ENERGY COMMUNITIES: INVENTORY OF BARRIERS & OPPORTUNITIES AND BEST PRACTICE

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Small glossary of energy justice[1]

Energy transition involves shifting a country's energy sources towards renewables, improving efficiency, and phasing out fossil fuels.

Renewable energy sources (RES) refer to energy obtained from natural sources that are naturally replenished at a rate higher than they are consumed.

Climate justice recognizes that certain groups of people are more affected by climate change, even though they have contributed negligibly to the problem. This global effort focuses on the needs and rights of the most vulnerable, ensuring that climate change is addressed fairly and equally for everyone.

Environmental justice focuses on acknowledging and addressing the disproportionately high and adverse human health or environmental effects on low-income communities.

Energy justice aims to achieve equity in social and economic participation in the energy system and address historical burdens on marginalized communities.

Energy poverty occurs when a household is forced to reduce its energy consumption to a level that adversely affects its residents' health and well-being. This issue is primarily attributable to three underlying factors: a significant portion of household income allocated to energy costs, low income, and inadequate energy efficiency.

Just energy transition is shifting from a fossil fuel-based economy to a new economy that offers respectful, fruitful, and environmentally sustainable livelihoods, fair governance, and ecological resilience. It requires establishment of an innovative, renewable economy centered on compassion and the importance of relationships of humans and nature.

Energy democracy emphasizes the involvement of those most affected by energy decisions in shaping them, promoting local control and citizen participation in various energy roles, not only as consumers but also as producers, distributors, owners, and collective users of energy.

Community energy refers to projects in which individuals have ownership or a noteworthy voice in RES or related services, such as energy efficiency.

Energy cooperative is a group of citizens working together on energy projects that benefit their community. The main goals are environmental protection and social and energy justice

[1] All the definitions are free interpretations of the Authors and were inspired by [1–7].

Contents

Introduction

This report was created with the goal of consolidating the legislative and regulatory frameworks of the energy communities within the four countries covered by the COPPER project: Denmark, Portugal, the Netherlands, and Norway. As a law that obliges member states to adopt and encourage the formation of energy communities was adopted at the European Union (EU) level, its implementation has resulted in various adjustments at the state level. This document summarizes the essential articles of the relevant European Directives, their adaptation at the level of the mentioned countries, and all the obstacles and barriers to establishing energy communities (ECs) arising from it. This approach makes it possible to assess the position of ECs in creating future energy systems and identify potential measures. Also, the analysis of legal documents is the starting point for preparing the following report within this project. It will enable the creation of an archetypal model that will examine the possible role of ECs in achieving positive energy districts (PEDs) that produce sufficient energy for their needs by applying RES. Looking at the position and opportunities of ECs in different legislative, climate, and social frameworks in Europe can provide insight into potential improvements to legislative frameworks adapted to national circumstances. This approach will provide a better understanding of the concept of PEDs and the role that citizens can take in its implementation.

The guiding question of this report is: what is the state of play in the selected countries regarding ECs and what are the main barriers and opportunities? This report is based on existing policy documents, analyses, and grey literature, all of which are cited in the text.

What is an Energy Community?

In 2019 the EU adopted the "Clean Energy for all Europeans" package [8], which helps EU to achieve the goals defined by the European Green Deal [9], which anticipates that Europe will become the first climate-neutral continent. The package aims to promote energy efficiency, adopt RES, regulate the energy market, and create new regulatory frameworks. Additionally, as part of the European Green Deal, it is expected that no one should be left behind; the package highlights that "consumers are at the forefront of the energy transition". The ongoing energy transition and EU goal mentioned above have underscored the importance and necessity of introducing the concept of ECs. Within the recent package, Energy Communities have been legally defined for the first time under two categories: Citizen Energy Community (CEC) [10] and Renewable Energy Community (REC) [11]. While bearing similarities to democratizing the energy sector, these two concepts principally differ in ownership structure and access[2]. In both instances, the primary aim of establishing communities is to deliver economic, environmental, and social benefits to the local community, prioritizing these over financial profit generation.

ECs involve various energy initiatives with active citizen participation in the energy transition. These communities can generate, sell (or resell) energy, use locally produced energy, and distribute energy. As the energy landscape evolves, citizens can help facilitate flexible energy consumption and storage. It is important to note that citizens can unite not only for participation in the *electric* energy sector but also for the production, distribution, and sale of *thermal* energy. They can also contribute to energy service projects aimed at enhancing energy efficiency and electric mobility [12]. Therefore, citizens can gather around different ideas that enable and facilitate them to become active participants in the (just) energy transition.

[2] *Citizen Energy Community* is a legal entity that 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 (Directive (EU) 2019/944);
Renewable Energy Community is a legal entity 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 which are natural persons, SMEs or local authorities, including municipalities (Directive (EU) 2018/2001)

Why are energy communities important?

ECS are expected to play a significant role in spreading RES throughout Europe, thereby contributing to decarbonization [13]. In 2021, more than 7700 ECs were active across the EU, with more than 2 million active citizens and installed RES capacity of 6,3 GW [14].

However, ECs are not only important from the point of view of reducing CO_2 emissions, but their social role is crucial too. They help democratize and decentralize the energy sector, allowing citizens to partake actively in the energy sector. An increasing number of households, public organizations, and small enterprises are anticipated to engage in energy production, offer demand-side flexibility, or store energy during periods of oversupply. On this basis, is estimated that by 2050, citizens may own over 45% of the energy produced by RES [15].

This is supposed to lead to a fair and inclusive energy transition. EC projects that invest in RES or energy efficiency (EE) offer social and economic benefits to local communities.

Establishing ECs can also provide citizens with energy at more favorable prices, open up opportunities for civil investments, and contribute to the development of local jobs [12]. As developed with the idea of "*by the people for the people*", trust-based ECs play an essential role in overcoming energy poverty and inequality within the energy system [16]. Vulnerable consumers with low income can participate and reap the benefits of getting energy from locally owned renewable energy (RE) for often a lower and more stable price than the market price, without having to invest in RE alone.

Also, ECs offer the entire range of organization, analysis, and implementation of social innovations that affect energy injustice and in which (energy-)vulnerable consumers become recognizable actors in energy changes [17]. Energy communities do not only create renewable energy but also shape active and educated communities through learning processes and citizens' education, thereby creating the basis for long-term investments in renewable energy sources [18]. As a concept, ECs can promote rural development and can ensure security of supply, reducing energy dependency and diversifying energy sources.

Barriers and opportunities for energy communities

Now that we have defined ECs and their role within the European energy landscape, we turn to the barriers and opportunities for ECs. The barriers encountered by initiatives when establishing

and sustaining ECs can be categorized into four groups: technical, social and cultural, financial, and regulatory & bureaucratic [19]. As the EC should exude a positive context [20], obstacles should be approached to find an appropriate solution, following national and local circumstances. The main barriers and opportunities for energy communities are shown in Table 1.

Table 1. Barriers and opportunities for energy communities [21–26]

BARRIERS	
Technical	Social and cultural
• Market for flexibility is still in early stage with a steady decline in price • Inadequate grid access • Saturation effect[3] • Lack of technical expertise • Shortage of production sites	• Lack of understanding of the concept of EC • Lack of legal knowledge • Suspicion about communities • Lack of awareness of climate-related issues • Lack of trust • Low willingness to dedicate time • Lack of skilled board members
Financial	Regulatory and bureaucratic
• High initial investments • Insufficiency of financial support and grants • Reliance on volunteers • Investment risk • Lack of warranties for energy projects	• Lack of control of the local distribution network • Contractual regulation with users of the EC • Too much bureaucracy and permitting • discrimination in favor of private companies • Lack of clear definition of EC • Unstable support scheme • Unsuitable procurement rules at the local level • Lack of open dialogue with officials • Need for a supplier license • Complicated administrative procedure • Lack of transparency • Registration procedure • Lack of municipality services • Lack of clarity over the kind of permits that EC's must be obtained from the municipality • Lack of legal templates that ECs can use • Overview of necessary legal documents, contractual templates, delivery conditions, price sheets eg. • Limited possibilities for municipalities to broaden the circle of participants in the EC, for example including large companies

[3] Grid saturation denotes the level of electricity output carried on the distribution grid. High grid saturation arises when the power generated exceeds the grid's capacity, leading to grid instability and necessitating grid operators to curtail electricity generators.

OPPORTUNITIES	
Technical	Social and cultural
• Providing production sites through public tenders or through local networks • Creating local skills and technical knowledge • Energy sharing • Time-of-use tariffs • Aggregation of production	• Raising awareness • Informative meeting • Instruments to promote trust • Cooperation with vulnerable households • Expanding individual and collective skills • Service and assistance for establishment of new EC • Energy democracy • Employment of people that can commit to the projects • Promoting local jobs • Maintain conditions for a thriving community-promotions in school and kindergarten
Financial	Regulatory and bureaucratic
• Reliable finance agreement support • EU fonds • Local and regional fonds • Bank loans • Crowd investment and crowdfunding • Capital from members • Lower energy costs for members • Appropriate financing tools	• Integration of EC into renewable support schemes • Clear definitions and regulations • Roles and responsibilities for system operators • Cooperation between supplier and EC • Capacity building for municipalities and EC through new knowledge, negotiation skills e.g.

Technical, social, and financial barriers are often very similar for the majority of EC across Europe. In contrast, regulatory and bureaucratic barriers are closely related to policies and regulations, which are country-specific and depend on the member states' willingness to democratize energy production and provision. However, it can be seen that in most European countries with undefined regulations, there is a certain space for misuse and fraud due to unclear frameworks [27]. Therefore, a clear and articulated national strategy is essential for enabling democratization, removing barriers, and establishing a support system [20].

Barriers and opportunities for ECs within existing legal frameworks

Regulation of the energy communities has begun with the adoption of important directives:

- DIRECTIVE (EU) 2018/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources [11]
- DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on common rules for the internal market for electricity [10]
- DIRECTIVE (EU) 2023/1791 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on energy efficiency and amending Regulation (EU) 2023/955 [28].

Important Articles of these directives relating to the EC are shown in Annex 1 and constitute the starting point for the legal empowerment of energy democratization and the further development of the concept.

Besides, in June 2024, the EU introduced a Directive improving the Union's electricity market design [29] and introducing new rules for energy sharing (art. 15a) that have to be implemented before the 17. July 2026. According to this article, Member States must ensure that all households, small and medium-sized enterprises (SMEs), and public bodies have the right to participate in energy sharing as active customers in a non-discriminatory manner within designated areas. Active customers can share RE through private agreements or legal entities, but this should not be their main commercial activity. Member States should implement measures to help vulnerable customers and those affected by energy poverty access energy sharing schemes, including financial support. Additionally, energy sharing projects owned by public authorities must make at least 10% of the shared electricity accessible to these customers.

Also, in September 2024, the European Commission published a guide to help Member States and stakeholders in implementing the revised directives on RE and EE [30]. Among the various recommendations, the guidance on Article 20a on sector integration of RES [31] puts emphasis on ECs through the active engagement of consumers. Additionally, it is noted that the distribution system operators have to make available (anonymized) data on the demand-response potential and electricity injected into the grid by the ECs.

The aim of the mentioned Directives is to define the REC and CEC and to empower citizens to invest in the green transition. Although the Directives broadly address the problems that communities face, EU Member States have the discretion to tailor these directives according to national frameworks. The primary aspiration of the Directives is to achieve equality and a non-discriminatory position for ECs and to secure appropriate support schemes for these communities.

After the introduction, the role of ECs in each analyzed country in a comparative way will be discuss. In the next section, the legal frameworks and the implementation of ECs in Denmark, the Netherlands, Portugal and Norway are reviewed.

Denmark

[4] Figures are adopted from: https://www.lemvarmevaerk.dk and https://www.hsfv.dk

Denmark has a long history of energy cooperatives and is one of the EU countries with the highest share of citizen ownership of energy investments, with more than 633 established energy cooperatives. In this form of organization, with citizens around joint energy projects, the participants of the cooperatives most often organized themselves around the projects of heating, or cooperatives that produce electricity from wind, solar energy or biogas. According to the estimation, 52% of Denmark's total wind turbine capacity was organized in some form of citizen ownership [32].

In previous citizen energy production, it was possible to independently generate from RES, most commonly by installing solar panels on rooftops and acting as prosumers. There are also many examples of the use of energy behind the meter. Electricity that is shred behind meter is defined by regulation and it is only possible within one building unit with one common meter (such as housing cooperatives).

It is also interesting to reflect on the example of Hvide Sande. This EC serves as a compelling testament to what is possible when a community comes together for energy independence. In 2012, this small town successfully installed three wind turbines and launched its first shared energy initiative. While it is not legally permissible for citizens to own an electricity grid, they took the initiative to create a mini grid based on the behind the meter concept. This remarkable effort exemplifies civic energy unity and has inspired numerous similar projects throughout Europe [33].

However, in order to provide an adequate response to the proposed European Regulations and to enable energy sharing, the Danish Energy Agency presented a new concept of ECs in 2019. According to the Danish National Energy Climate Plan (NECP) [34], ECs are joint terms for CEC and REC. In contrast to REC, CEC can be controlled by natural persons, local authorities, municipalities, or SMEs, although any entity is eligible to participate. The primary distinction between REC and CEC lies in the location of the members. In the case of REC, participants should be situated near the community's developed project, whereas for CEC, there are no specific location requirements for participants [35]. As well there is a new focus on sharing energy that is locally produced and used. Before it was not possible to share energy, but just to sell the energy on the net or use it behand the meter.

To implement the principles of Directive (EU) 2018/2001, and to develop a legal framework for ECs in Denmark, executive Order on *Renewable Energy Communities and Citizen Energy*

Communities and Electricity Trading Companies and Collective Electricity Supply Companies[5], stated that ECs may take part in the production, supply, consumption, aggregation, energy storage, energy efficiency services for charging electric vehicles or provide other energy services, but cannot own, establish, buy or rent a distribution network [36]. All the obstacles and regulation restrictions for the EC should be abolished, and the EC should be treated as non-discriminatory as other companies or consumers in the same field of activities. In that regard, ECs can have access to electricity markets, by establishing electricity trading, or as an aggregator. The Danish Utility Regulator should ensure that ECs are in accordance with the transparent and simple rules, but ECs are financially responsible if they cause imbalances in the electrical system [36].

These changes in the law have resulted in the establishment of a clear distinction between ECs and energy cooperatives. Unlike energy cooperatives, ECs may share the electricity produced and owned by the EC or members via a collective grid. In an EC the raw energy price is decided by EC. ECs are sharing electricity through the collective grid and is therefore subjects to network tariffs and electricity tax.

One way of overcoming full charging of sharing electricity was introduced as a local collective tariff for EC, when the total consumption reduced by the production helps the energy community to lower the grid load and especially to bring down the peaks and not exceed an agreed limit. In this way, electricity grids could benefit from ECs and the DSOs can reduce the expansion of the grid. [37]. Energy Communities have a positive impact on the electricity distribution network due to the requirement that electricity produced within the Community must be used within 15 minutes of generation. This approach encourages the participation of multiple stakeholders with varying consumption patterns.

[5] Bekendtgørelse om VE-fællesskaber og borgerenergifællesskaber og forholdet mellem VE fællesskaber og borgerenergifællesskaber og
elhandelsvirksomheder og kollektive elforsyningsvirksomheder

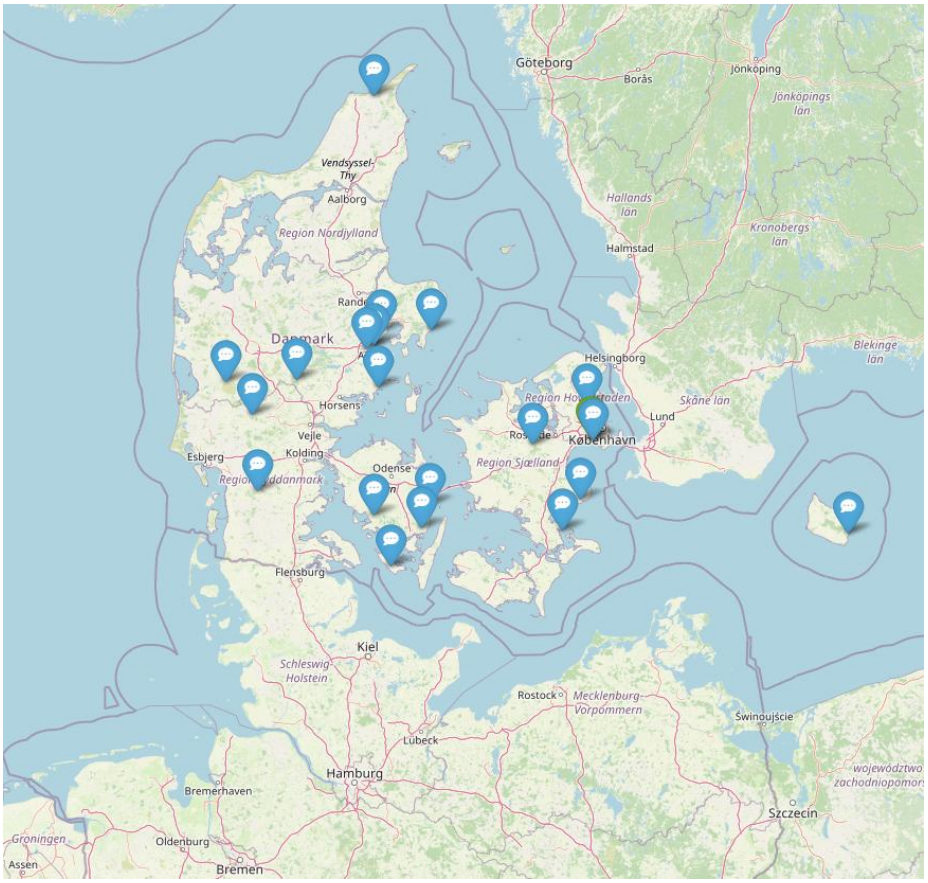

Figure 1. Map of new ECs that can share electricity in Denmark [38]

In ECs that deal primarily with heating, sharing is regulated less restrictively than for electricity. So far, Denmark has a rich history of district heating cooperatives, with more than 64% of district heating owned by consumers [39] and more than 320 district heating cooperatives [40]. The Danish heat supply act [41] aims to promote a heat supply that is socio-economically and environmentally acceptable for consumers. In the same way, the Act promotes the use of RES in the heating sector and ensures that all actors are treated equally. The legislation delineates the specific conditions under which municipalities are authorized to conduct heat supply activities, and under which district heating is defined as a not-for-profit public service. It is noted that under the Heat Supply Act, district heating companies must make district heating their main business activity. As such, district heating can be part of the EC only if it is owned by the people or municipalities. In the case of a district heating EC, all energy produced can only be distributed within the energy community, but not outside its borders.

In March 2024, the Danish Energy Agency presented the EU's new concept of energy sharing in accordance with the newly revised EU Electricity Market Directive [42] that entered into force on

the 16th of July 2024. The Danish Energy Agency, along with the Danish TSO, will over the next two years try to implement the new rules on example of energy sharing. In this context, energy sharing will be possible between active customers. They will be able to share via the collective grid without the creation of a legal entity such as an ECs. This surplus energy can be shared either at an agreed price or free of charge, based on the arrangement made between the participants, although tariffs and taxes must still be paid.

An *active customer* refers to a final customer or a group of final customers who consume or store electricity produced within their specific area, or self-generate or share electricity from other areas, or sell electricity they produce, or participate in flexibility or energy efficiency schemes. However, these activities should not constitute their main business or professional activity.

Energy could be shared between Small and Medium Enterprises (SMEs) and households within the same bidding zone. If Denmark decide that bigger companies are allowed to share energy this can only be in a more restricted geographical area and the installed capacity of the generation facility must not exceed 6 MW. The sharing of energy must be facilitated through a collective grid and can be facilitated directly or through a third party. Energy sharing is not contingent upon the production facility being in direct physical proximity to the active customers involved in the sharing. It is permissible to transfer the right to share energy from another active customer without the necessity of owning, renting, or leasing the production facility used for energy sharing.

Although energy sharing among active consumers does not imply the creation of energy, the possibility of involving more public services and larger industries represents an opportunity to create a new concept of decentralization of the energy sector.

The Netherlands

So far, in the Netherlands, citizen-led energy initiatives are mostly organized as a cooperative, foundation, association of owners, or company [32]. In 2023, the Netherlands had 714 energy cooperatives (Figure 2), of which 301 cooperatives work in the field of energy savings, 70 in collective heat projects, 146 in solar projects, and 105 in wind projects [43].

Figure 2. Maps of energy cooperatives in Netherlands [43]

Since cooperatives are defined as private companies, there are barriers for them to enter the electricity market. For any changes or infrastructure installations, cooperatives are required to engage in a tender process with private companies. This often results in a situation where they become reliant on other actors in unequal market competition. To overcome this barrier, the support of local initiatives is possible through different incentives, such as the Subsidy scheme for Cooperative Energy Generation (SCE), with a total budget of 100 million EUR [44].

Up until now, under the previous Electricity Act and Gas Act, sharing energy between community members was practically impossible [32]. Therefore, energy cooperatives could sell energy to the supplier, who would then sell it back to the community. Currently, pilot projects for energy sharing are underway in informal ECs under the guidance of Energie Samen, which co-developed this program under the name *Local4Local*. These projects include energy sharing initiatives, typically in the form of virtual energy sharing, involving both citizens and SMEs. Additionally, Energy Hubs

are being developed as a solution to alleviate grid congestion, although these ECs are primarily composed of SMEs.

The only exceptions were acting through experimental schemes under the Stimulation of Sustainable Energy Production (SDE+) program: the new Electricity Act Experiments Scheme and Dutch Green Deals [32]. Implementation of the Energy Agreement for Sustainable Growth increased the energy generation by citizens and energy communities under the same postal code and implemented tax reductions for citizen energy [45]. In this way, it was feasible to achieve cost savings through the generation of own energy, simultaneously fostering the engagement of citizens in an equitable energy transition. Also, a national program for Regional Energy Strategies [46] was developed with the same goal of expanding RES and involving locals in the energy transition, with the goal of 50% of wind and solar projects being owned by citizens.

Local ECs have been mainly focused on the development of shared electricity production facilities in the Netherlands. Lately, the number of ECs that deal with heat supply is increasing, with almost 30 projects of district heating ECs in progress in the Netherlands[6]. This change can positively affect the rising need to switch from natural gas, on which the heating sector depends. To promote the establishment of new energy cooperatives in district heating, Danish EBO Consult A/S and the Cooperative Energie Samen received a grant "Energy Export Initiatives Grant Program" from the Danish authorities [40]. The grant will focus on establishing the foundational framework for a cooperative support aimed at facilitating the growth and implementation of local district heating initiatives.

However, in order to comply with EU regulations, on 10 December 2024, a new Energy Act[7] was approved by the senate, and the definitions of CEC and REC are being established for the first time in the Netherlands. The Energy Act replaces the Electricity Act 1998 and the Gas Act, combining them into one new law [47]. The new Energy Act includes a single definition of EC, combining both CEC and REC under one definition. As outlined in the definition of this legislation, ECs are recognized as legal entities engaged in energy market activities designed to yield environmental, economic, and social benefits for their members and the local areas they operate in, whilst not making profit [48]. According to the explanatory memorandum of the Energy Act,

[6] Energie Samen, oral announcement
[7] Energiewet

local collaborations such as ECs can stimulate participation in the energy transition, lead to higher financial investments, and increase consumer choice[8] .

According to Article 2.4 in the Energy Act, ECs need to meet several conditions, including:

1. Participation in the EC should be open and on a voluntary basis;
2. The members, owners or shareholders of the EC should have the right to leave the community;
3. Decision-making should lie with the members, owners or shareholders of the EC, which may include individual people, micro businesses, small businesses, municipalities, regional water authorities, provinces, or joint regulations.

In the case of EC developing RE projects, the Energy Act stipulates that the members, owners or shareholders of the EC can be in the vicinity (*"nabije omgeving"*) of the RE generation projects. Decision-making about such EC should be attributed equally amongst either individual people, municipalities, regional water authorities, provinces, joint regulations or micro, small or medium-sized enterprises; all involved parties should have an equal vote.

However, Article 2.30 in the preliminary Energy Act stipulates that citizens, enterprises and/or local governments should in principle be able and allowed to directly share energy with each other. It mentions that each active energy consumer within the community should have a consumption and production contract with an energy distributing company offering energy sharing facilities (Art. 2.30, sub a/b), and make use of a measuring device (Art. 2.30, sub c). Additionally, the energy sharing should occur within the timespan of a single Imbalance Settlement Period (ISP) (15 minutes), as well as within a geographical area that can be specifically defined using local jurisdictions (Art. 2.30.2).

Enabling the sharing of energy within members of EC has been argued to offer a number of opportunities, as was recently discussed in an expert hearing about the preliminary Energy Act in the Dutch Senate [49] and during a presentation at the national congress for regional energy and local heat[9]. The most relevant contributions that energy sharing can deliver are the following:

- *Lower costs:* Energy sharing can reduce energy bills by using (in part) locally generated and cheaper RE.

[8] MvT Energiewet, p. 31
[9] NPRES/NPLW presentation on energy sharing ("Energie delen"), 11/18/2024

- *Greater ownership:* Energy sharing activates citizens and businesses to invest in renewable generation, thereby diminishing their dependence on large energy companies and shifting to more local solutions. This can help strengthen support for solar and wind farms, for example, and can make the Netherlands more energy independent.
- *Legal equality:* If properly regulated, energy sharing increases legal equality with respect to net-metering, for example, because more groups from society can participate, such as tenants and residents of apartment buildings.
- *Resolving grid congestion:* Energy sharing can help reduce grid congestion by encouraging simultaneous, local and collective use of renewable energy generation, which alleviates the burden on energy transport capacity.

Portugal

[10] Figures are adopted from https://www.coopernico.org

In order to promote energy transition and active participation of consumers in the energy sector, a new legal framework was introduced. Decree-Law 162/2019 [50] enables the establishment of REC. REC is legally established as an entity, whether operating for profit or not, and is founded on the principles of open and voluntary membership. This includes the participation of individuals, small and medium-sized enterprises, or local authorities. The community operates autonomously from its members or partners and is effectively controlled by them. Members or participants should be located near the RE projects or actively involved in related activities. The primary objective is to provide environmental and social benefits to its members or the localities in which it operates, rather than focusing solely on financial gains. For the first time, citizens, businesses and other public/private entities are able to produce, consume, share, store or participate in energy market with renewable energy.

According to the *Article 19-Renewable energy communities* of the Law, RECs should ensure compliance with the national energy and climate goals. RECs can produce, consume, store, and sell RE, including through renewable power purchase agreements. The entities have the capability to distribute the RE generated by their production facilities among themselves. Sharing should not affect the rights and responsibilities of the REC members as consumers. Additionally, RECs have the right to access energy markets, both directly and through aggregation, in a non-discriminatory manner. The final energy consumer has the right to participate in an REC while maintaining their rights and obligations as a consumer. RECs are responsible for any deviation in the energy system and are subject to fair, proportionate, and transparent procedures, including the registration and licensing process. Additionally, an REC is responsible for cost-based network charges, as well as other applicable fees and taxes, ensuring that they contribute to the overall costs of the system fairly and equitably. This is in line with a transparent analysis of the cost-benefit ratio of the distribution of energy sources developed by the competent national authorities. RECs are not subject to discriminatory treatment regarding their activities, rights, and obligations as final consumers, self-consumers, electricity suppliers, distribution system operators, or other market participants.

Apart from REC, Decree-Law 15/2022 also introduced the concept of CECs. Community members of a CEC must be located in the vicinity of the community development project, that must be owned and developed by the community. As in the case of REC, the main goal of a CEC is to provide environmental, economic and social benefits to its members, or the environment

where the project is developed, rather than financial benefit. Unlike RECs, CECs can own, establish, purchase or lease a distribution network. The distribution network must be established in accordance with the distribution network operator regulation. The CEC can be involved in the production of electricity from RES, to own and develop and manage charging stations for electric vehicles, or energy storage facilities. When the distribution network is part of the EC, it must deliver electricity to its members.

In the NECP of Portugal [51], ECs are recognized as the main carriers of the promotion of social innovation, empowerment and inclusion of citizens in the energy sector and contribute to social and economic development, with the possibility of providing assistance to energy poverty. According to the NECP, in order to promote ECs effectively, it is essential to implement a program for disseminating information and reinforcement for community building. This will serve to reduce information asymmetries and provide crucial support for municipalities and citizens in their development endeavors.

In this context, the action plan involves supporting programs to establish ECs in collaboration with municipalities, updating the online portal to facilitate the verification and digitization of licensing processes, and providing comprehensive information on establishing the community. Additionally, the program will promote technical manuals outlining clear procedures for various types of communities, including agrivoltaics.

The Law on the National Energy Systems (Decree-Law 15/2022) [52] enables the sharing of energy and collective self-consumption. Self-consumers, that are members of a collective of self-consumers, have to establish a management entity responsible for the operational management of an internal network, a connection with the national grid, and the sharing of the electricity.

Both RECs and CECs can share energy through specific dynamic control systems. In RECs, the rules of collective self-consumption can be applied, with the necessary adaptations. Users involved in self-consumption have access to network tariffs in accordance with the established costs. As ECs should be established on a non-discriminatory basis, every member has the right to withdraw from the EC, without the need for providing economic or any other additional compensation [53].

Currently, ECs in Portugal often involve a diverse range of participants, including citizens, municipalities, industries, social football clubs, schools, parishes, business associations, and

voluntary fire services. In some cases, the electricity generated is shared with underprivileged families in the neighborhood to address energy poverty.

There is only one agricultural REC, which consists of farmers from irrigation associations.

In February 2023, there were 372 new applications for the establishment of EC, with 95 being approved [54]. The EC in Portugal that produce energy from photovoltaic (PV) panels are illustrated in Figure 3.

Figure 3. Map of existing (PV) energy communities in Portugal [55]

Norway

[11]

[11]Figures are adopted from https://smartsenja.no

As Norway is not a member of the European Union, it does not bear the legal obligation to implement CEC and REC. In addition, a long maintained low price of electrical energy, as well as the energy system that relies dominant on hydro energy, do not promote implementation of the CEC concept. Directorate under the Ministry of Petroleum and Energy, concludes that there are in fact no local energy communities (LEC) in Norway that involve genuine end-user participation.

So far in Norway, LEC are formed when multiple individuals, households, or actors collaborate to produce and store electricity locally. This enables the grid company to operate the network without having to invest in expensive infrastructure. Provided that production and storage occur within the circuit of a single transformer station, opportunities arise for improved monitoring and local trade. These arrangements facilitate favorable grid operations and the creation of business models that promote the use of smart grid technology, distributed RE production, and storage. As the popularization of electric cars grows in Norway, with the projection that during 2025 every new car will be electric [56] smart use of grid is important.

Although not in accordance with the EU's definition some initiatives do exist, but only a few has been implemented so far, mostly gathered around pilot projects (Figure 4.).

The key actors for implementing LEC in Norway include the most influential stakeholders in the Norwegian energy system. These are the Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Energy Regulatory Authority (NVE-RME), the Norwegian Transmission System Operator (TSO) Statnett, the Distribution System Operators (DSOs), municipalities, citizen communities, and private companies. NVE is responsible for ensuring reliable electricity supplies and regulating energy systems while also issuing licenses for both energy production and transmission. Their work is particularly significant in research and development projects, especially in initiatives involving LEC. NVE-RME focuses on overseeing the Norwegian electricity and gas markets, ensuring that they comply with national legislation. They actively participate in advancing various innovative projects related to LEC. Additionally, the TSO plays a crucial role in managing the national transmission network, ensuring that electricity supply is consistent with national regulations. On a more localized level, the DSO oversees the regional and distribution network, managing the distribution model and holding the necessary licenses to operate effectively. Together, these entities contribute to a well-functioning energy landscape. In Norway, public stakeholders are actively participating in LEC as a vital step towards a sustainable green transition. By adopting new solutions for RE production and implementing smart management

capabilities, these companies aim to reduce the load on the grid, thereby limiting future investment costs. Also, Financial incentives play a crucial role in driving DSO to invest in LEC [32]. Several energy communities were founded as cooperation between energy cooperatives and municipalities, private companies or other participants. The primary objective of establishing LEC is to achieve economic benefits, such as defer grid investments, and add value to property. Some of the energy communities are built as research examples [32]. In this framework, real estate companies, housing associations can invest in RES for their internal consumption. Also, Energy communities can emerge in remote areas to produce, store and share energy due to unstable electricity supply. Usually, those LEC involved DSO, citizens, companies, local authorities and academia.

In Norway, energy sharing ins also possible within industrial zone. Although doesn't include citizens, those industrial clusters are important since they help avoiding or reducing grid upgrade cost and promote flexible electricity demand through optimization and intersectoral integration [57].

Currently, sharing is limited to properties with the same parcel number. It would be valuable to pilot projects allowing sharing within neighborhoods, with cost-sharing models for grid services. The Norwegian Energy Regulatory Authority (RME) has suggested regulatory changes to facilitate energy sharing within the same property, enabling customers to produce and distribute energy internally before feeding surplus into the grid.

In Norway, the establishment of LEC is regulated by law. The LEC in Norway primarily include DSOs who invest in local flexible markets, energy production, and storage. They also develop microgrids on remote coastal islands to stabilize energy supply while various stakeholders invest in renewable energy solutions for residential housing associations. The main reason is the country's energy distribution network operates under a monopoly and is regulated by the state. The NVE is managed by the Ministry of Petroleum and Energy and oversees the energy system and supply. According to the Energy Act, the DSO is responsible for developing and maintaining the electricity network. In contrast, any electricity production, conversion, transmission, and distribution can only be estimated with possessing the relevant area licenses [32]. Since DSOs have area license, these legal provisions give the State's DSO a monopoly over the LEC. The possession of licenses is necessary for the voltage over 230 V but it released LECs of obtaining other licenses, such as a network assets license. Area licenses allow LECs to become a DSO, which in turn comes with legal obligations, such as ensuring a grid connection and a secure electricity

supply for all consumers in the specified area. However, there are exceptions, such as non-payment for connections or if the user does not reside at the address full-time. LEC are also expected to cover the costs of network investments. Small producers, with a capacity less than 200 A and voltages below 230 V, are not required to obtain special approval. However, LEC are rarely recognized within these frameworks.

To facilitate the sharing of electrical RE among LEC members, they must possess a micro-grid, effectively making the community a DSO. Consequently, the community must obtain a trading license as a network operator, which entails additional responsibilities. These include regular reporting of economic and technical data related to network activities, as well as taking on the responsibility for measurements, including the installation of measurement points and data collection. Furthermore, as the LEC that owns the network, it must adhere to the principles of neutrality and allow third-party access to the network if a member of the LEC decides to withdraw [58].

If the community does not adhere to these principles, a special permit, a single network assets license, is required for each connection within the voltage range of 1000 V AC and 1500 V DC. Procuring this permit is equally demanding as obtaining the Area License. It is important to note that when installing PV panels, only one consumer connection is allowed, limited by energy sharing among community members. To overcome this barrier LECs can form an electricity production company. Additionally, if communities intend to supply electricity to multiple locations, separate licenses are required for each location. The exception of this rule is electricity generated from onshore wind, provided that the total capacity is 1 MW or less and the number of turbines does not exceed 5 [58].

In July 2022, the Norwegian Energy Regulatory Authority (RME) submitted a proposal for the introduction of a model for sharing surplus production for consultation. The consultation period ended on September 30, 2022, and RME received 48 responses. In November 2022, RME recommended implementing the model for sharing surplus RE production. The model allows producers to share their production with other grid customers on the same property, which is particularly relevant for customers in multi-unit residential buildings and commercial properties. On December 19, 2022, the Ministry of Finance adopted an amendment to the regulation on excise duties. This amendment provides an exemption from the electricity tax for power generated from renewable energy sources that is used on the same property. The exemption is geographically limited to the property associated with the production facility and allows for the

virtual distribution of power via the external grid. To qualify for this exemption, there is a maximum limit of 500 kW of installed capacity per property [59]. As of October 2023, Regulatory amendments in Norway have come into effect, permitting the sharing of self-produced renewable electricity on the same property. With these changes, the maximum limit of installed capacity within the same housing unit has been increased to 1 MW [60].

Additionally, in December 2024, the Ministry of Energy and the Ministry of Finance of Norway will publish a draft document for public consultation. This document will allow commercial companies to participate in the sharing of RE, primarily from photovoltaic (PV) panels, from plants with a total installed capacity of 5 MW [61].

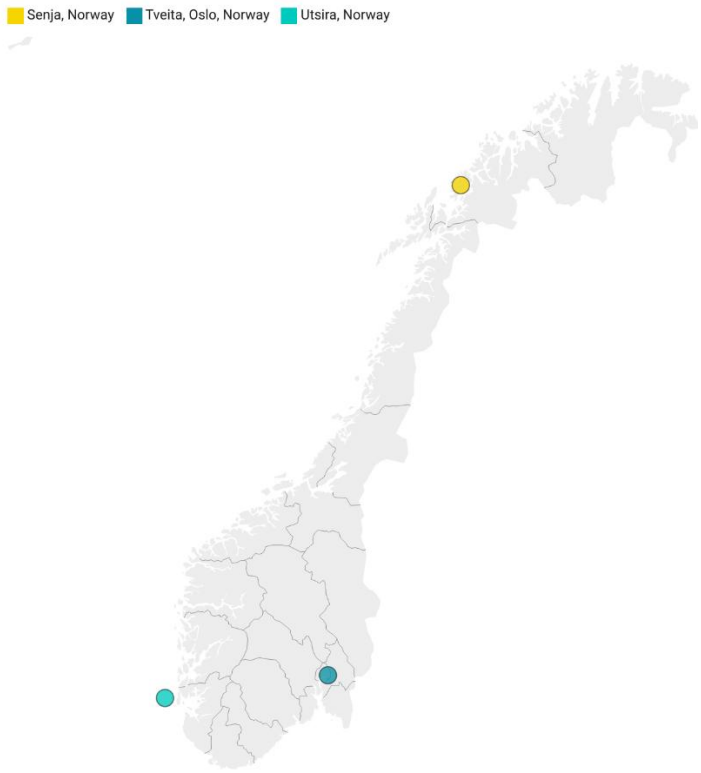

Figure 4. Examples of LEC in Norway

Overall comparison

The countries under analysis have adapted European Directives to align with their specific legal and regulatory frameworks (Figure 5). Nonetheless, they face several common challenges, including high initial investment costs and complex bureaucratic processes. Furthermore, the involvement of various stakeholders remains limited, resulting in restricted access for industry, with the exception of small and medium-sized enterprises (SMEs). This limitation is particularly notable, as industry possesses the potential to make significant contributions to mitigating grid congestion, given its distinctive energy consumption patterns.

Figure 5. Compliance of definitions of REC and CEC with EU regulations within the analyzed countries

It is important to refer to a new NIS2 directive of the EU [62], pertaining to a high level of cybersecurity. While the need for such regulatory frameworks is very justified, it can result in very high costs for energy communities.

It is evident that, despite numerous ambiguities and complex procedures, civil energy and the democratization of the energy production are increasingly becoming significant changes in the energy sector, even in countries where traditional structures are still prevalent, and concept of EC is still in development. In this regard, in order for citizens to become prominent drivers of the energy transition, it is imperative to remove obstacles and to turn barriers into opportunities. It

was noted that in spite of various forms of civil action, the definition of energy communities is not always clear and fully aligned with European legislative frameworks in place (see Figure 5). The comparison of barriers and opportunities for the establishment of energy communities in the analyzed countries is presented in Table 2.

By comparing all analyzed countries, the clearest definitions of REC and CEC are presented in Danish legislative frameworks [63]. In this country, the definitions encompass all requirements of EU regulations and include additional details aimed at rejecting abuse and discrimination. Although defined by the legal framework governing communities (such as associations, partnerships, cooperatives, or capital), definitions of obligatory citizen participation are not clearly outlined.

In the context of Portugal, both the definitions for CEC and REC of 2022 are outlined in the legislation. These definitions closely mirror EU regulations but lack specific details regarding their implementation within the country. There is ambiguity surrounding ownership within the REC, as it allows third parties to have installations, which contradicts the terms outlined in the Renewable Directive. In terms of Effective Control and Eligibility, the definition of REC exceeds the European standard, as it requires community members to be located near the project and includes a special review of self-consumption. On the other hand, the definition of CEC is quite rudimentary, lacking clear opportunities for management control and allowing medium-sized enterprises to control CEC, contrary to the Electricity Directive [64].

The legislative framework in Norway mentions local energy communities, but it has not fully been adjusted to EU regulations since the country is not a member. Furthermore, the frameworks for EC are strictly defined, which can limit citizen participation (Chapter 3).

Although an EU member, the Netherlands adopted a new Energy Law at the end of 2024 defining the EC and mentioning the possibility of energy sharing. Until now, there have been no clear legal definitions of EC in the Netherlands, although they are widely recognized and widespread and mostly act in the form of energy cooperatives. Energy cooperatives, as such, are largely coincident with the definition of the REC within EU regulations. Within the adoption of future laws in the field of energy, as well as the development of a new draft NECP, clear definitions of these concepts are expected.

Table 2. Overall comparison of ECs opportunities and barriers in analyzed countries

Country	Who can participate in energy sharing?	Barriers	Opportunities
Denmark	Citizens, SMEs, Municipalities, district heating companies	• CEC and REC cannot operate their own distribution network • General tariffs and taxes are applied to electricity shared through the collective grid • Restrictions on the possibility of owning an electricity distribution network • Availability of information and help form DSOs depends on their attitude towards EC	• Clear technical procedures • Electricity sharing in housing communities is possible • ECs are seen as an opportunity for innovation • Non complicated and clear solution for heat energy • Advisory support
The Netherlands	Will be available between citizens, enterprise and/or local governments	• There are still new and unclear definitions of the EC • ECs have the same requirement as other participants in energy market • Financial barriers and high investments upfront • Dependence on other actors to set up communities (DSO, municipalities, companies) • Energy sharing is not fully possible due to legal limitations	• Business model for electricity supply is more appealing due to the high electricity costs • ECs have a strong and highly active representative • Collaboration between local government and organizations • ECs are supported by DSO

Portugal	Individuals, SMEs, local authorities	• ECs are responsible for all deviation in the electric system, like overload • Management entity is mandatory for all forms of self-consumption • ECs and collective self-consumers must pay for electrical installation used for electricity sharing • Bureaucratic process of getting license for RES	• Sharing of electricity is possible among EC members • Access to all energy markets • Program support for promotion and establishment of EC • Energy agency developed simulation tool for techno-economic feasibility
Norway	Same property (example: multiapartment building or commercial properties)	• The Energy Act limit ECs to produce, share and store electricity among buildings • Legislative framework that enables sharing PV electricity between more consumers • Necessity of license possession • Restriction on the battery size	• Available financial incentives • Governmental support for new projects and solutions • Secure supply for rural areas

Examples of best practice

Energy communities and Positive Energy Districts

Now that we have analyzed the legal situation and barriers and opportunities of ECs in each of the countries, we will turn to the concept of Energy Districts. We will review the different conceptualizations of energy districts and next we will discuss the (possible) roles of ECs within energy districts.

The concept of energy districts was created to accelerate the energy transition and achievement of the European Green Deal goals. The analysis of energy districts continues with the zero-energy concept related to reducing energy consumption and producing energy demand using locally available RES, such as energy-positive buildings and neighborhoods.

The energy district can be classified into five groups (Fig.6) based on energy consumption criteria [66]:

- Nearly Zero Energy District: high energy performance but does not achieve a zero-energy target throughout the year. However, it meets almost all of its remaining energy demand through on-site or nearby RES;
- Zero Carbon Districts: Without using sources that emit carbon dioxide, they produce enough energy to be carbon neutral on an annual basis;
- Zero stand-alone Districts: not grid connected and generate their own RE, storing excess energy in batteries (neither import nor export);
- Net Zero Energy Districts: connected to the grid but the same amount of energy is exported and imported annually. No fossil fuels is used.
- Positive Energy District: As part of the SET-Plan Action 3.2 [67] Positive energy districts are defined as "*districts with annual net zero energy imports and with Zero CO_2 emission, with the aim of achieving surplus energy production from RES*". The similar definition can be found in other EU programs based on the need to meet the total annual energy demand

within the analyzed area [68]. The EER JPSC program three categories of PED are proposed [69]:

- PED autonomous: district with clear geographical boundaries that covers all the energy demand from self-production. Energy import at any moment is not possible (electricity, district heating, gas). Export is allowed.
- PED dynamic: districts with clear geographical boundaries in which more energy is produced than needed. Energy can be exchanged with systems outside the boundaries.
- PED virtual: RES can be utilized outside the system's geographical boundaries, but the energy production from virtual or onsite RES should be higher than the system's energy demand.

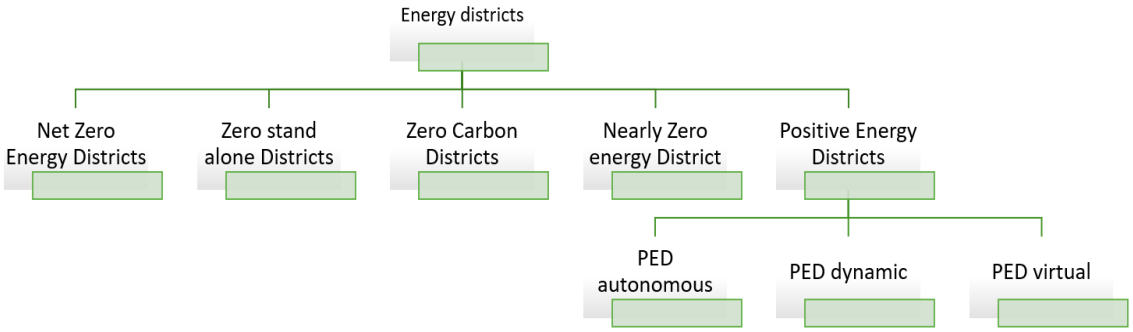

Figure 6. Energy district classification

At the same time, European regulations recognize ECs as key players in the energy transition. They serve to attract private sector investment and promote public acceptance of energy projects, thereby facilitating the utilization of RES in the long term. As ECs bring together stakeholders who are in the vicinity of the project, they can contribute to the establishment of the PED vision through the active involvement of interested citizens and local communities.

In this regard, there are numerous examples of good practice in Europe (Table 3), in which citizens have united and become active participants in the energy transition, with the aim of producing surplus energy and decarbonizing at the local level, creating PEDs of their ECs.

Table 3. Examples of best practice

Country	*Energy community*
Sweden	Simris
Finland	LEMENE – Lempäälä
Germany	Bioenergy Municipality Neustrelitz
Slovenia	COMPILE pilot site Luče
Netherlands	Republica
	Aardehuis

Pilot site Luče

COMPILE Pilot site Luče [70] is located in Upper Savinja Valley in Slovenia. This EC represents a good example of rural EC aiming to overcome low voltage network problems and unstable connection to the grid. The goal is to increase the local energy system's self-sufficiency and security, including residential and commercial buildings with a high penetration of RES. Luče EC aims to improve network conditions, resulting in numerous socio-economic benefits, such as supporting local agricultural businesses. Luče aims to maintain citizens' interest in energy and climate topics, establish trust in the EC and local RES production, and become the first EC in Slovenia which will be able to cover the electricity demands only from RES. PV plants of total capacity of 102 kW have been installed, together with 150 kW of community battery, 5 households' batteries and electric vehicles charging point. Also, in this community Home Energy Management System as well as Micro-grid control were integrated

Simris

Simris [71] is a self-sufficient EC in Sweden based on 100% renewable, locally generated electricity. The project had been launched in 2015., to prove that self-sufficient energy solution is possible. Electricity is generated by combining PV, wind, batteries, and a biofuel for run backup electricity generation. Smart energy control system is integrated in the energy community, providing stability of supply. Residents of Simris are usually prosumers (they produce and use their own electricity), utilized their heat pumps, PVs, and batteries to enhance the system's flexibility. Any surplus energy beyond the consumers' needs was sold to E.ON, who is the main supporter of the project. Installed batteries enable electricity storage and help balance the grid. With the integration of RES and storage, the Simris EC can operate in island mode when needed.

LEMENE – Lempäälä energy community

LEMENE [72] is an example of self-sufficient EC in Finland. This advanced system comprises PV panels, gas engines, district heating, energy storage, and fuel cells, all efficiently controlled by a cutting-edge microgrid controller. The capacity of PV plant and electric battery is 4 MW, each. Also, combined heat and power (CHP) biomass plant of 8.1 MWe is used to produce electricity and heat for district heating network. Besides, two CHP fuel cells are used in the community's smart grid, representing the first one in Finland.

The LEMENE energy system is designed to meet future demands and can seamlessly integrate new production units and consumption methods. LEMENE is committed to ensuring the area's energy supply and leading the way in decentralized, RE production. This innovative work has been developed in collaboration with a local university, and present unique system on national scale, supported by Ministry of Economic Affairs and Employment of Finland.

Bioenergy Municipality Neustrelitz

City of Neustrelitz [73] present a self-sufficient EC, based on biomass CHP plants, located in Germany. The project was realized in cooperation of municipality and 20 000 citizens of Neustrelitz, with the idea of energy independence, and a stable price of energy. Energy community connected 533 households and 38 public buildings. The annually heat production of biomass CHP is 45 000 MWh, and electricity 63 000 MWh, saving over 14 000 t of CO_2. With this energy production units 74% of total energy used is from RES, aiming to reach climate neutrality.

Aardehuis

Earthship (Aardehuis) [74] neighborhood presents unique example of sustainable and self-sufficient EC located in Netherlands. Neighborhood consists of 12 energy efficient houses, build from a locally available material. The construction and orientation of the houses ensures high energy performance and heat pumps or wood stove are used for heating, when needed. Annual production of PV panels is 60 300 kWh, ensuring neutral total electricity demand.

Conclusion

An analysis of the recent regulations pertaining to energy communities in Denmark, the Netherlands, Norway, and Portugal indicates a range of strategies employed to foster local energy initiatives. Each of these nations has established regulatory frameworks that are specifically designed to address their distinct energy requirements, political contexts, and societal conditions. While these frameworks present valuable opportunities for development, they also encounter certain challenges in the establishment of sustainable ECs.

Denmark has become a leader in supporting ECs by implementing local initiatives and favorable regulations that encourage citizen involvement. However, there are still obstacles, such as complicated administrative procedures and difficulties in securing long-term financing.

Similarly, the Netherlands promotes ECs through introducing new Energy laws and innovative projects, but it faces challenges in balancing commercial interests with local participation.

Progress in the development of ECs is also observed in Portugal. This country is experiencing accelerated development through incentives and regulatory reforms that encourage local communities to take a more active role in the energy transition but faces issues of capacity and technical support.

Norway, with its focus on RES, offers significant potential for ECs, but its high dependence on hydropower and centralized energy system are an obstacle to decentralization and active citizen participation. However, Norway is currently noticing changes in regulations and in the interest of citizens in starting LEC projects.

Despite the challenges that exist, there are substantial opportunities for the development of ECs in the analyzed countries. Energy sharing can foster energy democratization, reduce reliance on fossil fuels, and enhance energy security. At the same time, successful establishment of ECs relies on clear regulations and financial support.

ECs can be a driving force behind the establishment of PED by actively engaging citizens, promoting local energy production and distribution. Citizens who produce their own energy, encouraged by potential positive changes, can significantly contribute to the decarbonization of neighborhoods, cities, and countries.

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Appendix 1- EU directive on EC

DIRECTIVE (EU) 2018/2001 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources

Article 18- Information and training

6. Member States, where appropriate with the participation of local and regional authorities, shall develop suitable information, awareness-raising, guidance or training programs in order to inform citizens of how to exercise their rights as active customers, and of the benefits and practicalities, including technical and financial aspects, of developing and using energy from renewable sources, including by renewables self-consumption or in the framework of renewable energy communities.

Article 22- Renewable energy communities

1. Member States shall ensure that final customers, in particular household customers, are entitled to participate in a renewable energy community while maintaining their rights or obligations as final customers, and without being subject to unjustified or discriminatory conditions or procedures that would prevent their participation in a renewable energy community, provided that for private undertakings, their participation does not constitute their primary commercial or professional activity.

2. Member States shall ensure that renewable energy communities are entitled to:

(a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements;

(b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers;

(c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.

3. Member States shall carry out an assessment of the existing barriers and potential of development of renewable energy communities in their territories.

4. Member States shall provide an enabling framework to promote and facilitate the development of renewable energy communities. That framework shall ensure, inter alia, that:

(a) unjustified regulatory and administrative barriers to renewable energy communities are removed;

(b) renewable energy communities that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities;

(c) the relevant distribution system operator cooperates with renewable energy communities to facilitate energy transfers within renewable energy communities;

(d) renewable energy communities are subject to fair, proportionate and transparent procedures, including registration and licensing procedures, and cost-reflective network charges, as well as relevant charges, levies and taxes, ensuring that they contribute, in an adequate, fair and balanced way, to the overall cost sharing of the system in line with a transparent cost-benefit analysis of distributed energy sources developed by the national competent authorities;

(e) renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators, or as other market participants;

(f) the participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households;

(g) tools to facilitate access to finance and information are available;

(h) regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly;(i) rules to secure the equal and non-discriminatory treatment of consumers that participate in the renewable energy community are in place.

5. The main elements of the enabling framework referred to in paragraph 4, and of its implementation, shall be part of the updates of the Member States' integrated national energy and climate plans and progress reports pursuant to Regulation (EU) 2018/1999.

6. Member States may provide for renewable energy communities to be open to cross-border participation.

7. Without prejudice to Articles 107 and 108 TFEU, Member States shall take into account specificities of renewable energy communities when designing support schemes in order to allow them to compete for support on an equal footing with other market participants

Article 24- District heating and cooling

6. Member States shall put in place, where necessary, a coordination framework between district heating and cooling system operators and the potential sources of waste heat and cold in the industrial and tertiary sectors to facilitate the use of waste heat and cold. That coordination framework shall ensure dialogue as regards the use of waste heat and cold involving, in particular renewable energy communities involved in heating and cooling.

DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on common rules for the internal market for electricity [10]

(46) *Citizen energy communities should be allowed to operate on the market on a level playing field without distorting competition, and the rights and obligations applicable to the other electricity undertakings on the market should be applied to citizen energy communities in a non-discriminatory and proportionate manner.*

Citizen energy communities should not face regulatory restrictions when they apply existing or future information and communications technologies 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. Electricity sharing enables members or shareholders to be supplied with electricity from generating installations within the community without being in direct physical proximity to the generating installation and without being behind a single metering point. Where electricity is shared, the sharing should not affect the collection of network charges, tariffs and levies related to electricity flows. The sharing should be facilitated in accordance with the obligations and correct timeframes for balancing, metering and settlement.

(47) *This Directive empowers Member States to allow citizen energy communities to become distribution system operators either under the general regime or as 'closed distribution system operators'. Once a citizen energy community is granted the status of a distribution system operator, it should be treated as, and be subject to the same obligations as, a distribution system*

operator. The provisions of this Directive on citizen energy communities only clarify aspects of distribution system operation that are likely to be relevant for citizen energy communities, while other aspects of distribution system operation apply in accordance with the rules relating to distribution system operators.

DIRECTIVE (EU) 2023/1791 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on energy efficiency and amending Regulation (EU) 2023/955

(64) *To empower and protect people affected by energy poverty, vulnerable customers, people in low-income households and, where applicable, people living in social housing, and to implement policy measures as a priority among those people, Member States can require obligated parties to achieve energy savings among those people. For that purpose, Member States can also establish energy cost reduction targets. Obligated parties could achieve those targets by promoting the installation of measures that lead to energy savings and financial savings on energy bills, such as the installation of insulation and heating measures, and by supporting energy savings initiatives by renewable energy communities and citizen energy communities.*

(117) *Member States should, therefore, consider and promote the role of renewable energy communities and citizen energy communities. Those communities can help Member States to achieve the objectives of this Directive by advancing energy efficiency at local or household level, as well as in public buildings, in cooperation with local authorities. They can empower and engage consumers and enable certain groups of household customers, including in rural and remote areas, to participate in energy efficiency projects and interventions that can combine actions with investment in renewable energy. Energy communities can have a strong role to play in educating and increasing citizens' awareness of measures designed to achieve energy savings. If properly supported by Member States, energy communities can help fighting energy poverty through the facilitation of energy efficiency projects, reduced energy consumption and lower supply tariffs.*

(118) *Member States should empower such actions by citizens through support for community energy projects and organisations.*

Atricle 22-Information and awareness raising

(9) *Member States shall take appropriate measures to support a multilateral dialogue among relevant partners, such as local and regional authorities, the social partners, owners' and tenants' organisations, consumer organisations, energy distributors or retail energy sales companies, ESCOs, renewable energy communities, citizen energy communities, public authorities and agencies, with the aim of setting out proposals on jointly accepted measures, incentives and guidelines pertinent to split incentives between owners and tenants or among owners of a building or building unit.*

*Article 25-****Heating and cooling assessment and planning***

(g) *assess the role of energy communities and other consumer-led initiatives that can actively contribute to the implementation of local heating and cooling projects;*