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Collective self-consumption and energy communities: Overview of emerging regulatory approaches in Europe

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DISCLAIMER: Due to frequent updates of the national regulatory frameworks, it turned out to be difficult to provide an overview that is up to date for all discussed countries. Therefore, we may not have included all latest developments and do not claim completeness. Besides providing an overview on national developments, this paper thus serves as a basis for discussion and further analysis. The writing team is grateful for additional inputs and feedback. Contact: dorian.frieden@joanneum.at

I 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) and the electricity market directive (EMDII) provide basic definitions and requirements for the activities of individual and collective self-consumption as well as for two types of energy communities. Specifically, “renewable energy communities” (defined in the REDII) and “citizen energy communities” (defined in the EMDII), 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 specific provisions and needs to be finalized during the two years to come. Since a few years, the discussion and first implementation of collective self-consumption schemes is ongoing in some EU Member States (MS) while the legislative processes on energy communities is in its very early stage in most countries. Some MS, as well as Switzerland, have already introduced a regulatory framework allowing collective self-consumption in, e.g., multi-apartment buildings, an activity that is also promoted by the REDII. Simple PV self-consumption (self-consumption by one consumer) on the other hand is allowed in all EU MS, in conjunction with different types and levels of financial support. Simple self-consumption therefore is not specifically addressed in this paper.

The main aim of this paper is to understand and compare the emerging regulatory concepts in MS. This paper therefore provides an overview of the status quo of (emerging) national approaches for collective self-consumption and energy communities and assesses their relation to the EU directives. In addition, the case of Switzerland is presented to provide for a comparison.

2 DEFINITIONS

The three concepts addressed in this paper, namely collective self-consumption, renewable energy communities and citizen energy communities are explained and defined 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, 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.

2.1 COLLECTIVE SELF-CONSUMPTION (JOINTLY ACTING RENEWABLES SELF-CONSUMERS)

Collective self-consumption (CSC) is addressed in article 21 of the REDII. The REDII defines ‘renewables self-consumers’ as well as ‘jointly acting renewables self-consumers’ 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”. 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’.**

Currently some EU MS already allow CSC on building scale, others are extending it to block scale.

- **CSC on a building scale:** In this case, for instance, inhabitants of one multi-apartment building share produced renewable electricity. Also connected installations such as a storage system can be shared.
- **CSC on a block scale:** Here the area is enlarged to more than one building (including neighbouring buildings via direct lines) and correspondingly more actors are involved.

According to the REDII, besides electricity generation, the two types of renewables self-consumers should be able to operate electricity storage systems without underlying double charges, including network charges. The self-consumer’s installation may be owned or managed by a third party according to the consumer’s instructions. For electricity fed into the grid, (jointly acting) renewables self-consumers shall be granted non-discriminatory access to relevant existing support schemes as well as to all electricity market segments.

2.2 ENERGY COMMUNITIES

The Clean Energy Package contains two definitions of energy communities: The concept of Citizen Energy Communities (CEC), which is contained in the EMDII, and Renewable Energy Communities (REC), 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. These represent the final content that was agreed in the legislative process to the Clean Energy Package. They therefore serve as the basis for transposition of new EU rules into national legislation. Note that the term “Local energy community” was abandoned during the legislative process.

The final Clean Energy Package contains two definitions of energy community: Citizen Energy Community (CEC) which is contained in the provisionally agreed recast Electricity Directive, and Renewable Energy Community (REC), which is contained in the recast Renewables Directive.

Table 1: Comparison of the "Renewable Energy" and "Citizen Energy" Community concepts according to the REDII and the EMDII

Article 2(16) Recast Renewable Energy Directive 'Renewable Energy Community'	Article 2(11) Recast Electricity Directive 'Citizen Energy Community'
<p>A legal entity:</p> <p>(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;</p> <p>(b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;</p> <p>(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> <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> <p>(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;</p> <p>(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</p> <p>(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.</p>

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).
- Should be collective actions.

According to the EMDII, “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.

The overarching emphasis of the CECs definition is on a specific way to organize an activity – not the activity itself. However, the Definition of CECs also identifies different types of activities that CECs could engage in, although they are not limited to specific activities. The identification of these activities in the CEC definition is intended to acknowledge activities that CECs may engage in. Furthermore, the listing of activities in the definition does not imply that a CEC is meant to perform an integrated set of activities, even though integrated activities may be foreseen.

In general, **‘Renewable energy communities’** follow the same logic. However, they have more stringent governance requirements, are technology-specific around renewable energy sources, and are rooted in local communities. There is also a stronger obligation for Member States to promote the development of RECs, not just provide a level playing field (contrasted with 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 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).
 - 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 (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 EMDII 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 EMDII on closed distribution systems.

In addition, the EMDII 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. 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 renewable projects. Table 2

below provides an overview of activities, shareholders and members, as well as the entities that may exercise “effective control” of the community as foreseen in the REDII and EMDII. The following provides some explanation of the table.

Activities: The used wording in the two directives partly differs. For instance, in the EMDII, ‘**supply**’ is defined as “the sale, including resale, of electricity to customers”. However, although the REDII adopts the definitions of the EMDII, 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**’, departing fundamentally from traditional supply. Even though this concept is not specifically defined, Article 16 of the EMDII 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 EMDII 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 EMDII refers to electricity only. In addition, the EMDII provides following definitions that equally apply to 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;
- ‘**producer**’: a natural or legal person generating electricity.

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...”.

‘**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”.

It needs to be noted that the activities explicitly stated for renewables self-consumers, RECs and LECs are not of an exclusive nature, i.e. other activities may be carried out as well.

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 EMDII 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, as mentioned above, a limitation is expressed to “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 other traditional market actors that participate in the community as members or shareholders, or who cooperate through other means such as investment.”

Table 2: Activities and actors foreseen for renewables self-consumption (RSC) and the two types of energy communities under the REDII and EMDII

Activity	REDII		EMDII
	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	✓	(✓)	(✓)
Distribution (CEC: right for grid management optional on MS level)		✓	✓
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 (EMDII para 30a)

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

For collective self-consumption (CSC) the national approaches mostly refer to multi-family houses and mixed use with offices and/or small and medium-sized enterprises (SMEs). Partly, CSC is also enabled between different buildings. In this context, also storage is an important element to maximise the self-consumption rate of locally produced electricity and is partly specifically considered in the legislation, e.g. through incentive schemes. In some countries, CSC is currently allowed only in a limited way (e.g. via private grids) or tolerated within a regulatory grey zone. In the field of energy communities, legislation is much less advanced. The heterogeneity of national legislation in the analysed countries is very high and continuously changing. Where not stated differently, the following information is based on legislative texts and an exchange with national experts.

In 2016/2017 important legislative changes were introduced in Austria, France, Germany, and Switzerland related to the direct use of locally generated electricity by the tenants in multi-family houses or commercial buildings via a private grid. In 2016, Greece passed a law on virtual net metering which was complemented by a law on energy communities in 2018. Wallonia and Slovenia recently adopted laws on CSC and energy communities, while Luxembourg has drafted a law in 2018 that may still undergo important changes.

Table 3 gives an overview of currently available CSC and energy community schemes in the EU MS considered in this report and in Switzerland. In the case of energy communities, full transposition of the EU provisions is not yet the case in EU MS. However, specific elements or framework legislation with further need for specification are in place in some cases. Because legislation on energy communities often cannot clearly be attributed to either RECs or CECs, in the table no distinction is made. However, the detailed country sections will show that many frameworks have a stronger focus on either RECs or CECs. The case of Switzerland is a specific one as the EU definitions and regulations do not apply.

Table 3: Collective self-consumption and energy community frameworks in selected EU MS and Switzerland (PG = private Grid)

Country	Collective Self-consumption	Energy Communities
AT	✓ EIWOG 2017	Legislative process started (Renewables expansion law)
BE	✓ Wallonia, decrees in 2018, 2019	✓ Wallonia, framework legislation; decree in 2019
DE	✓ Tenant power model 2017	-
DK	PG only	-
EE	PG only, Electricity Market Act	-
ES	✓ Royal Decree 244/19	- (multi-building CSC)
FI	PG only	-
FR	✓ Law 2017-227, decree 2017-676	Legislative process started
GR	✓ 2016 law on virtual net metering	✓ Law N4513/2018 on energy communities 2018
LU	Draft electricity market bill 2018	Draft electricity market bill 2018
NL	PG only	-
PT	Legislative process started	-
SI	✓ Regulation on self-supply 2019	✓ Framework within regulation on self-supply 2019
SE	PG only	-
UK	PG only	-
CH	✓ Energy law and decree 2016/2017	✓ Energy law and decree 2016/2017

The following sections are split according to the status of regulatory frameworks. In the first section, frameworks that are already in place for at least CSC are presented. The subsequent section discusses emerging frameworks.

3.1 COUNTRIES WITH A REGULATORY FRAMEWORK FOR CSC/ENERGY COMMUNITIES IN PLACE

Austria's amendment of the electricity act in 2017 (ElWOG¹) supports private and commercial **CSC** (in e.g., multi-apartment buildings) which previously was hardly possible. The amendment defined specific aspects of these models on building scale such as the role of the different involved actors and the required contractual relationships between them. Neighbouring buildings so far are not covered. The measurement costs to be charged by the distribution system operator (DSO) were defined by the Austrian regulator e-Control. Regarding support schemes, 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 is the case in, e.g., Styria (Land Steiermark, 2018). On municipality level, for instance, the city of Graz implemented a CSC support in 2016². Since 2017, also a first support scheme for subsidizing CSC projects on national level is available (KLIEN, 2017).

In late 2018, a first outline for a new renewable energy legislation was presented that will come into force in 2020 ('Erneuerbaren Ausbau Gesetz 2020'). The new law will extend the scope of the CSC framework to energy communities. This includes **RECs** according to the REDII that may have cooperative structures for generating, storing and delivering renewable electricity across different real estate boundaries. According to the legislative plans, local grid structures can be established. To avoid the creation of unnecessary new grid infrastructure, however, new grid tariff structures are foreseen. These aim at incentivizing the use of existing grids via, e.g., local grid tariffs or rolling cost models for the system services (BMVIT 2018). Current discussions on local grid tariffs between the regulator and market actors involve the idea that consumers only using the LV grid also pay only the LV grid related share of the grid tariff. The spatial and regulatory boundary of an energy community would be the transformer station.

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 **CSC** 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 new rules, power surpluses may be shared with nearby consumers also in other buildings or fed to the grid. The generation facilities are connected to the internal network of associated consumers (direct lines) or to the low voltage network derived from the same center of transformation. Self-consumed energy from renewable sources, cogeneration or waste will be exempt from all kinds of charges and taxes. 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. In this case there will be a single type of subject, who will be the consumer.

¹ <https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007045>

² For the support as of 2018 see <https://www.graz.at/cms/beitrag/10023431/7882683/>

- 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.
- Production facilities not exceeding 100 kW power associated with surpluses will be exempted from the obligation to register as facility of electricity production 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.

In Wallonia/ **Belgium** in May 2019 a legislative framework promoting **CSC** and **renewable energy communities** was adopted (Gouvernement Wallon, 2019). Renewable energy communities are aimed to balance the consumption and production flux on the grid. According to this framework, the specific 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. 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 high quality cogeneration (co-generation with a specific efficiency). The law defines such a local perimeter as a grid segment whose connection points are located downstream of one or more stations of public electricity transformation of medium or low voltage. Thus, as opposed to proximity definitions using a predefined distance, local perimeters can have differing extents, taking into account in particular the technical constraints of the network. The specific conditions for local perimeters will be defined by future pieces of legislation in the coming months.

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 Walloon government has the right to review the list of eligible participants. So far, corporate participants must not have energy as their primary focus, professional or commercial activity. The renewable energy community can delegate the management of its activities to a third party. The renewable energy community does not require a supplier licence, except if it is mandated by its participants to sell the excess energy out of the “local perimeter”. Furthermore, the law defines “network managers” that implement, according to the regulated tariffs, the technical, administrative and contractual preconditions necessary, particular with regard to electricity metering. However also the DSO can be mandated by the renewable energy community to manage its distribution network. The grid tariffs for renewable energy community will still be defined, but the new law states that the tariff methodology should contribute to renewable energy community development. At the same time, the law aims at ensuring the balance between the interest of participating in renewable energy communities as well as the solidary coverage of networks costs and the contribution to taxes, surcharges and other regulated costs. Grid tariffs for the use of the public grid will be determined by the regulator, taking into accounts the benefits (loss avoided, investment avoided and development of renewable energy) brought forward by the renewable energy community. While renewable energy communities in Wallonia will benefit from local grid tariffs, the participation in a renewable energy community prevents self-producers to benefit from the net-metering regime accessible to private self-consumers (production under 10 kW). The procedure to create a renewable energy community requires the approval of the regulator and the DSO. This authorisation is provided for a set time and can be renewed. The government will also, in concertation with the DSOs and regulator, implement measures to facilitate the growth of renewable energy communities.

Germany is a country with an already long tradition in experiencing and developing **CSC** schemes on building scale. In 2017, the so-called “Mieterstrommodell” has been legally introduced (BMWV 2017), which 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 tariff 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 new 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.

Self-consumption in **France** is enshrined in law 2017-227³ and decree 2017-676⁴ which contain provisions for individual and **collective self-consumption**. These provisions are included in the French Energy Code. The definition of the two forms of self-consumption include that 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. CSC is allowed if electricity is produced and consumed by several consumers and producers linked together through a legal entity. According to the PACTE law adopted in April 2019, the geographical scope no longer relates to a transformer station but refers to proximity within the low-voltage grid. The proximity (1km probably) is to be acted soon through ministerial order.⁵

The DSOs (in France primarily Enedis) are required to equip each participant with a smart meter. Individual self-consumption is limited to a single person with on-site presumption. 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. The standard sharing consists of a *pro rata* attribution according to the consumption of each consumer in a 30 minutes interval. Net metering is not allowed for either scheme, avoiding that more electricity is treated as being self-consumed than the energy consumed instantly (Oriol 2018).

According to the regulator CRE, the aim is to design the national Distribution Grid Utilization Tariff (TURPE) in a way that takes into account the public grid costs caused by the different self-consumption schemes⁶. CRE is tasked to elaborate specific grid tariffs for self-consumption. Specific tariffs for “autoproductions” were implemented in August 2018. No tariff on self-consumed energy in individual self-consumption applies whereas a tariff applies in the case of CSC. Collective self-consumers can choose between the standard TURPE and CSC TURPE (Enedis 2018). The latter is more interesting than the standard TURPE only in case of a high share of self-production. In addition, for both, individual and collective self-consumption, a fee component is charged which relates to the specific management of

³ 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

⁴ Décret no 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

⁵ <https://www.actu-environnement.com/ae/news/adoption-loi-pacte-autoconsommation-33287.php4>

⁶ <https://www.cre.fr/Transition-energetique-et-innovation-technologique/Autoconsommation>

the self-consumption scheme (CRE 2018). The PACTE law expands the scope for collective self-consumption. The law modifies the definition of collective self-consumption in order to allow for large scale installations, proposing to abolish the 100 kW threshold currently set out in the French Energy Code. This removal of the division of production facilities would enable a wider range of CSC schemes to benefit from the specific TURPE.

Even though the described provisions refer to the term collective self-consumption (autoconsommation collective), some of the features such as the possible geographic boundary of 1km with use of the public grid tend towards the energy community concept.

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. In 2018, a **law on energy communities** (law N4513/2018) was introduced, that 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 consumption, distribution and supply, self-sufficiency and security in island municipalities. They are also expected to improve the efficiency in end-use at local and regional level, cogeneration, rational energy use, energy efficiency, sustainable transport, and demand-side management. Energy communities can produce, distribute and supply renewable energy from installations of up to 1MW. 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.

The law defines a minimum number of members as:

- five if the members are legal entities other than the local governments or private legal entities, legal or natural persons,
- three if the members are public legal entities or private law entities or natural persons, of which at least two are local governments, or
- two if the members are only local governments with less than 3,100 inhabitants according to the latter census.

At least fifty percent plus one of the members should be related to the location of the headquarters of the energy community, in particular the members being natural persons or members that have full or limited ownership. Also, the modalities of cooperative governance and ownership are defined in the law.

The activities of the energy community 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.

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.

Slovenia has adopted a new 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 regards the new 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 of the related EU directives. 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.

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.

- The customers who belong to the same collective scheme must sign a contract specifying the mutual relationships and the key for 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 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).

In **Switzerland**, a new energy law was adopted in 2016 (Energiegesetz, EnG), followed by an energy decree in 2017 (Energieverordnung, EnV). Both provide new 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 a “**self-consumption consortium**” (“Zusammenschluss zum Eigenverbrauch”- ZEV) or sold to the grid. These 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 FIT 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 new regulation from 1st April 2019, the framework, especially for a self consumption consortium, 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 investor, creating more favourable conditions for investors (Energie Schweiz 2019).

3.2 COUNTRIES WITH AN EMERGING REGULATORY FRAMEWORK FOR CSC AND ENERGY COMMUNITIES

In several countries, a regulatory framework according to the Clean Energy Package is under discussion or preparation. These include, for example Portugal and Luxembourg. While Portugal plans to publish a legislative proposal on CSC before summer 2019 Luxembourg has started a consultation process on a new electricity market bill that would update the current electricity market law of 2007.

Luxembourg, unlike EU regulation, so far integrates the concepts of CSC and energy communities, defining each of the concepts in relation to the other (Ministry of the Economy Luxembourg 2018):

- an energy community is defined as “a legal person constituted specifically for collective self-consumption”,
- collective self-consumption is defined as "consumption within an energy community of electricity produced from energy sources renewable energy and those from high-efficiency cogeneration by one or more members of the energy community at one or more of their sites"
- The draft bill thereby aims to enable CSC within an energy community, and in particular at regulating
- the creation and functioning of energy communities (more specifically defined as “a legal person constituted specifically for collective self-consumption and exclusively by network users, all of whom injection and sampling points are located on the same network segment downstream of a low-voltage medium-voltage electricity transformer substation operated by the distribution system operator concerned, and whose members are collectively able to manage their electricity flows in a way that benefits the network”) (in general applying to neighbourhoods) and
- the creation of virtual energy communities, where virtual energy communities are defined as “a legal person incorporated specifically for the purpose of collective self-consumption and exclusively by users of the network and / or local energy communities that are part of the same area of control” (this form allows for sharing of electricity amongst not geographically related members).

The bill is likely to undergo significant changes on the subject of energy communities and CSC. This has the aim to align it more closely with the provisions of the Clean Energy Package, albeit the aim is not yet to fully transpose the Directives (REDII, EMDII) at this stage.

3.3 COUNTRIES WITH LIMITED CSC PROVISIONS

In a few MS collective self-consumption exists outside of a dedicated regulatory framework. In several cases, CSC is enabled by regulatory exceptions. Where not stated differently, the following information is based on an exchange with national experts.

In Denmark, CSC is 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 power produced. There are charges for grid connection and grid access. Previously, annual net-metering was allowed and there have been several different schemes such as hourly metering. Annual metering, which was a substantial economic factor for CSC, is not allowed anymore. Currently, hourly net metering and instant net metering are in place. CSC can be carried out internally with only the main utility meter of the whole building serving the billing by an electricity provider. Internal billing can be carried out by, e.g., the building owner, based on the meters of the tenants. The building owner then is responsible for the meter administration but may also outsource this responsibility (including billing). Because this set-up requires participation of all tenants, these have to agree on this setup and it has to be part of the building use agreements. While this excludes the individual choice of a supplier for the residual energy demand, structures such as cooperatives exist in which the tenants jointly agree on the model and on the common electricity supplier to be involved. Older buildings can be rebuilt to this set-up that requires physical modifications for the metering scheme.

Third-party ownership is currently not accepted. An attempt of implementing a virtual net-metering scheme was made, but it never went into practice. One challenge was that the utilities had to administrate the scheme but did not have the required billing system in place. Thus, the initial costs for setting up such a system would have been high and would have to be carried by the potential first CSC customers.

No specific regulations on supporting technologies for self-consumption (storage, DSM...) exist. Also, for PV, no specific subsidies are available and no renewable energy technology specific support schemes are expected. Thus, the surplus of energy can only be sold to the market. A new Danish energy plan is under development, planned to be effective by 2020. Details are still not available but technology neutral tenders and auction schemes are planned. Overall, the economic and regulatory situation for PV in general and CSC is currently not very favourable in Denmark.

In Sweden, comparably 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 management⁷. 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. This has been done in a project in Halland, in southwest Sweden, using a DC micro grid⁸.

In Estonia, there have been no restrictions for apartment associations to divide and sell electricity to apartments, specifically for "a non-profit organization who sells and conveys electricity to its members

⁷ <https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2019/06/sou-201930/>

⁸ <https://www.bebostad.se/projekt/teknikutvecklingsprojekt/utveckling-av-helhetsloesning-foer-solel-i-bebyggelsen>

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 electricity meters.

In Finland, collective self-consumption is currently only allowed in locations where the connections are under an industrial network or a real-estate network that do not cross public land. The discussion on broadening CSC and creating energy communities has started. The Finnish Ministry of Economy proposed CSC including neighbouring buildings via direct lines and a “distributed” approach that would not have geographical limitations within Finland (Jasiak, 2019).

In the UK it is permitted to connect to a neighbour via a private line. In this way, a chain of properties can be formed as long as there are no breaks caused by public roads or non-participating properties. Moreover, it is prohibited to connect the private system to the public grid at any point. This also applies to communal buildings.

Table 4 provides an overview of features of (emerging) national regulatory frameworks for energy communities in selected countries. Many details on specific activities such as aggregation as well as on governance aspects (shareholders, members, organizational format, effective control) are not yet specified in most cases. Therefore, the table is limited as compared to the more extensive overview on the EU provisions in Table 2. The main purpose of Table 4 is to show the general direction that countries follow so far providing, e.g., insights on whether elements of the REDII or of the EMDII are represented more prominently.

Activities and actors in the two energy communities directives (✓ = specifically stated in REDII / applicable in MS, ✓ = specifically stated in EMDII / applicable in MS, ✓ = applies on MS level without specific requirements in EMDII and REDII).

Table 4: Overview of legislative design elements for selected countries

Concept and aims	EU Directives		National frameworks					
	RED Art. 22 RECs	EMD Art. 16 CECs	Slovenia	Austria	Greece	Spain	France	Belgium (Wallonia)
Only renewable energy	✓		✓	✓				
Only electricity		✓					✓	
Other forms of energy					RES and gas	RES/ CHP		electricity (RES/ CHP)
Energy Efficiency Services	-	✓	-		✓			
EV charging services	-	✓	-		✓			
Other energy services (RED: “commercial”)	✓+	✓	-		✓✓			
Specifications and responsibilities								
Specification of local area (e.g. transformer station, distance)			✓	✓		✓	✓	✓
Exemption from the need to become a formal electricity supplier			✓			✓ <100k W		✓
Support								
Special grid tariffs			-	✓	-	-	✓	✓
Support schemes			✓	-	-	✓	-	-

4 SYNTHESIS AND OUTLOOK

In several EU Member States, framework legislation is being established that still needs to be detailed or that implements only elements of EU legislation as a first step. In particular, several MS have started to establish REC and CSC provisions within the same legislative proposals while not yet fully addressing CECs (except Greece). Linking the implementation of the activity-based CSC to REC concepts seems a pragmatic approach as both aim for the expansion and self-supply of renewable energy. Also, the local nature of CSC is reflected in the requirements of RECs to retain the effective control by those community members that are located in the proximity of the renewable projects. However, constituting primarily an activity rather than an organisational structure, the CSC framework has a spatial limitation to the same building, multi-apartment block or possible neighbouring buildings but has lower requirements regarding its organisational set up. CSC schemes may therefore be faster rolled out as compared to RECs and a few MS such as Germany and Austria already have corresponding legislative frameworks in place. RECs, in contrary, allow for the use of the public grid and cover a broader range of activities and all forms of renewable energy (e.g. heating, cooling). They may therefore enable the creation of a range of new multi-energy business cases.

Regarding MS plans for energy community implementation a few patterns are visible. Several MS aim to link regulatory boundaries to physical boundaries of the energy system, i.e., the LV and/or the MV transformer station (e.g. Austria or Spain). This links physical and regulatory features, namely in terms of grid management as well as for tariff setting in relation to the used network segment. Several MS are currently developing local grid tariffs (Austria, Belgium, or France). Tariff setting is a core element of the current process of transposition but appears to be a challenging task as it has to consider (1) the impact of energy communities on the system and (2) guarantee a reasonable distribution of system costs over all customer groups. Other MS such as Spain provide support for energy communities rather than establishing specific local grid tariffs. Another important observation made in this report is that so far MS mainly address technical and economic features of energy communities and not yet have a clear vision of the organisational set-up.

In cases where CSC is still bound to joint supply by a common electricity supplier requiring participation of all tenants (e.g. in national approaches in Denmark and Sweden), finding consensus appears to be a major element for allowing actual implementation. While EU legislation reduces the need for consensus finding by allowing for individual participation (or opt-out) the issue of partial participation remains and can be expected to be a major issue for energy communities.

While both types of energy communities have a range of commonalities, some distinguishing features such as limitations to membership and effective control as well as proximity aspects are fundamental. Therefore, care should be taken that the specificities of CSC, RECs and CECs are appropriately distinguished and addressed in national frameworks and that all of these are enabled in a coordinated but independent way on national level.

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