnection of several multi-family buildings on the same property. While this would result in an expanded form of collective self-consumption (i.e. between buildings), it primarily addresses electricity used in shared spaces and for facility management (Government Offices of Sweden 2019). Currently, it is already possible to use an exception enabling to “interconnect single parts of a power plant” with an internal grid between different buildings.

In 2019, the Swedish government tasked the Swedish Energy Market inspectorate (EI) to investigate options for the transposition of the Clean Energy Package (Swedish government 2019). EI developed a legislative proposal for REC and CECs. It states that only those who reside or operate in or otherwise have a lasting grid connection to the concerned area may be admitted as members of a REC. An energy community is formed by three or more natural or legal persons. Regarding member voting rights, each member has one vote, unless otherwise stated in the statutes. RECs and CECs, while both having their own definitions, must take the legal form of an Economic Association, a Swedish legal body that allows cooperative structures and thus provides a governance framework. The proposal distinguishes between non-investing members and investing members. For investing members more restrictive rules apply. If investing members for example take part in a vote and have more than one third of the total number of votes cast in the ballot, the value of their votes shall be reduced to half the total number of other votes.

4.24 SWITZERLAND

In **Switzerland**, a new energy law was adopted in 2016 (Energiegesetz, EnG) followed by an energy decree in 2017 (Energieverordnung, EnV). Both provide details for CSC (Bundesversammlung 2016, Schweizerischer Bundesrat 2017). The new energy law and the corresponding decree came into force on January 1st, 2018. Locally produced electricity can be locally consumed by “self-consumption consortiums” (“Zusammenschluss zum Eigenverbrauch” - ZEV) or sold to the grid. Such consortiums can be organized by the residents themselves or by an external service provider and provide energy sharing/trading models among the residents. The participating parcels of land/buildings do not need to be adjacent to the

production facility, but no public area is allowed to be in-between, unless the municipality participates in the ZEV. All involved buildings have to be behind the same point of common coupling and the public grid must not be used. The self-consumption consortium needs to have a production capacity of at least 10% of the grid connection capacity of the ZEV. If the electricity consumption of the ZEV is more than 100 MWh per year, the consortium can freely choose its electricity provider (access to the liberalised electricity market), which is not generally the case in Switzerland.

The DSO has only one main meter for the ZEV, thus the ZEV is considered as one final consumer. Behind this main meter, ZEVs have the right to autonomously measure the electricity consumption of the participants or can engage service providers. For consumers with an annual consumption of up to 50,000 kWh, grid charges are based on an energy component (at least 70%) and a power component (max. 30%), hence increasing the interest of self-consumption. For larger consumers the power component can be more important, incentivizing storage solutions for peak shaving. The DSO is bound to buy the injected electricity for plants up to 3 MW. The price shall be based on the alternative costs incurred by the system operator for the purchase of the equivalent electricity from third parties as well as the production costs of its own electricity generation facilities (EnV, Art. 12), unless the production gets a feed-in tariff. A feed-in tariff is, however, available only for a limited number of installations in Switzerland (no new commitments for installations announced after 30/06/2012). The DSO can reject the connection if secure operation of the grid is under risk.

Tenants do not need to participate in the ZEV, but once they join, they cannot switch back to the old supplier unless the ZEV cannot guarantee power quality or if a tenant has access to the liberalised electricity market (i.e. if he has an annual consumption exceeding 100 MWh). For new tenants the participation in the ZEV can be mandatory but the costs cannot exceed the costs of external supply before creating the ZEV.

With an additional regulation from 1st April 2019, the framework, especially for self consumption consortiums, has been developed further (EnV from 1/4/2019). Properties separated by a road, a river or a railway line are newly allowed to form a ZEV, as long as the property owner gives its consent. Another important change concerns the price a building owner can charge to its tenants for self-consumed solar electricity. The difference between the PV production cost and the (previous) electricity cost from the grid is split between consumers and investors, creating more favourable conditions for investors (Energie Schweiz 2019).

5 ANALYSIS OF MAJOR ELEMENTS OF THE TRANSPOSITION PROCESS

This chapter provides a summary, comparison and discussion of major design elements of CSC and energy communities proposed or implemented in the national frameworks.

5.1 TYPE OF ENERGY

Many member states currently focus on electricity when implementing RECs and CSC and partly explicitly foresee a potential expansion to other energy forms at a later stage (e.g. Portugal). While for CSC, the limitation to renewable electricity corresponds to the definition of the REDII, RECs are only limited to renewable energy in general including, e.g., heat, according to the EU framework. Some of the central and eastern European countries put a strong focus on renewable heat in their REC frameworks.

5.2 GENERATION CAPACITY LIMITS FOR CSC AND RECS

There are strongly differing limits of **maximum** generation capacities that are allowed for energy communities or CSC schemes. The limits are also different in nature, with some referring to total power within an entire initiative, some to the power of individual installations. For instance, in Greece, the maximum power for an installation within an energy community is limited to 1 MW. In Italy, individual generation plants must not exceed 200 kW. In Slovenia, the sum of RES production should not surpass 0.8 times the sum of the coupling capacities included in the collective scheme, and in France the maximum total power that may be installed within a CSC scheme on the continental metropolitan territory is 3 MW. Interestingly, in Switzerland, a **minimum** production capacity is defined (10% of the grid connection capacity of the community); an approach we did not identify in any of the EU member states.

5.3 LOCAL ELECTRICITY GRID TARIFFS

Among the current developments, a trend towards the definition of local electricity grid tariffs is apparent. This is also motivated by the requirement of the EU to set cost reflective tariffs¹³. This requirement may entail the principle of only paying for the actual network-level used for distribution within the community. While some countries develop local tariffs specifically for renewable energy communities (Austria, Wallonia, Italy), other countries (France, Portugal and Spain) also allow CSC initiatives to use the public grid to which specific tariffs will equally apply. In France, the choice of this tariff is optional and does not in all cases lead to a cost reduction. In Spain, such a tariff is still under development. In Wallonia and Flanders, the government demands a cost-benefit analysis investigating the impact of energy communities on the distribution network, including avoided investments in the network. Based on the assessment, specific tariff reductions may be applied, in Flanders to both, RECs and CECs.

The development of local grid tariffs for RECs generally involves a reduction of volumetric elements of the grid tariff and in some cases of additional taxes and charges not related to the costs of the public grid. While in Austria, Portugal and Wallonia a reduced local tariff would be granted upfront, REC members in

¹³ Article 18(7) of the recast of the EMD sets out that distribution tariffs shall be cost-reflective taking into account the network use, including by active consumers.

Italy pay the ordinary tariff and are later reimbursed. The reimbursement corresponds to the consumption-based part of the network tariff covering transmission-related costs.

These developments clearly show two fundamentally different motivations for local tariffs: 1) cost reflectiveness and 2) support of CSC and RECs. Both motivations are embedded in the EU framework, even though in different pieces of legislation (electricity market rules in the EMD and electricity market directive, and the requirement to support renewable energy communities defined in the REDII). Roughly, reductions of the tariff element for the grid use can serve cost-reflectiveness, while the reduction of, e.g., renewables support charges clearly falls under the supportive nature. However, grid tariff reductions do represent reduced costs, and can thus be expected to have a supportive nature as well. Therefore, in practice, the boundary between policy goals and energy market regulation cannot be drawn clearly.

While local grid tariffs may correspond to the cost reflectiveness criterion, it may conflict with the actual need to finance the overall electricity system. This is also highlighted by the REDII for electricity consumed on-site; while member states should “generally not apply charges to electricity produced and consumed within the same premises”, they “should be allowed to apply non-discriminatory and proportionate charges to such electricity if necessary to ensure the financial sustainability of the electricity system”¹⁴.

The trend towards local grid tariffs may to some extent prevent discussions around other tax and levy-related support. While these are partly introduced in conjunction with grid tariff reductions as explained before, this link is not necessarily a given. While, e.g., renewables support levies are often charged in connection to grid fees, reducing these elements can be applied independently. This could lead to a more differentiated approach. For instance, where CECs focus on renewable electricity generation, applying exemptions from renewables support levies may be justified just as for RECs. Due to the difference in geographical scope, however, local grid tariffs would not apply to CECs, at least not to the same extent.

Table 5: Local grid tariffs in EU member states

Member state	Network tariff for EC	Other tariff elements
Austria	No consumption-based grid fees for grid level superordinate to LV or MV REC. Net capacity-based tariffs	Removal of consumption-based renewables surcharges
Italy	Refund of consumption-based part of network tariff, covering transmission-related costs	
Portugal	Consumption-based grid fees above the grid level of REC do not need to be paid	Reduction of consumption-based surcharges (policy costs CIEG: 100% for CSC, 50% for individual self-consumption)

¹⁴ REDII, Recital 68

France	Tariff for collective self-consumption	
Belgium (Wallonia/Flanders)	To be defined based on expected benefits	

5.4 ORGANISATIONAL FORM OF ENERGY COMMUNITIES AND CSC

Regarding the **organisational form of energy communities**, several member states list potential options for the type of legal entity that may be chosen. Greece and Sweden prescribe a specific legal body; while in Greece a specific type of cooperative is foreseen for energy communities, in Sweden an “Economic Association” is to be formed. In some countries, energy communities are embedded in existing concepts for local or regional initiatives. In particular Ireland represents a specific case, as it links energy communities to two other types of initiatives; “Sustainable Energy Communities” as regional concepts, and “community-led projects” that rather refer to the local level and need to be owned to at least 51% by a REC. In other countries, different types of existing initiatives may be suitable to form the basis of an energy community. In Spain, for instance, a dedicated legal framework already exists for Energy Consumption Cooperatives (*Cooperativas de Consumo*).

The analysis revealed a high diversity of different approaches in defining the legal format of energy communities. A general distinction can be made between the proposed use of existing types of legal bodies, the prescription of a single, potentially new or adapted, legal form that may be specific to energy communities (e.g. Greece), or the definition of criteria without prescribing or proposing specific legal forms (e.g. France, Wallonia, Luxembourg, Lithuania). The latter may be limited to the criteria already defined in the EU framework, without further specification. An important criterion for the chosen approach may be the recognition of pre-existing initiatives, with the aim to best integrate these in the new frameworks (REScoop.eu 2020).

While generally open and voluntary participation are highlighted, this does not necessarily mean that joining and leaving an energy community is possible at any time. Luxembourg foresees a **minimum duration for the participation** in a REC of one year. In other countries, membership conditions will be defined, for instance, in the statutes of cooperatives or other legal bodies.

Collective-self consumption in most cases does not require the formation of a legal body but contracts between the participating actors are foreseen. Exceptions are France and the Brussels Capital Region, where also producers of a CSC scheme need to be organised in a legal entity.

5.5 PHYSICAL EXPANSION, PROXIMITY, AND GOVERNANCE

Spatial aspects of RECs are linked to their governance through the proximity criterion, requiring that members or shareholders of RECs with effective control be in proximity to the renewable energy projects. General geographic limitations of membership and ownership, potentially in combination with the allowed physical expansion of a REC as such, may equally satisfy the proximity criterion. In some member states, spatial limitations of CSC schemes using the public grid are applied and may provide a basis for corresponding rules for RECs. Due to their interrelatedness, we discuss the general spatial expansion of CSC

schemes and RECs, the governance oriented proximity, as well as additional governance criteria of RECs and CECs in one section.

While **CECs** are not per se limited in geographical or system-related scope, questions of locality play a major role for **RECs**. The REDII requires that RECs are “effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects”. The concept of proximity thus refers to the governance of RECs rather than limiting their physical expansion as such. This implies, however, that, in order to be able to meet the proximity requirement, a localisation of the involved renewable energy projects is necessary. Consequently, the REDII indirectly requires a localisation of the energy communities, while it does not require that all members or shareholders need to be located in proximity to the involved projects. Both, a definition of the localisation as such, as well as the criteria defining proximity as regards to effective control are left open in the directive.

The analysis has shown that, in absence of clear definitions on EU level, the term proximity and the definition of the local character in general, are used in strongly differing ways in the member states. A general tendency is that the physical expansion of RECs, and thereby the notion of locality, is more frequently addressed as compared to the governance-related proximity term according to the REDII.

Regarding the **physical expansion of CSC** schemes, the REDII refers to “the same building or multi-apartment block” as well as to direct lines. In most member states CSC is indeed limited to, e.g., multi-apartment buildings. In these cases, CSC is rather limited in its spatial expansion. However, France, Spain and Portugal foresee CSC via the public grid, while applying limitations to the physical expansion. Portugal currently limits CSC to the same voltage level, while France uses a spatial limitation of 2 km for its CSC scheme (exceptions: 20 km). In Spain, where currently only a CSC framework is defined in detail, the local system needs to be located within a 500 m boundary, in the same cadastral area, and in a grid segment below the same LV transformer station. Thereby, Spain adopts a highly encompassing set of spatial criteria, also in comparison to the existing concepts for renewable energy communities.

Regarding the **physical expansion of RECs**, several member states refer to the **typology of the public grid** which facilitates, e.g., the implementation of local grid tariffs. Slovenia for example limits RECs (in Slovenia currently “RES communities” as a specific form of a self-consumption scheme) to the same LV transformer without additional spatial limitations. Austria and Italy refer to the same LV or MV transformer, Luxembourg even refers to HV transformers. Wallonia introduced a more unreserved regulation with so-called “local perimeters” describing grid segments downstream of one or more MV/LV transformer stations. The definition of local perimeter, however, equally refers to a “technically, socially, environmentally and economically optimal” section of the grid to promote local self-consumption. In addition, “local perimeters” are to be defined on a case-by-case basis, equally taking into account criteria such as the “quality of the participants”. Other member states set spatial limitations by, e.g., **distance or administrative structures (e.g. municipalities)**, aiming a better consideration of settlement and community structures that may not coincide with grid limitations. Flanders proposed that the participation in a renewable energy community is limited on the basis of technical or geographic proximity, also **taking into account activities** that the renewable energy community wants to carry out.

Some countries cover the **governance-related proximity aspect** of the REDII by requiring that the majority of the members have to be located in or have ownership in defined spatial boundaries, in other countries all members have to be within the defined spatial boundaries. For instance, Lithuania provides that 51% of members need to be residents in the municipality of the production plant or a neighbouring municipality. In Greece, equally 51% of the energy community members are expected to have local ties with the district within which the energy community has its headquarters, referring to local ownership or use rights or official registration as residents in the concerned municipality. For legal entities, in Greece, the local relation to the energy community requires the headquarters of the participating entity to be within the district in which the energy community has its headquarters.

Obviously, if membership and/or shareholding is entirely limited to spatial boundaries related to a project, the governance-related proximity aspect as foreseen in the REDII is addressed at the same time. This, however, fully excludes members or shareholders located outside of the local REC even if they do not carry out effective control. An example can be found in Sweden. Whether this causes relevant practical constraints remains to be seen; membership or shareholding outside of the local area of the REC may be of less interest without participation in the effective control.

It is worthwhile critically discussing the **practical implications of physical boundaries of RECs and CSC**. The choice of a system-related boundary has a practical correlation to the definition of local grid tariffs and financing of the distribution (and transmission) system. At the same time, information of the precise grid architecture may not easily be available for planners and local initiatives while system-related limits may be located between, e.g., two neighbouring buildings within the same municipality. Distances are much more transparent for the general public and may expand over several municipalities (as opposed to, e.g., postal codes) but ignore the grid infrastructure. The cases of Portugal and Wallonia are interesting in this sense, as it will (for now) be decided on a case-by-case basis whether a potential REC can be considered as such. This provides room for individual spatial limitations and for gaining practical experience. On the other hand, a lack of planning certainty may be an issue for the developers.

Besides the general eligibility of specific types of actors to become shareholders or members of an energy community and restrictions regarding “effective control” (including the above discussed proximity requirement), the EU framework does not further specify any membership and governance mechanisms for energy communities.

The concept of **autonomy** overlaps with membership criteria to the extent that the **power of individual members may be limited**. A few countries have already defined more specific membership criteria and procedures limiting the power of individual members or types of members. In Lithuania, at least five members have to be natural persons, holding a minimum of 51% of all votes. In Greece, a minimum number of participants is required for the establishment of an energy community; between two and 15 members depending on the nature of the participants and on whether the community is profit-oriented or not. The Swedish Economic Association is a body allowing for “cooperative structures” and thus provides a corresponding governance framework. Regarding member voting rights, each member has one vote, unless otherwise stated in the statutes. Besides voting rights or membership criteria, some countries limit capital shares of individual members. This is foreseen in the Greek law that provides for a cap on the participation rate of each member in the cooperative capital of 20%. Only municipalities may participate

in the cooperative capital with up to 50%. Autonomy from external market actors is considered in Lithuania, where a member cannot have shares of another energy producer of more than 20%.

5.6 INVOLVEMENT OF VULNERABLE GROUPS

So far, only Greece has embedded the reduction of energy poverty as a prime goal of energy communities in its legal framework, also establishing specific measures. Bulgaria and Hungary plan to put a focus on energy poverty in the upcoming legislation on energy communities. In particular, the inclusion of vulnerable or poor households in the Greek net metering scheme without requiring membership in the energy community may be a powerful approach to reduce barriers for these groups. In the other cases, where such specific options are not defined in detail, further national transposition and actual community level governance will need to address the question of access of vulnerable households to the benefits of energy communities. This means that the concept of “open and voluntary” participation in most cases still needs to be broken down into specific rules and measures. For instance, the need to become a member of an energy community by purchasing a share of, e.g., a cooperative, or the requirement to participate in joint investments may importantly hamper the involvement of vulnerable groups.

Many conversations were identified by REScoop.eu in several member states with regard to energy communities and the implemented “solidarity principle”, for instance in France. These discussions include the potential of energy communities to create unfair imbalances in the system, creating a risk for high system charge for vulnerable groups. This is, however, in contradiction with many on-the-ground experiences. Still, the principles of energy justice should be considered while transposing the energy community definitions, in order to leverage the full potential of those initiatives for final consumers in general, and vulnerable consumer groups in particular.

6 CONCLUSIONS AND OUTLOOK

2020 saw a major progress of the EU member states implementing the EU framework on energy communities and collective self-consumption. Overall, member states focused on drafting approaches for CSC and RECs, while CECs are addressed to a much lower extent so far. Member states often build on existing approaches and organisational structures in defining RECs. For instance, several EU countries introduced CSC models even before the finalization of the Clean Energy Package. It can be expected that the provisions on RECs build on the experiences with these frameworks.

Despite the important progress, the transposition process of the Clean Energy Package into national law is far from finished. Even if deadlines for the transposition are met, full implementation may include a stepwise procedure, learning, and potential adaptation over a longer timeframe as is specifically foreseen in, e.g., Portugal and Austria. So far, there is a range of implementation approaches from the simple “copy and paste” inclusion of EU definitions in national legislation to more detailed technical specifications, and finally, tailor-made approaches addressing the specific national context and issues. Major lines of the technical and governance-related developments include the specification of physical expansion, effective control, proximity, or reduced grid tariffs. Regarding the physical expansion of RECs, several countries combine different approaches, considering socioeconomic structures and the physical and geographical continuity of projects. Furthermore we observe a high diversity of governance criteria, relating to the power distribution within the communities. The discussion on local grid tariffs finally shows member states’ focus on supporting local self-consumption, with limited attention paid to the role of energy communities as provider of flexibilities.

In the EU framework, energy communities are embedded in overarching targets such as broad consumer empowerment and the reduction of energy poverty. Addressing these targets to an important extent requires specific measures and support, for instance in order to facilitate the involvement of citizens that are not professionals in the energy market. So far, we have little evidence for the broad introduction of corresponding accompanying measures.

The Clean Energy package aims at an integrated energy market which would include, for instance, the provision of flexibility by active consumers and energy communities. In this context, the full integration in national frameworks and the energy market would include a good understanding of the role of energy communities to create system benefits. So far, assumed system-benefits of energy communities are largely covered by the introduction of local grid tariffs, equally addressing cost-reflectiveness. This static approach may also provide some incentives, in particular for the local balancing of production and consumption. The integration in dynamic flexibility markets could provide even stronger incentives to provide specific system benefits. In the longer run, fully embedding energy communities in the energy policy and market structures could allow to benefit most efficiently from their technical but also socio-economic potential.

7 REFERENCES

ARERA - Autorità di Regolazione per Energia Reti e Ambient (2019): Memoria dell'autorità di regolazione per energia reti e ambiente in merito all'affare sul sostegno alle attività produttive mediante l'impiego di sistemi di generazione, accumulo e autoconsumo di energia elettrica (atto n. 59).

<https://www.arera.it/allegati/docs/19/094-19.pdf>

ARERA - Autorità di Regolazione per Energia Reti e Ambient (2020): Orientamenti per la regolazione delle partite economiche relative all'energia elettrica oggetto di autoconsumo collettivo o di condivisione nell'ambito di comunità di energia rinnovabile. <https://www.arera.it/allegati/docs/20/112-20.pdf>

BMWi, Federal Ministry for Economic Affairs (2017): Gesetz zur Förderung von Mieterstrom und zur Änderung weiterer Vorschriften des Erneuerbare-Energien-Gesetzes vom 17. Juli 2017.

Bundesgesetzblatt Jahrgang 2017 Teil I Nr. 49, ausgegeben zu Bonn am 24. Juli 2017.

https://www.bmwi.de/Redaktion/DE/Downloads/M-O/mieterstrom-gesetz-bgbl.pdf?__blob=publicationFile&v=4

BRIDGE (2020): CEER meets BRIDGE Task Force, 15.10.2020

https://www.researchgate.net/publication/344675554_CEER_meets_BRIDGE_Task_Force_Energy_Communities

Région de Bruxelles-Capital (2018): Ordonnance modifiant l'ordonnance du 19 juillet 2001 relative à l'organisation du marché de l'électricité en Région de Bruxelles-Capitale, [...].

http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=fr&la=F&table_name=loi&cn=2018072307

Bulgarian Government (2020): Integrated energy and climate plan of the Republic of Bulgaria 2021 – 2030. https://ec.europa.eu/energy/sites/ener/files/documents/bg_final_necp_main_en.pdf

Bundesnetzagentur (2017): Hinweis zum Mieterstromzuschlag als eine Sonderform der EEG-Förderung. Hinweis2017/320. Dezember 2017

https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/ErneuerbareEnergien/Mieterstrom/Hinweis_Mieterstrom.pdf?__blob=publicationFile&v=3

Bundesversammlung der Schweizerischen Eidgenossenschaft (2016): Energiegesetz (EnG) vom 30. September 2016

Commission for Regulation of Utilities (2020): Enduring Connection Policy Stage 2 (ECP-2)

Czech Ministry of Industry and Trade (2020): Government Decree No. 772 from 27th of July 2020 on Measures for the Transition of the Czech Republic to a low-carbon Energy Sector and an Amendment of Act No. 458/2000 Coll. on Business Conditions and Public Administration in the Energy Sectors and Amending Certain Laws (the “Energy Act”). <https://www.mpo.cz/en/energy/nuclear-energy-and-new-nuclear-builds/development-of-new-nuclear-build/government-decree-no--772-2020--256618/>

Danish Government (2020): Forslag til lov om ændring af lov om elforsyning – suggestion to act amending the electricity supply act. <https://hoeringsportalen.dk/Hearing/Details/64148;full>

Collective self-consumption and energy communities: Trends and challenges

document: <https://prodstoragehoeringspo.blob.core.windows.net/283f91a6-ab36-4c6a-be65-aaf54e47e9ad/Master%20Samlet%20lovforslag%20til%20H%C3%B8ring.pdf>

Dansk Energi (2015): Tarifiering i elnetselskaber.

<https://www.danskeenergi.dk/sites/danskeenergi.dk/files/media/dokumenter/2017-10/PrincipnotatTarifmodel20.pdf>

Douvitsa I. (2018): The new law on energy communities in Greece. Cooperativismo e Economía Social (CES). N.º 40, 2017-2018, p 31-58. ISSN: 1130-2682

<http://revistas.webs.uvigo.es/index.php/CES/article/view/1385/1367>

Enedis (2018): TURPE 5 bis HTA/BT Tarifs d'utilisation des réseaux publics de distribution d'électricité. Tarifs en vigueur au 1er août 2019.

https://www.enedis.fr/sites/default/files/TURPE_5bis_plaquette_tarifaire_aout_2018.pdf

Energie Schweiz (2019): Leitfaden Eigenverbrauch. Bundesamt für Energie, Bern, April 2019.

Estonian Government (2019): Estonia's 2030 National Energy and Climate Plan (NECP 2030).

https://ec.europa.eu/energy/sites/ener/files/documents/ee_final_necp_main_en.pdf

Estonian government (2020): Activities of energy communities in the draft amendment of the electricity act. <https://www.mkm.ee/et/uudised/seadusemuudatus-soodustab-energiakogukondade-tegevust>

Estonian Parliament (Riigikogu) (2019): Electricity Market Act. Translation as of 20.03.2019.

https://www.riigiteataja.ee/en/compare_wordings?grupild=100044&vasakAktId=530072018005

Federal Chancellery of Austria (2020): Aus Verantwortung für Österreich. Regierungsprogramm 2020 – 2024, p80. Vienna, 2020.

Federal Government of Germany (2020): Entwurf eines Gesetzes zur Änderung des Erneuerbare-Energien Gesetzes und weiterer energierechtlicher Vorschriften

https://www.bmwi.de/Redaktion/DE/Downloads/G/gesetzentwurf-aenderung-erneuerbare-energien-gesetzes-und-weiterer-energierechtlicher-vorschriften.pdf?__blob=publicationFile&v=4

Flemish Government (2020): Draft Decree amending the Energy Decree of 8 May 2009.

<https://www.vlaamsparlament.be/parlementaire-documenten/parlementaire-initiatieven/1434250>

French Government (2017): Décret n° 2017-676 du 28 avril 2017 relatif à l'autoconsommation d'électricité et modifiant les articles D. 314-15 et D. 314-23 à D. 314-25 du code de l'énergie.

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000034517272&categorieLien=id>

French Government (2019a): Decree setting criteria of geographic proximity of extended collective self-consumption operations.

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000039417566&dateTexte=20200706>

French Government (2019b): LOI n° 2019-1147 du 8 novembre 2019 relative à l'énergie et au climat / Code de l'énergie Article L211-3-2.

https://www.legifrance.gouv.fr/affichCodeArticle.do;jsessionid=9D7E08C8C73918657D51500DF05D4CAB.tplgfr31s_2?cidTexte=LEGITEXT000023983208&idArticle=LEGIARTI000039360473&dateTexte=20200720&categorieLien=cid#LEGIARTI000039360473

Collective self-consumption and energy communities: Trends and challenges

French Government (2019c): Code de l'énergie Article L315-6, Modifié par LOI n°2019-1147 du 8 novembre 2019 - art. 40.

https://www.legifrance.gouv.fr/affichCodeArticle.do;sessionId=A7AB12757858DE54E7B3E24897BCCFA2.tplgfr31s_2?cidTexte=LEGITEXT000023983208&idArticle=LEGIARTI000039369894&dateTexte=20200721&categorieLien=id#LEGIARTI000039369894

French Government (2020): Arrêté du 14 octobre 2020 modifiant l'arrêté du 21 novembre 2019 fixant le critère de proximité géographique de l'autoconsommation collective étendue.

<https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000042434286>

Frieden, D., Andreas Tuerk, Josh Roberts, Stanislas d'Herbement, Andrej Gubina (2019): Collective self-consumption and energy communities: Overview of emerging regulatory approaches in Europe.

Working paper, June 2019. <https://www.compile-project.eu/downloads/>

Frieden, D., Andreas Tuerk, Melani Furlan, Boris Pavlin, Alexandros Chronis, Nasos Vasilakis, Lin Herenčić (2020): COMPILE Deliverable D2.3: Regulatory frameworks for energy communities in the pilot site countries Croatia, Spain, Greece, Portugal and Slovenia – Shaping EU framework transposition and project implementation. <https://www.compile-project.eu/downloads/>

Gouvernement Wallon (2019): DÉCRET modifiant les décrets des 12 avril 2001 relatif à l'organisation du marché régional de l'électricité, du 19 décembre 2002 relatif à l'organisation du marché régional du gaz et du 19 janvier 2017 relatif à la méthodologie tarifaire applicable aux gestionnaires de réseau de distribution de gaz et d'électricité en vue de favoriser le développement des communautés d'énergie renouvelable

Government of Austria (2020a): Bundesrecht konsolidiert: Gesamte Rechtsvorschrift für Elektrizitätswirtschafts- und –organisationsgesetz 2010 , Fassung vom 09.09.2020.

<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007045>

Government of Austria (2020b): Erneuerbaren-Ausbau-Gesetz – EAG/ Erneuerbaren-Ausbau-Gesetzpaket – EAG-Paket. Draft of septembre 16th 2020.

https://www.parlament.gv.at/PAKT/VHG/XXVII/ME/ME_00058/index.shtml

Government of Croatia (2016): The Act on Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette Nos. 100/15, 123/16, 131/17, 111/18).

Government of Luxembourg (2020): Projet de loi No 7266 11 modifiant la loi du 1er août 2007 relative à l'organisation du marché de l'électricité.

<https://chd.lu/wps/portal/public/Accueil/TravailALaChambre/Recherche/RoleDesAffaires?action=doDocpaDetails&backto=/wps/portal/public/Accueil/Actualite&id=7266>

Government of Spain (2020): Real Decreto-ley 23/2020, de 23 de junio, por el que se aprueban medidas en materia de energía y en otros ámbitos para la reactivación económica.

https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-6621

Government of the Republic of Slovenia (2019): Regulation on self-supply with electricity from renewable energy sources. The official gazette of Republic of Slovenia, No. 17/2019, 22.3.2019.

Collective self-consumption and energy communities: Trends and challenges

<https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2019-01-0700/uredba-o-samooskrbi-z-elektricno-energijo-iz-obnovljivih-virov-energije>

Government Offices of Sweden (2019): Moderna tillståndsprocesser för elnät.

<https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2019/06/sou-201930>

HEDNO (2018): Net metering in Greece. https://energy-community.org/dam/jcr:5ee4d036-ac87-47b5-991f-28989dfdea2e/REWS_HEDNO_112018.pdf

Hungarian government (2020): National Energy and Climate Plan.

Irish Central Statistical office (2016): <https://www.cso.ie/en/releasesandpublications/ep/p-cp1hii/cp1hii/hs/>

Irish Government (2020): Terms and Conditions for the first competition under the renewable electricity support scheme – RESS1:2020.

https://www.dccae.gov.ie/documents/RESS_1_Terms_and_Conditions.pdf

Kausika B, O.Dolla, W. van Sark (2017): Assessment of policy based residential solar PV potential using GIS-based multicriteria decision analysis: A case study of Apeldoorn, The Netherlands. 9th International Conference on Sustainability in Energy and Buildings, SEB-17, 5-7 July 2017, Chania, Crete, Greece

KLIEN, Klima- und Energiefonds (2017): Leitfaden Photovoltaik-Anlagen, Version 2017.

<https://www.klimafonds.gv.at/wp-content/uploads/sites/6/LFPV-Anlagen2017.pdf>

KLIEN, Klima- und Energiefonds (2020): Leitfaden Photovoltaik-Anlagen, Version 2020.

<https://www.klimafonds.gv.at/call/photovoltaik-anlagen-6/>

Kooij, Henk-Jan, Arnoud Lagendijk, Marieke Oteman (2018): Who Beats the Dutch Tax Department? Tracing 20 Years of Niche–Regime Interactions on Collective Solar PV Production in The Netherlands. Sustainability 2018, 10(8), 2807, DOI: 10.3390/su10082807

Land Steiermark, Fachabteilung Energie und Wohnbau (2018): Ökofonds Ausschreibung. Förderung von Photovoltaik Gemeinschaftsanlagen http://www.ich-tus.steiermark.at/cms/dokumente/12641122_142617604/9185d7e9/2018-02-16_F%C3%B6rderrichtlinie%20PV%20Gemeinschaftsanlagen%20V1.1.pdf

Ministry of Energy of the Republic of Lithuania (2020): Lithuania to allow renewable energy communities, more opportunities for businesses to use green electricity. <http://enmin.lrv.lt/en/news/lithuania-to-allow-renewable-energy-communities-more-opportunities-for-businesses-to-use-green-electricity>

Oriol, L. (2018): Self-consumption framework in France. Presentation. Ministry for the Ecological and Inclusive Transition, May 2018. https://energie-fr-de.eu/fr/manifestations/lecteur/conference-sur-lautoconsommation-photovoltaique-cadres-reglementaires-et-modeles-daffaires-785.html?file=files/ofaenr/02-conferences/2018/180515_conference_pv_autoconsommation/Presentations/02_Louise_Oriol_MTES_OFATE_DFBEW.pdf

Republic of Lithuania (2020): Lietuvos Respublikos atsinaujinančių išteklių energetikos įstatymo Nr. XI-1375. <https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/76ecca608acd11eaa51db668f0092944>

Collective self-consumption and energy communities: Trends and challenges

REScoop.eu, ClientEarth (2020): Energy Communities under the Clean Energy Package – Transposition Guidance.

Romanian government (2020): ORDIN nr. 165 din 16 septembrie 2020.

<http://legislatie.just.ro/Public/DetaliiDocument/230504>

Schweizerischer Bundesrat (2017): Energieverordnung (EnV) vom 1. November 2017

Slovakian Government (2019): Integrated National Energy and Climate Plan for 2021 to 2030.

https://ec.europa.eu/energy/sites/ener/files/sk_final_necp_main_en.pdf

Slovenian Government (2019): The Official Gazette of Republic of Slovenia, OG 17/2019

Slovenian Government (2020a): Integrated national energy and climate plan of the republic of Slovenia.

https://ec.europa.eu/energy/sites/ener/files/documents/si_final_necp_main_en.pdf

Slovenian Government (2020b): Draft electricity supply act 2020 (ZAKON O OSKRBI Z ELEKTRIČNO ENERGIJO)

Swedish government (2019): Moderna tillståndsprocesser för elnät, Betänkande av Nätkoncessionsutredningen, Stockholm 2019.

https://www.regeringen.se/4ada75/contentassets/44f30a8f474440adae314f86d4311f74/sou-2019_30_webb.pdf

Umweltamt Graz (2018): Solaranlagen – Förderungen.

<https://www.graz.at/cms/beitrag/10023431/7882683/>

Verbraucherzentrale Bundesverband e.V. (2018): Ein Jahr Mieterstromgesetz. Berlin, den 25. Juli 2018

https://www.solarwirtschaft.de/fileadmin/user_upload/bsw_posipap_mieterstrom_2018.pdf

8 ACRONYMS

Acronyms list	
CEC	Citizen energy community
CSC	Collective self-consumption
DSO	Distribution system operator
EMD	EU Electricity market directive (current recast: Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast))
EnC	Energy community
EV	Electric vehicle
LV	Low voltage
NECP	National Energy and Climate Plan
PV	Photovoltaic
REC	Renewable energy community
REDII	The current (second) EU Renewable energy directive (Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast))
RES	Renewable energy sources
SME	Small and medium-sized enterprises
TSO	Transmission system operator