Energy Citizenship and Energy Communities for a Clean-Energy Transition

D3.3

Catalogue of potential legal and economic barriers and facilitators of energy citizenship

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022565

Document Description

Document Name	D3.3 Catalogue of potential legal and economic barriers and facilitators of energy citizenship
Document ID	D3.3
Date	19.9.2022
Responsible Organisation	University of Graz, Law Team
Author(s)	Maria Bertel, Celin Gutschi, Brigitta Lurger, Piotr Szymański, Magdalena Rozwadowska, Bożena Ryszawska,
Co-Author(s)	Markus Mogg
Reviewers	WUEB, Economics Team
Dissemination Level	Public

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101022565. Neither the European Commission nor any person acting on behalf of the Commission is responsible for how the following information is used. The views expressed in this publication are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission.

Abstract

This report analyses the legal and the economic framework for energy communities and describes major barriers and facilitators to citizens' activity and engagement in community energy projects. The analysis reveals several pathways to overcome existing barriers and to facilitate citizens' engagement in such projects, thus strengthening energy citizenship.

Table of Contents

Contents

List of Abbreviations

ABGB	Allgemeines Bürgerliches Gesetzbuch
AG	Aktiengesellschaft
AGer	Amtsgericht
ARERA	Autorità di Regolazione per Energia Reti e Ambiente
Art	Article
BGB	Bürgerliches Gesetzbuch
BGBl	Bundesgesetzblatt
BGH	Bundesgerichtshof
BlgNR	Beilagen zu den Stenographischen Protokollen des Nationalrates
BT-Dr	Bundestagsdrucksache
B-VG	Bundes-Verfassungsgesetz
BOE	Boletín Oficial del Estado
BW	Burgerlijk Wetboek
CC	Codice Civile
CEC	Citizens' energy community
COA	condominium owners' association
DSO	Distribution System Operator
EAG	Erneuerbaren-Ausbau-Gesetz
ed	editor
eds	editors
EEG 2021	Erneuerbare-Energien-Gesetz 2021
e.g.	exempli gratia, for example
ElWOG 2010	Elektrizitätswirtschafts- und -organisationsgesetz 2010
ErlRV	Erläuterungen zur Regierungsvorlage
EnWG	Energiewirtschaftsgesetz
EnWZ	Zeitschrift für das gesamte Recht der Energiewirtschaft
et al	et alii, and others
EC	Energy community, energy communities

ec	energy citizen, energy citizens
et seqq	et sequentes, and the following
ElW	Elektriciteitswet
EW	Energiewet
GenG	Genossenschaftsgesetz
GG	Grundgesetz für die Bundesrepublik Deutschland
GmbH	Gesellschaft mit beschränkter Haftung
HGB	Handelsgesetzbuch
i.e.	id est, that means
IIS	Integrated Information System
IMA-VO 2011	Intelligente-Messgeräte-Anforderungsverordnung 2011
IME-VO	Intelligente-Messgeräte Einführungsverordnung
IMED	Directive for common rules for the internal markets for electricity, OJ 14.6.2019 L 158/125
INEK	Integral National Energy- and Climate Plan
ISAP	Internetowy System Aktów Prawnych
KG	Kommanditgesellschaft
Kli.EN-Fonds-G	Klima- und Energiefondsgesetz
KOWR	Krajowy Ośrodek Wsparcia Rolnictwa
KSchG	Konsumentenschutzgesetz
KPEIK	Krajowy Plan na rzecz Energii i Klimatu
kW	Kilowatt
LAU	Ley 29/1994, de 24 de noviembre, de Arrendamientos Urbanos
LC	Ley 27/1999, de 16 de julio, de Cooperativas
LCCT	Ley 7/2021, de 20 de mayo, de cambio climático y transición energética
LES	Ley 2/2011, de 4 de marzo, de Economía Sostenible
LPH	Ley 49/1960, de 21 de julio, sobre propiedad horizontal
LSE	Ley 24/2013, de 26 de diciembre, del Sector Eléctrico
LSK	Leitsatzkartei des deutschen Rechts
MRG	Mietrechtsgesetz

MsbG	Messstellenbetriebsgesetz
MW	Megawatt
MWh	Megawatt hour
MWp	Megawatt peak
MWth	Megawatt thermal
NFOŚiGW	Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej
no	number
NGO	Non Governmental Organization
OG	Offene Gesellschaft
OGH	Oberster Gerichtshof
OJ	Official Journal
ÖSG 2012	Ökostromgesetz 2012
PV	Photovoltaic
para	paragraph
PNIEC	Plan Nacional Integrado de Energía y Clima
RdW	Recht der Wirtschaft
REC	Renewable energy community
RED II	Renewable Energy Directive, OJ 21.12.2018 L 328/82
RIS	Rechtsinformationssystem
ROP	Regional Operational Programmes
SNE-V 2018	Systemnutzungsentgelte-Verordnung 2018
Strom-NZW	Netzzugangsverordnung
UGB	Unternehmensgesetzbuch
UOZE	Ustawa z dnia 20 lutego 2015 r – i odnawialnych źródłach energii
UPE	Ustawa z dnia 10 kwietnia 1997 r – Prawo energetyczne
UPS	Ustawa z dnia 16 września 1982 r – Prawo spółdzielcze
VerG	Vereinsgesetz
VvE	Vereniging van Eigenaren
WEG	Wohnungseigentumsgesetz
WEG 2002	Wohnungseigentumsgesetz 2002

wbl	Wirtschaftsrechtliche Blätter
WP	Workpackage
ZWE	Zeitschrift für Wohnungseigentumsrecht

1 Introduction

The aim of WP3 is to gain a systematic understanding of the legal and economic/market conditions that shape energy communities and the emergence of energy citizenship based on the conceptualization of energy citizenship acquired in WP2. As laid down in WP2 participation in an energy community is one of the most pronounced expressions of energy citizenship, therefore the analysis puts a strong focus on energy communities. Based on the analysis of the legal and the economic framework for energy communities and energy citizenship which resulted in two Deliverables (D.1, D.2) as well as on four Co-Creation Workshops which took place in spring 2022 (Task 3.3), this deliverable identifies barriers and facilitators for energy communities and energy citizenship. This deliverable will provide therefore an analysis of the legal rules and the economic factors that make it easier (facilitators) and legal rules and economic factors that make it more difficult (barriers) for consumer-citizens to become active and to engage in energy communities.
The analysis of the facilitators and barriers will further the understanding of the relationship between energy citizenship, energy communities, the legal framework and the economic conditions. It will support the empirical studies in WP4, and will be the base for the co-creation of tools in WP5, and the development of recommendations in WP6.

The deliverable comes in three parts: The first part (3) consists of a legal analysis of facilitators and barriers (written by Maria Bertel, Celin Gutschi, Brigitta Lurger), the second part (4) contains the economic analysis of facilitators and barriers (written by Magdalena Rozwadowska, Bożena Ryszawska, Piotr Szymański) and in the third part (5), the results of the Co-Creation workshops are summarized.
Whereas the aims of the legal part and the economic part are the same - to gain a systematic understanding of the legal and economic/market conditions that shape energy communities and the emergence of energy citizenship – the approach used differs by academic discipline: Whereas the law team is relying on an analysis of legal norms of selected EU countries (Austria, Germany, Italy, Poland, Spain and the Netherlands), the economics team applies the PESTEL[1] method, and not only focuses on the countries already mentioned, but also enriches its analysis by other examples, where appropriate. Regarding terminology, again due to differences between the disciplines, some variations occur. In the legal part, the definition of energy communities is narrower, relying on the RED-II and the IMED directive. In the economics part, the meaning of energy communities is broader, encompassing also energy cooperatives or other joint forms of energy production or usage.

[1] https://blog.oxfordcollegeofmarketing.com/2016/06/30/pestel-analysis/ (6.9.2022).

2 Executive Summary

The legal and economic analysis, in conjunction with the co-creation workshops, show three major barriers to citizens' activity and engagement in community energy projects.

1. First, in many countries, the legal framework does not sufficiently support or even prevents the establishment and successful operation of energy communities. In some cases, specific legal rules for energy communities are lacking. Sometimes, private law rules (e.g. housing, property law) have not been sufficiently adapted to the needs of community forms of energy production, thus preventing their establishment or endangering their future operation. Most countries lack legal rules concerning peer-to-peer trade. These problems, consisting of the lack of rules or the lack of appropriate adaptations of existing rules, can only be resolved by lawmakers, not by citizens themselves.

2. Second, in many countries, we observe a lack of reliable and easily accessible information, accompanied by a highly complex and not sufficiently transparent legal framework. The gap in the knowledge and skills (managerial, financial, technological) between incumbent actors and newly established communities is big and could be reduced by mutual exchanges and other measures. In general, all information tools which increase the relevant and actionable information of citizens and empowers them to easily proceed in their community energy activities are welcome. From the legal perspective, we recommend institutionalised forms of information and assistance which are made available to all citizens for free: as for instance, central points of information or personalized assistance by energy experts for every citizen who needs it (energy coaches). Specific legislative measures to reduce the complexity and non-transparency of the respective legal situation in the Member States should be taken as well.
   From an economics and management perspective infrastructural support at the information level (concerning mainly economic and legal aspects) and the operational level (energy management, energy settlement, costs, and revenues) is recommended, which could be compiled and collected in a toolbox for citizens, where the entire process of establishing a community and its running is presented for bottom up and top down initiatives.

3. Third, the economic analysis shows, that many households are not able to afford to start or be part of an energy community. Governments could empower citizens by providing funding, reducing taxes, or making loans available as well as promoting citizens' activities through a strong role of municipalities.

3 Barriers and Facilitators from the Legal Perspective

3.1 Structure of Legal Framework, Information and Accessibility for Citizens (One-Stop-Shop, Energy Coach)

3.1.1 The degree of implementation of EU directives

3.1.1.1 Description of the problem

When it comes to energy communities and collective self-consumption, not all countries studied have implemented the IMED and RED II. No implementation at all can be a barrier because citizens cannot make use of the possibilities energy communities are offering. At the same time, incomplete implementation can be a barrier as well because incomplete transposition can lead to legal vagueness.

3.1.1.2 Specifications

In **Austria**, not only already existing legislation was amended[2] but also an entirely new statute was enacted in the form of the EAG. It contains regulations on RECs in its sixth section.[3] To implement the IMED, existing statutes – in particular the ElWOG 2010 – were amended.[4] In **Italy**, the provisions relevant for energy communities of the RED II have been implemented by the Legislative Decree no 199/2921 of 8th of November 2021.[5] The respective provisions of the IMED have been implemented by the Legislative Decree no 210/2021 of 8th of November 2021.[6] In **Spain**, the two EU Directives were (partly) implemented by the LSE[7] and Royal Decree-Laws which are changing the LSE. The most significant change came with the Royal Decree-Law 23/2020 of 23rd June[8] which introduced REC to the Spanish legal system. **Whereas** the former German government thought that the already existing forms of decentralized energy generation are sufficient and that further implementation was therefore not necessary,[9] the EEG 2023 will introduce renewable energy communities.[10] **Poland** has

[2] §§ 16c et seqq ElWOG 2010. See also *Storr*, Energierecht (2022) 155 ff.
[3] §§ 79, 80 EAG. See also *Storr*, Energierecht (2022) 155 ff.
[4] §§ 16b, 16d et seqq ElWOG 2010.
[5] https://www.normattiva.it/atto/caricaDettaglioAtto?atto.dataPubblicazioneGazzetta=2021-11-30&atto.codiceRedazionale=21G00214&atto.articolo.numero=0&atto.articolo.sottoArticolo=1&atto.articolo.sottoArticolo1=10&qId=6600637b-27fc-4057-80c9-fd8807585e8f&tabID=0.39298457145461296&title=lbl.dettaglioAtto (6.9.2022).
[6] https://www.normattiva.it/atto/caricaDettaglioAtto?atto.dataPubblicazioneGazzetta=2021-12-11&atto.codiceRedazionale=21G00233&atto.articolo.numero=0&atto.articolo.sottoArticolo=1&atto.articolo.sottoArticolo1=10&qId=fd9359b0-e1ef-4fa9-8dc0-feb96b1527b0&tabID=0.39298457145461296&title=lbl.dettaglioAtto (6.9.2022).
[7] https://boe.es/buscar/act.php?id=BOE-A-1997-25340 (6.9.2022). See also *Gallego Córcoles*, Comunidades de energía y transición energética (2022) and *Fajardo*, El autoconsumo de energía renovable, las comunidades energéticas y las cooperativas, Noticias de la economía pública, social y cooperativa 66 (2021) 34 ff.

[8] Real Decreto-ley 23/2020, de 23 de junio, RD 23/2002, https://www.boe.es/eli/es/rdl/2020/06/23/23/con (6.9.2022).
[9] Draft bill on a law to implement EU requirements and to regulate pure hydrogen networks in energy law (Gesetzesentwurf der Bundesregierung, Entwurf eines Gesetzes zur Umsetzung unionsrechtlicher Vorgaben und zur Regelung reiner Wasserstoffnetze im Energiewirtschaftsrecht), BT-Dr 19/27453, 9.3.2021, 57, https://dserver.bundestag.de/btd/19/274/1927453.pdf (6.9.2022).

also not fully implemented both Directives into the national legal order. Two legal proposals[11] were published and planned to be adopted by the Council of Ministers. Since in the meantime, the Minister of Climate has changed, it is unclear whether those projects will be processed further. Most likely, there will be a new proposal. In **the Netherlands** implementation of both Directives is planned for 2022.[12]

3.1.1.3 Best practice example(s)

Austria as well as Italy have fully implemented the directives.

3.1.1.4 Suggestions of improvement from the co-creation workshop

Citizens are calling for laws in easy and accessible language (see below, e.g. Groningen Co-Creation workshop). [13] Therefore, lawmakers or governments should provide citizens with accessible information on the legal situation.

3.1.2 Degree of complexity of legal framework

3.1.2.1 General constitutional framework - Different legislators as a barrier and a facilitator for citizens to become active

3.1.2.2 Description of problem

Four out of the six countries studied are federal (Austria[14], Germany[15]) or decentralized states with legislative competencies of the regions (Italy[16], Spain[17]). This means that (sometimes) not only different levels of government are competent to legislate on energy communities, but that also in fields relevant to energy communities (such as eg spatial planning laws) different levels of government might be compelled to legislate. Therefore, different rules might apply in different regions, and the conditions to engage in an energy community might vary.

3.1.2.3 Specification

Where citizens are called to become active, they have to know about the situation in their respective regions. Since founding an energy community is a complex process entailing many aspects, different rules for energy communities in each region as well as different rules regarding spatial planning laws and e.g. plants can make it more difficult for citizens to get active.[18]

---

[10] Draft bill on a law on immediate measures to accelerate the expansion of of renewable energies and further measures in the electricity sector (Gesetzesentwurf der Bundesregierung, Entwurf eines Gesetzes zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor), BT-Dr 20/1630, 2.5.2022, https://dserver.bundestag.de/btd/20/016/2001630.pdf (6.9.2022).
[11] Project No UC74 https://legislacja.rcl.gov.pl/projekt/12347450 (6.9.2022); Project No UC99 https://legislacja.rcl.gov.pl/projekt/12357005 (6.9.2022).
[12] https://www.internetconsultatie.nl/energiewet (6.9.2022).
[13] See appendix part 1.
[14] See Art 2 B-VG and *Öhlinger/Eberhard*, Verfassungsrecht, 13th ed (2022), 116 ff.
[15] See Art 20 German Grundgesetz.
[16] See, Title V Italian Constitution. See also *Gamper*, Die Regionen mit Gesetzgebungshoheit (2014) 259 ff.
[17] See Art 2 Constitución Espanola.
[18] See above 3.1.1.4.

At the same time a federal or regionalized structure might lead to competition between the different regions or states.[19] For the general situation of the citizens involved, it might be helpful if one region e.g. implements generous rules for energy communities as other regions might follow the example later on.

3.1.2.4 Suggestions for improvement

The improvements are addressing especially lawmakers in decentralized, regionalized and/or federal states. They should consider that the legal framework can be confusing for citizens. Cooperation between the different levels, e.g. in providing information on a joint webpage with links directing towards the homepages of the regional and local authorities competent could help to at least achieve a higher degree of legal security.

3.1.2.5 Suggestions of improvement from the co-creation workshop

See above, 3.1.1.4.

3.1.3 Different rules on collective self-consumption and energy communities

3.1.3.1 Description of problem

Collective self-consumption and energy communities might be regulated differently.[20]

3.1.3.2 Specification

For citizens wanting to engage themselves collectively, it seems complicated to find out whether they should opt for organizing themselves under the umbrella of collective self-consumption, as active customers acting together, or as an energy community (REC or CEC).

3.1.3.3 Best practice example

The new Dutch Energy Act[21] does not tie specific legal consequences to specific legal forms of energy communities. Instead, it stipulates rules for small plants and small producers of energy. Therefore, the legal consequences depend on the capacity of the plants and not on the legal form. Advantages the energy community brings do not depend on the character as an energy community, but they do depend on the actions undertaken. The focus on actions leads to a simplification of the general legal situation. It does not matter whether a certain plant is used for self-consumption, collective-self consumption or exchange of energy within an energy community.

3.1.3.4 Suggestions for improvement

If a system like the Dutch one is implemented, less problems will arise. In cases, where the distinction between collective-self consumption/active customers acting collectively has to be upheld,

[19] *Jones*, Dynamic federalism: competition, cooperation and securities enforcement, Connecticut Insurance Law Journal 11 (2004), 107 (121 f).
[20] See Art 15 para 3 and Art 16 IMED and Art 2 para 15, Art 21 and Art 22 RED II.
[21] Energiewet Draft, available at https://wetgevingskalender.overheid.nl/regeling/WGK010483/documenten/Raad%20van%20State/Adviesaanvraag%20aanhangig%20bij%20Raad%20van%20State/1 (6.9.2022).

information not only on energy communities, but moreover on other forms of collective consumption of energy should be provided.

3.1.4 Central point/website for information on energy communities

3.1.4.1 Description of problem

Many people interested in energy communities are simply overwhelmed by the task of setting up an energy community. At the beginning, it is important to obtain information about the various aspects (permits needed, the installation of the generation plant, establishment of the community, legal issues), which can be obtained from various sources. Obtaining this information is often time-consuming and (in the case of legal advice) also costly.

It must also be considered that too little information is a problem, but on the other hand, an overabundance of information can also lead to consumers feeling overwhelmed.

3.1.4.2 Specification

A central information point (a place or website) where people can obtain all the important information in a short and understandable way can help to eliminate the uncertainties. This place should provide information or even a checklist for all points that are important in the establishment and management process of the energy community. Such a central point, by providing information to people and being available for all questions during the establishment process, would contribute to more people establishing energy communities.[22]

3.1.4.3 Best-practice example

In Austria, the Federal Ministry for Climate Protection has set up a Climate and Energy Fund, which has been entrusted with the establishment of a so-called "Coordination Office for Energy Communities". This coordination office aims to optimize the framework conditions for a successful implementation of the energy community model throughout Austria and to provide assistance in the establishment of RECs and CECs.[23] On a website,[24] information necessary for the establishment and operation of an energy community is provided in a concise and easily comprehensible language (and also in short videos). There are even a step-by-step guide to setting up an energy community and a comprehensive Q&A section that answers a variety of questions on many aspects (organization, grid operation, subsidies, legal matters).

3.1.4.4 Suggestions for improvement

(Mandatory) establishment of a one-stop shop for energy communities (addressing civil and public law themes) or at least provision of an official information point that guides people step by step through the process of setting up an energy community. A universal assistant for energy communities

[22] The need for more information is also recognized by *De la Valle/Czako*, Empowering energy citizenship among the energy poor, Energy Research & Social Science 89 (2022), 102654 who point at several strategies to increase information of citizens as well as municipalities, e.g. energy advice by an external coach, tailored energy advice or the training of energy actors, ore to strengthen trusted intermediaries.

[23] *Österreichische Koordinationsstelle für Energiegemeinschaften*, Über uns, https://energiegemeinschaften.gv.at/koordinationsstelle/ (6.9.2022).

[24] https://energiegemeinschaften.gv.at (6.9.2022).

financed by the state should be made available to all citizens free of charge. A Checklist to show citizens that the process of setting up an energy community is simple and straightforward.

3.2 Administrative Procedures Required to Set Up an EC and spatial planning law

3.2.1 General description of the problem: Administrative procedures and energy communities

Facilitators and barriers regarding administrative procedures for setting up an energy community can be split into three topics:

1. The law can stipulate or allow a certain legal form for an energy community that can entail an administrative procedure. The implications the choice of the legal form brings are discussed below 3.3.1.
2. There can be a separate administrative procedure foreseen for the recognition (of the e.g. association founded) as an energy community.
3. Administrative procedures can be stipulated regarding permits for plants.

I the following sections, administrative procedures for the recognition of an association as an energy community as well as administrative procedures for permits are analyzed.

3.2.2 Different administrative steps might hinder the creation of energy communities; a one-stop-shop for energy communities can work as a facilitator (background: Art 16 IMED)

3.2.2.1 Description of the problem

None of the countries studied has a combined procedure for setting up the legal form (if a form for which the law provides for an [administrative] procedure is chosen, such as e.g. an association) as well as the permit for the plant. Citizens who want to form a citizen energy community therefore might have to undergo legal proceedings for creating the legal form for the energy community as well as administrative proceedings regarding the plants or installations they want to use as an energy community.

3.2.2.2 Specifications

Different legal administrative steps can work as a barrier for citizens to set up an energy community. Even if no administrative steps are necessary for the legal form, different administrative steps might be necessary for one plant.

A single point for administrative proceedings regarding the legal form as well as the administrative proceedings regarding the plant(s) or installations planned, or at least a single point for administrative proceedings regarding the plant or installations, would facilitate setting up an energy community. According to the PNIEC, Spain is planning to create a “ventanilla unica" (a one-stop-shop) for energy communities and also for projects of energy storage.[25] Similarly (but only touching upon the topic of

[25] PNIEC, 88, 105 f, available at https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf (6.9.2022).

plants) is planned in Styria (see the bill regarding a change of § 6a "Steiermärkisches Elektrizitätswirtschafts- und -organisationsgesetz 2005").[26]

3.2.2.3 Suggestions for improvement

Installing a one-stop shop (including at least all administrative issues) for energy communities as well as providing an official point of information that guides people through the process of setting up an energy community.

3.2.2.4 Suggestions for improvement from the co-creation workshop

In the co-creation workshop it was suggested, that the government (regional or local level) should provide interested people with a person guiding energy communities through the administrative proceedings ("energy coach").[27]

3.2.3 Spatial planning law and other administrative rules as barrier for the construction of a plant

3.2.3.1 Description of the problem

Spatial planning laws can stipulate that e.g. wind turbines can only be built in certain areas. Similarly, construction law can contain rules on where generation units can be built.

3.2.3.2 Specifications

In Austria, e.g., the municipal level can with zoning plans influence where e.g. free-standing solar panels can be put up.[28] Similar is true for at least some regions in Spain.[29] In Poland, the so-called "10H Act"[30] states that the distance between a wind farm above 50 kWp and a residential building, must be equal to or greater than ten times the height [10H] of the wind farm measured from ground level to the rotor blade's highest point. This stopped the development of on-shore wind power in Poland.[31]

[26] Available at https://pallast2.stmk.gv.at/pallast-p/pub/document?dswid=-2060&ref=319b4cd5-3d8b-4ad2-89b7-cbe5afd10d98 (6.9.2022).
[27] See *De la Valle/Czako*, Empowering energy citizenship among the energy poor, Energy Research & Social Science 89 (2022), 102654 (5 f).
[28] See, e.g., § 38 Steiermärkisches Raumordnungsgesetz 2010, Styrian spatial planning Act, https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=LrStmk&Gesetzesnummer=20000069 (6.9.2022).
[29] See *Mora Ruiz*, La acción municipal de lucha contra el cambio climático tras la Ley 7/2021, de 20 de mayo, de Cambio Climático y Transición Energética: ¿un modelo suficiente para la Administración local?, Anuario de Derecho Municipal 2021 (2022), 115 (126).
[30] Ustawa antywiatrakowa, Ustawa 10H, https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20160000961 (6.9.2022).
[31] *Czyżak/Sikorski/Wrona*, What's next after coal? RES potential in Poland, Instrat Policy Paper 06/2021 (2021) https://instrat.pl/en/res-potential/ (6.9.2022).

3.2.3.3 Best-practice example

Generally, (and not only in Poland[32]) smaller plants seem to be privileged. In Baden-Württemberg (**Germany**), e.g., wind power plants up until 10 m height are exempted from administrative proceedings according to the Construction Act.[33]

3.2.3.4 Suggestions for improvement

Small plants could be exempted from the rules of construction and spatial planning laws. Moreover, construction laws could even foresee, e.g., that solar panels have to be included in the construction of new houses.[34]

3.3 Requirement of Legal Form of EC

3.3.1 Civil law perspective of legal form of EC

3.3.1.1 Description of problem

RED II[35] defines the REC in Art 2 no 16 lit a very generally as a legal entity based on open and voluntary participation. According to recital no 71 RED II (which serves as a guide to the interpretation of the Directive), the Member States should have the option of choosing any legal form for RECs. The only requirement is that the REC must have legal personality. The REC must therefore be able to exercise rights and enter into obligations in its own name. The CEC is also defined in Art 2 no 11 IMED[36] as a legal entity based on open and voluntary membership controlled by its members and shareholders. Recital no 44 IMED (which also serves as a guide to the interpretation of the Directive) states that Member States should be able to choose any legal form for CEC - for example, an association, a cooperative, a partnership, a non-profit organization or a small or medium-sized enterprise. As with the REC, the prerequisite is that the CEC can act in its own name, exercise rights and be subject to obligations.

Accordingly, the European legislator has left it to the Member States themselves to decide upon an appropriate legal form for RECs and CECs.

---

[32] In Poland, small wind turbines are exempted from the 10H Act, see https://www.gov.pl/web/ncbr/mala-elektrownia-wiatrowa-na-indywidualne-potrzeby-ncbr-przekaze-milion-zlotych-tworcy-najlepszego-projektu (6.9.2022).

[33] Annex to the *Landesbauordnung für Baden-Württemberg (LBO) in der Fassung vom 5. März 2010*, Construction Act, Verfahrensfreie Vorhaben no 3 lit d, https://www.landesrecht-bw.de/jportal/;jsessionid=58980A4BF038D012DB85B8FD18299020.jp80?quelle=jlink&query=BauO+BW&psml=bsbawueprod.psml&max=t%20rue&aiz=true#jlr-BauOBW2010V8P5 (6.9.2022).

[34] See, e.g. the *Bauordnung für Wien*, which stipulates (for certain buildings) in § 118 para 3b and 3c a duty to put solar panels on new buildings, https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=LrW&Gesetzesnummer=20000006 (6.9.2022).

[35] Directive (EU) 2018/2001 of the European Parliament and the Council of 11 December 2018 on the use of energy from renewable sources, OJ 21. 12. 2018 L 328/82.

[36] Directive (EU) 2019/944 of the European Parliament and the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, OJ 14.6.2019, L 158/125.

3.3.1.2 Specifications

The possibility to freely choose an appropriate legal form can be both a facilitator and a barrier for the establishment of energy communities. A facilitator because the (potential) founders can choose a legal form that best suits their respective needs. The only requirement is that the chosen legal form must have legal personality. The more accessible a legal form is and the less complicated it is to handle, the more interesting it becomes for (potential) founders of an energy community.

On the other hand, it can easily overburden (potential) founders who are often not familiar with the law, who do not know what special characteristics the respective legal forms entail and do not know what costs are associated with the individual legal forms. In advance, it is essential to find out about high formation and operating costs, complex formal requirements (such as a notarial deed) and liability issues. In particular, people who are not firm in legal matters would often have to seek expensive legal advice in order to set up an energy community. This comes with effort and costs and that is likely to discourage people from setting up an energy community.

In the Member States examined which have already transposed the Directives in full (Austria[37], Italy[38]) or in part (Spain[39], in Germany,[40] the Netherlands[41] and in Poland[42] there are draft laws), there has been no commitment to a specific legal form for either RECs or CECs. The transposition laws[43] merely list, by way of demonstration and not exhaustively, some of the company and legal forms available under national law that can be used to establish an energy community. It was therefore left to the potential founders of an energy community to choose a suitable legal form from all those that could be considered at national level.

A special situation can (probably) be found in the proposed Dutch Energy Act (*Energiewet*, EW)[44]. The EW does not distinguish between RECs and CECs, but aims to create an energy community that encompasses both types.[45]

3.3.1.3 Best-practice example

In Austria, for example, it is possible to establish an energy community in the form of an association.[46] In order to establish an association, the articles of association must be drawn up.[47] The

[37] See the Renewable Energy Expansion Act (*Erneuerbaren-Ausbau-Gesetz*, EAG) and the Electricity Sector Act 2010 (*Elektrizitätswirtschafts- und -organisationsgesetz 2010*, ElWOG 2010).
[38] See the Legislative Decree no 199/2921 of 8th of November 2021 and the Legislative Decree no 210/2021 of 8th of November 2021.
[39] *Ley 24/2013, de 26 de diciembre, del Sector Eléctrico* (LSE) and Real Decreto-ley 23/2020, de 23 de junio, RD 23/2002.
[40] Draft Act on immediate measures for the accelerated expansion of renewable energies and further measures in the electricity sector (*Gesetzesentwurf der Bundesregierung, Entwurf eines Gesetzes zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor*), BT-Dr 20/1630, 2.5.2022, 169.
[41] Draft bill containing rules on energy markets and energy systems (*Conceptvoorstel van wet houdende regels over energiemarkten en energiesystemen*, EW), https://www.rijksoverheid.nl/documenten/publicaties/2021/11/26/wetsvoorstel-energiewet-uht (6.9.2022).
[42] Project No UC74, https://legislacja.rcl.gov.pl/projekt/12347450 (6.9.2022) and Project No UC99, https://legislacja.rcl.gov.pl/projekt/12357005 (6.9.2022).
[43] For example, see the EAG (for RECs) and the ElWOG 2010 (for CECs) which state that both types of energy communities can be structured as an association (*Verein*), a cooperative (*Genossenschaft*), a general partnership (*Offene Gesellschaft*, OG), a limited partnership (*Kommanditgesellschaft*, KG), a limited liability company (*Gesellschaft mit beschränkter Haftung*, GmbH) and a joint stock company (*Aktiengesellschaft*, AG) and similar legal forms.
[44] https://www.rijksoverheid.nl/documenten/publicaties/2021/11/26/wetsvoorstel-energiewet-uht (6.9.2022).
[45] Footnote 54 of the explanatory memorandum to the proposed Energy Act, https://www.internetconsultatie.nl/energiewet (6.9.2022).

minimum content of these articles of association (name, seat, purpose, etc.) is prescribed by law.[48] The founding members or already appointed representatives must notify the competent association authority of the intended foundation of the association.[49] Within a period of four weeks (which can be extended to six weeks[50]), the authority must examine whether the association is unlawful due to its name or purpose. In this case, the authority could prohibit the foundation by means of a notice.[51] Otherwise, the association comes into existence upon expiry of the deadline.[52] No further legal act by the authority is necessary. Before the deadline expires, the authority could issue an express invitation to take up the association's activities by means of a notice.[53] The fees for the notification and the notice of formation amount to approximately €25. Because it is simple and inexpensive to set up, the association is a very low-threshold model for founding an energy community. The fact that it is also very easy to join and leave the association,[54] and that the members can determine the organizational matters themselves apart from the legal minimum content of the association's articles of association, and that the personal liability of the members is also limited,[55] could further contribute to the association being chosen by many potential founders as the legal form for their energy community.

3.3.1.4 Suggestions for improvement

A new legal form tailored to energy communities could be created.[56] For this legal form - but also for already existing legal forms - model statutes could be created by official bodies, which are easily accessible for (potential) founders of energy communities.

3.3.2 Official recognition as an energy community can work as a facilitator

3.3.2.1 Description of problem

Energy communities have to follow different legal rules, such as e.g. regarding who can become a member of an energy community. If energy communities do not follow said rules, they might face consequences. They can stop being considered energy communities in the sense of the Directives. The Austrian ElWOG 2010, e.g., stipulates that the regulator (E-Control) can force the energy community to comply with the rules (§ 16d ElWOG 2010; § 24 E-ControlG). But the regulator cannot confirm that a community is an energy community in the sense of the directives. Yet, recognition as an energy community can be important when it comes e.g. to the fiscal classification of the energy community.

3.3.2.2 Specifications

The official recognition of an energy community works as a facilitator because it creates more clarity for the legal situation of an energy community.

---

[46] However, it is important to note that the rules for associations are different in the Member States.
[47] § 2 (1) Austrian Association Act (*Vereinsgesetz*, VerG).
[48] § 3 VerG.
[49] § 11 (1) VerG.
[50] § 12 (3) VerG.
[51] § 12 (2) VerG.
[52] § 13 (1) VerG.
[53] § 13 (2) VerG.
[54] § 3 (2) no 5 VerG stipulates that the articles of association must contain rules on joining and leaving the association. These can be freely agreed by the contracting parties.
[55] § 23 VerG.
[56] This idea was raised during the EC² Consortium meeting on 23rd and 24th of May.

3.3.2.3 Suggestions for improvement

An official register of energy communities could help to overcome these uncertainties for energy communities. Energy communities listed in the register would qualify as energy communities in the sense of law. Although Spain has not yet implemented energy communities, their register for collective self-consumption (Art 19 Royal Decree 244/2019) shows how the recognition of energy communities could work. In Spain, all plants for collective self-consumption are part of an official register. For small producers, registration is done by the autonomous community. If the prerequisites for self-consumption are not fulfilled anymore, the entry in the registry is deleted (or if necessary changed).

An alternative could be the Dutch model, where legal consequences are only linked to the actions taken (and do not depend on the status as an energy community).[57]

3.4 Housing Law

Neither the RED II nor the IMED require Member States to make adjustments in national housing law that favour the implementation of energy communities. Even in the Member States that have already implemented the Directives, housing regulations have hardly been changed,[58] if at all. Accordingly, the previously applicable housing law regulations are to be applied to the various housing law problems.

3.4.1 Right to freely choose one's energy supplier:

3.4.1.1 Description of problem/situation

Art 4 IMED requires Member States to ensure that all customers have the freedom to purchase electricity from the supplier of their choice and to have more than one electricity supply contract at the same time, where technical conditions permit. Art 4 IMED must be transposed into national law by the Member States. In the event that a landlord wishes to contractually prohibit the tenant from choosing and/or changing the supplier himself, this contractual agreement would be invalid due to the legal provision.

3.4.1.2 Specification

The right to freely choose one's energy supplier benefits the joining of energy communities. If a tenant or an owner of a flat wants to join an energy community without bringing in a generation plant, they are allowed to do so on the basis of the right to free choice of energy supplier enshrined in Art 4 IMED, which is to be transposed into national law by the Member States. The consent of the landlord or the other flat owners is not necessary for the choice of energy supplier.

[57] See above 3.1.3.3.

[58] The Spanish Law on Climate Change and Energy Transition steered towards the energy transition. indicates in its final provisions that further amendments to the law will be proposed within one year of the law coming into force (22.5.2021). These aim at amendments for more flexibility in the LPH with regard to photovoltaic systems for self-consumption in condominiums as well as a reform of the energy sector. The aim is to broaden consumer participation in energy markets and to encourage investment in variable and flexible electricity generation from renewable sources and decentralized generation. In Austria, too, there has been an amendment to the Condominium Act, which, however, did not bring about any improvements that would directly contribute to an easier establishment of energy communities.

3.4.1.3 Suggestions for improvement

The possibility of free choice of energy supplier/the prohibition for the landlord to impose a certain energy supplier on the tenant or to prevent the tenant from changing the supplier should be explicitly standardised by law.

3.4.2 Landlord's consent required for the installation of a generation plant on or at the leased property

3.4.2.1 Description of problem

If tenants want to install a generation plant (e.g. a photovoltaic system) on the rented property, they often need the consent of the landlord (Austria,[59] Germany,[60]). This consent is also at the discretion of the landlord.

The requirement of the landlord's consent to the installation of a generation plant is likely to deter tenants from wanting to install one. The consent is at the discretion of the landlord, who may have no interest in such an installation, for example due to the impairment of the interests of the other tenants as well as due to the impairment of the external appearance of the house, and who may therefore refuse the installation to the tenant.

3.4.2.2 Specification

In Austria, for example, the tenant must notify the landlord of any change he intends to make to the rented property. If the landlord does not reject the change within 2 months, consent is deemed to have been given.[61] The law lists some cases in which the landlord cannot refuse his consent. This applies, for example, if the change is in accordance with the practice of the trade and serves an important interest of the tenant.[62] According to the law, such an important interest is served, for example, by a change that serves to reduce energy consumption.[63]

3.4.2.3 Suggestions for improvement

The law may provide for an exemption from the landlord's consent requirement for the installation of a photovoltaic system or another system for the generation of renewable energy on or at the condominium property.

[59] § 9 para 1 no 1-7 Austrian tenancy Act (*Mietrechtsgesetz*, MRG), https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10002531 (6.9.2022).
[60] *Blank/Börstinghaus* in *Blank/Börstinghaus* (eds) Miete[6] (2020) margin no 519; For the installation of solar panels on the balcony or terrace other conditions may apply in individual cases, see BGH 16.11.2005, VIII ZR 5/05; AG München, 4.10.1990, 214 C 2481/90; AGer Stuttgart 30.3.2021, 37 C 2283/20.
[61] § 9 (1) Austrian Tenancy Act (*Mietrechtsgesetz*, MRG), https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10002531 (6.9.2022).
[62] § 9 (1) no 2 MRG.
[63] § 9 (2) no 2 MRG.

3.4.3 Consent of the other condominium owners is required for the installation of a generation plant at or on a condominium property

3.4.3.1 Description of problem

In many Member States surveyed (Austria[64], Germany[65], Spain[66] and the Netherlands[67]), the installation of a generation plant (e.g. a photovoltaic plant) by a condominium owner on or in the condominium property requires the consent of the other co-owners.

3.4.3.2 Specification

If the photovoltaic system is installed on the roof, which is the common property of all condominium owners, in many Member States, the consent of all co-owners is required. Especially in large properties, it can be very time-consuming to request the consent of all co-owners, which is particularly difficult if they have moved away. If the other co-owners do not agree, the photovoltaic system may generally not be installed.

3.4.3.3 Best-practice example

In Italy, an individual condominium owner may also install a photovoltaic plant on the roof of the building. Art. 1122 bis (2) of the Italian Civil Code (*Codice Civile*)[68] provides that the installation of systems to produce energy from renewable sources intended for the individual units of the condominium is permitted on suitable common areas. The assembly cannot deny a condominium owner the possibility of installing photovoltaic plants for energy production on the common roof of the building. It may only prescribe reasonable alternatives for carrying out the encroachment or impose suitable precautions to preserve stability, safety or architectural decorum by qualified majority vote if this initiative involves a change to the common parts of the building. Furthermore, the right of the other unit owners to use the same area for the same purposes must not be affected.

In Austria, where the consent of the other co-owners is needed for the installation of photovoltaic systems on the condominium building, there is the possibility to replace the co-owners consent by a court order.[69] However, this requires (costly) court proceedings.

3.4.3.4 Suggestions for improvement

Statutory exemptions from the requirement of the consent of all other co-owners in favour of photovoltaic systems or other systems for the generation of renewable energies. Or at least a change from the requirement of the consent of all other co-owners (for example, to a requirement of the consent of half of the other co-owners). If the consent requirement is retained, the property management should be obliged to provide the current addresses of the co-owners if a condominium owner who wants to make changes needs them in order to request the consent of the co-owners. Introduction of a consent fiction to prevent the installation of a renewable energy system from being protracted by disinterested co-owners.

---

[64] §§ 16 (2), 52 (1) no 2 Austrian Condominium Act (*Wohnungseigentumsgesetz 2002*, WEG 2002), https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20001921 (6.9.2022).
[65] *Elzer* in *Hogenschurz* (ed), BeckOK WEG[46] § 20 Abs margin no 5, 35 and 139 (Version 1.1.2021, beck-online.beck.de).
[66] Art 17 *Ley de propiedad horizontal*, LPH, https://www.boe.es/buscar/act.php?id=BOE-A-1960-10906 (6.9.2022).
[67] Title 9 of Book 5 BW.
[68] https://www.codice-civile-online.it/ (6.9.2022).
[69] §§ 16 (2) and 52 (1) no 2 Austrian Condominium Act 2002 (*Wohnungseigentumsgesetz 2002*, WEG 2002), https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20001921 (6.9.2022).

3.5 Plant Ownership

3.5.1 Multi-party houses - transfer of ownership when a movable object is obstructed

3.5.1.1 Description of problem

Residents of multi-apartment buildings who install a photovoltaic plant on or in the building are confronted with a further problem, provided that they have overcome the problems under housing law described above. In some Member States (Austria,[70] Germany,[71] Spain,[72] the Netherlands[73]), the connection of a movable object to buildings results in the transfer of ownership of the movable object to the owner of the building. A movable object is an object that can be moved from one place to another without damaging its substance.[74]

3.5.1.2 Specification

A photovoltaic plant, for example, is such a movable item. If it is installed on a building, ownership of the photovoltaic plant may pass to the owner of the building. This is of course not desired by the original owner of the photovoltaic plant and can lead to fewer photovoltaic plants being purchased in general (which of course are not subsequently brought into energy communities) or that their ownership is transferred to the house owner and they cannot be brought into energy communities.

No regulations have been passed at European level that are suitable for solving this problem. Therefore, one must look at the national legal situation in each of the Member States:

In Austria, a distinction must be made between two cases. In the first case, the photovoltaic plant is an independent component of the building, if it can be actually and economically separated from the building. In this case, separate ownership of the plant is possible, and the building owner does not automatically become owner of the plant as well. The plant can be contractually disposed of.[75] In the second case, the generation plant is integrated into the building irreversibly. In this case, the photovoltaic plant becomes the property of the owner of the building,[76] even an agreement between the two parties cannot change this.[77] In Germany, the situation is quite similar: the photovoltaic plant becomes the property of the building owner if it is firmly connected to the building and its separation requires high effort and would damage the building.[78] In this context, it is referred to as an essential component within the meaning of § 94 BGB. Different rules apply to generation plants which can be removed rather easily. Objects that are only connected to the building for a temporary purpose are not essential components.[79] Especially in the case of tenancy, one can often assume a merely temporary

[70] § 297 Austrian Civil Code (Allgemeines Bürgerliches Gesetzbuch, *ABGB*).
[71] § 946 German Civil Code (Bürgerliches Gesetzbuch, *BGB*).
[72] Art 17.1. Ley 49/1960, de 21 de julio, sobre propiedad horizontal (*LPH*).
[73] Art 5:101 Dutch Civil Code.
[74] § 293 ABGB.
[75] *Amann* et al, STROMBIZ (2016), 149.
[76] *Helmich in Kletecka/Schauer* (eds), ABGB-ON[1.04] § 294 margin no 8 et seqq (Version 1.7.2018, rdb.at).
[77] OGH 12.12.1984, 3 Ob 585/84.
[78] § 946 BGB.
[79] § 95 BGB.

use of the building, because the right to use the rented property is also only temporary.[80] In the tenancy agreement, regulations can be made regarding this temporary connection.[81]

Overall, there are no or only case-specific regulations regarding the ownership of the generation plant. This leads to great legal uncertainty.

3.5.1.3 Suggestions for improvement

In order to create legal certainty, regulations should be enacted, if possible at European level otherwise at national level, which prevent ownership of the generation plant from being transferred to the building owner.

3.5.2 Third-party ownership of the generation plant

3.5.2.1 Description of problem/situation

In order to make energy communities attractive to the broad mass of the population, it is important to provide a model that is as easily accessible as possible. Since the construction and maintenance of a photovoltaic plant is time-consuming and cost-intensive (and the interested parties often do not have the necessary know-how to maintain the system, which then has to be carried out by a third party anyway what is associated with additional costs), outsourcing this task to third parties could also help to promote the emergence of energy communities.

3.5.2.2 Specification

In order to determine whether a third party can also be the owner of the generation plant or take over the maintenance of the plant, it is first necessary to take a look at the Directives. For RECs, Art 22 (2) lit b RED II refers to "*production units owned by that REC*" and for CEC, Art 16 (3) lit e IMED refers to "*production units owned by the community*". However, as the concept of ownership differs in the different member states, it is also necessary to take a look at the national legal systems.

In Italy[82] and Austria[83], it is possible for the generation plant to be owned by a third party as long as the energy community has the actual power of operation and disposal over the plant. The operation and maintenance can also be taken over by third parties, provided that the energy community retains the power of operation and disposal.

This option makes it easier for interested parties who would like to set up an energy community but do not have a generation plant and also do not have the necessary know-how for the maintenance of the plant to set up an energy community. A third party may make the facility available to the community and take over its operation and maintenance as long as the energy community exercises effective control and disposal over the facility.

[80] *Welsch/Woinar*, Veräußerung von Immobilien mit Photovoltaikanlagen aus zivilrechtlicher und steuerrechtlicher Sicht, LSK 2014, 161 (163).
[81] *Lange/Ländner*, Errichtung und Betrieb von Photovoltaikanlagen in der zivilgerichtlichen Entscheidungspraxis, EnWZ 2019, 99 (101).
[82] Art 30 (1) lit a subpara 1 and Art 31 (2) lit a Legislative Decree 199/2021 for REC; Art 14 (4) Legislative Decree 210/2021 for CEC.
[83] Explanatory remarks to the government bill of the Renewable Energy Expansion Act Package (ErlRV 733 BlgNR 27. GP 19).

3.5.2.3 Suggestions for improvement

The possibility of the generation facilities being owned by a third party if the energy community exercises the power of operation and disposal over them should be enshrined in law. Ideally, regulations at European level would be desirable, otherwise such regulations would be desirable at least at national level in all Member States.

3.5.3 Several plants for one energy community

3.5.3.1 Description of problem

Electricity generation from renewable energy sources is subject to highly seasonal, large fluctuations. Geographical location also has a major influence on energy production; consider, for example, the hours of sunshine, which are more frequent in the south than in the north of Europe. The capacities for generating electricity from hydropower or wind also vary in the member states.

In addition, if all participants always consume energy at the same time, there are times when more energy is needed than a generation plant can produce. Conversely, there may be times when surplus energy cannot used. If, for example, an energy community consisted exclusively of people who work during the day and the energy produced came exclusively from photovoltaic systems, the result could be that the needs and production load do not correlate.

In order to compensate for these seasonal and time-of-day fluctuations, and also due to the fact that the participants in an energy community have different levels of energy consumption depending on the time of day, it can make sense to combine several generation plants with each other.

3.5.3.2 Specification

Neither the RED II nor the IMED explicitly address the question of whether several generation facilities can be used within an energy community. However, the wording of the Directives (*share [...] renewable energy that is produced by the production units owned by that renewable energy community*[84]; and *sharing of electricity that is produced by the production units owned by the community*[85]*)* indicates that the possibility of using several production units within an energy community is at least not excluded.

3.5.3.3 Best-practice example

In Austria, for example, it is possible to operate several generation plants in an energy community.[86] Furthermore, from 1.1.2024 there will be the possibility to join several RECs or CECs.[87]

3.5.3.4 Suggestions for improvement

The possibility of bringing several generation plants into one energy community should be enshrined in law. This would also lead to increased legal certainty. At best, this should be done at the European level, otherwise at the national level, which would still be better than no regulation at all.

[84] Art 22 (2) lit b RED II.
[85] Art 16 (3) lit e IMED.
[86] *Österreichische Koordinationsstelle für Energiegemeinschaften*, FAQs – häufig gestellte Fragen, https://energiegemeinschaften.gv.at/faq/ (6.9.2022).
[87] § 111 (8) ElWOG 2010.

3.5.4 One plant for several energy communities

3.5.4.1 Description of problem/situation

If several energy communities could share the electricity produced from a generation plant, but also the costs incurred for the construction and operation of the plant, this could also contribute to increasing the attractiveness of energy communities.

3.5.4.2 Specification

Neither RED II nor IMED preclude the use of a generation plant in several energy communities. The possibility of sharing a generation plant in several energy communities should therefore be given in general. In the Member States studied, there are also hardly any legal provisions regulating the use of a generation plant in several energy communities.

3.5.4.3 Best-practice example

The possibility of participating in several energy communities with one generation plant is explicitly regulated in Austria: From 1.1.2024, it will be possible to participate in several RECs and CECs with one generation plant.[88]

3.5.4.4 Suggestions for improvement

The possibility of several energy communities participating in a generation plant should be enshrined in law. This would also lead to increased legal certainty. At best, this should be done at the European level, otherwise at the national level, which would still be better than no regulation at all.

3.6 Grid Access

Grid access is not only relevant concerning legal, but also economic factors.[89]

3.6.1 Finding suitable other members for a REC

3.6.1.1 Description of problem

In Austria members of an REC have to be located in the area of a medium or low-voltage distribution network in the concession area of the same network operator.[90] Therefore, when founding an energy community one has to know about these areas.

3.6.1.2 Specification

In Austria, the grid operator has to provide information on the grid levels on request.[91]

3.6.1.3 Best practice example

Some grid operators already provide online tools to find out which distribution network one belongs.[92]

[88] § 111 (8) ElWOG 2010.
[89] See below 4.2.9.
[90] § 16c (2) ElWOG 2010.
[91] § 16c (3) ElWOG 2010.
[92] See, e.g., https://energiegemeinschaften.vorarlbergnetz.at/eeg_auskunft/ (6.9.2022).

3.6.1.4 Suggestions for improvement

An online map or online tool provided by the grid operator would help to make it easier for interested citizens to find out who can participate in the REC. Whereas some grid operators already provide online tools, this could be enhanced by laws requesting such online tools from the operators.

3.6.2 Information on grid access

3.6.2.1 Description of problem

Since energy communities rely on the public grid[93], they need to be able to connect to the grid. They are therefore dependent on the grid operator providing information and making the access possible.

3.6.2.2 Specification

If the grid operator does not provide information or does not provide timely access, the realization of an energy community can be protracted and slowed down.

3.6.2.3 Best practice example

The new German Erneuerbare Energiengesetzes (§ 8 Abs 7 EEG) stipulates that grid operators have to provide an internet page providing information on among others the processing of a grid connection request, on the information the person/entity requesting access has to provide the grid operator with and the cost of grid access.[94] Moreover, the grid operator has to provide a webpage where the request for access can be desposited (§ 8 Abs 7 EEG).

3.6.2.4 Suggestions for improvement

Legal rules on clear and easy understandable information on the grid access and easy procedures for requesting grid access could force grid providers to make access to the grid as easy as possible. These legal rules should also provide clear time limits for the grid operator to reply to the request of access to the grid.

3.6.3 Contracts for grid access

3.6.3.1 Description of problem

Energy communities need continuous grid access. For that purpose they have to conclude a contract with the grid operator.[95]

3.6.3.2 Specification

Grid operators often provide standard agreements. Since grid operators are not necessarily interested in having many small providers in the grid, because grid operators have to take care of the grid stability, they might force energy communities to accept problematic clauses.

3.6.3.3 Suggestions for improvement

Standard contracts provided by administration could force grid operators to fair clauses.

[93] For Austria, see § 16c (2) ElWOG 2010 and § 16d (6) ElWOG 2010.
[94] https://dserver.bundestag.de/btd/20/026/2002656.pdf (6.9.2022), 22-23.
[95] For Austria, see § 16d (6) ElWOG 2010 and for an example for a contract see https://ebutilities.at/files/oee-db-app/Mustervertraege/211215_Mustervertrag_VNB%20mit%20EEG.pdf.

3.7 Smart meter

3.7.1 Widespread introduction of smart meters

3.7.1.1 Description of problem

Smart meters are a prerequisite for joining an energy community. They enable bidirectional communication exchange, provide real-time data on energy consumption and enable active participation in the energy market. They are also intended to strengthen the position of consumers, as these systems give them the possibility to get precise feedback on their consumption or energy production in almost real time and to better manage it, participate in and benefit from load control programmes and other services, as well as reduce the amount of their electricity bill.[96]

A widespread rollout of smart meters has also begun at the European level, but has not yet been implemented in all Member States: In the Internal Electricity Market Directive 2009[97], which was the predecessor of the IMED, the Member States were for the first time required to introduce smart meters. The introduction of smart meters could be subject to an economic cost-benefit analysis, which had to be carried out by September 2012. If this analysis was positive, the Member States were mandated to equip at least 80% of consumers with smart meters by 2020.[98]

In Art 19 IMED, the regulations were adapted. The introduction of smart meters can still be preceded by a cost-benefit analysis.[99] In the case of a positive cost-benefit analysis, at least 80% of the end customers must be equipped with smart meters within seven years or, in the case of Member States that started the systematic introduction of smart meters before 4th of July 2019, by 2024.[100] In the case of a negative cost-benefit analysis, this must be revised at least every four years.[101]

If the introduction of smart meters has been negatively assessed in the cost-benefit analysis and they are not systematically introduced in a Member State, Member States shall nevertheless ensure that every final customer is entitled to the installation or upgrade of a smart meter upon request and at his own expense, on fair, reasonable and cost-effective terms.[102] In this case, Member States shall ensure that the smart meter is installed at the latest within four months of the customer's request.[103]

3.7.1.2 Specification

The EU-Regulations had to be transposed into national law by the individual Member States: Italy is considered one of the pioneers in the introduction of smart meters and already started to introduce smart meters on a large scale in the early 2000s.[104] In 2006 the Italian Energy Regulatory Authority set the mandatory installation of smart meters. Since these meters have a lifespan of 10-15 years, the

[96] Recital no 52 IMED.
[97] Directive 2009/72/EC of the European Parliament and the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, OJ 14.8.2009, L 211/55.
[98] Annex I Internal Electricity Market Directive 2009.
[99] Art 19 (2) IMED.
[100] Annex II IMED.
[101] Art 19 (5) IMED.
[102] Art 21 (1) IMED.
[103] Art 21 (2) lit b IMED.
[104] *Stagnaro*, Second-generation smart meter roll-out in Italy: A cost-benefit analysis (2019) https://fsr.eui.eu/wp-content/uploads/smart_meter-CS.pdf, 1 (6.9.2022).

introduction of second-generation smart meters is already being prepared.[105] In Austria, a positive cost-benefit analysis has already been carried out in 2010. The Smart-Meter-Introduction-Regulation (*Intelligente Messgeräte-Einführungsverordnung*, IME-VO)[106] stipulates that 95% of the metering points connected to the grid are to be equipped with smart meters by the end of 2024.[107] In Spain, almost every household already has a smart meter.[108] The legal basis therefore can be found in the *Plan de Sustitución de Equipos de Medida de consumidores tipo 5 desarrollado por la Orden ITC/3860/2007, de 28 de diciembre, por la que se revisan las tarifas eléctricas a partir del 1 de enero de 2008*.[109] In Poland at the moment, the implementation of smart meters is still in its initial phase with around 8% of electricity consumers having access to those. The Polish Energy Act (*Ustawa z dnia 10. Kwietnia 1997 r. – Prawo energetyczne* [UPE])[110] provides in Art 11t that by the end of 2018 80% of energy consumers will receive a Smart meter.[111]

3.7.1.3 Suggestions for improvement

In order for energy communities to be introduced and operated nationwide, a complete smart meter rollout is necessary in all Member States. The necessary regulations should be created at European or, if necessary, at national level.

3.7.2 Ease of use for consumers

3.7.2.1 Description of problem

Many consumers are sceptical about the introduction of smart meters. There are fears of invasions of privacy and data protection concerns. In addition, many customers are not aware of the benefits of smart meters or find them too complicated to use.[112]

Article 20 IMED regulates the requirements that a smart meter must fulfil. Before or at the time of installation of the smart meter, end customers must be adequately advised and informed about the potential of smart meters for handling meter reading and monitoring energy consumption, as well as about the collection and processing of personal data. Smart meters must enable end customers to obtain information about their actual energy consumption. Consumption data from the past must be made easily and securely accessible to them on demand and clearly recognisable without additional costs. Non-validated near-real-time consumption data must be made easily and securely accessible via a standardised interface or remote access at no additional cost. Member States shall ensure the security of privacy and data, taking into account best available techniques and in accordance with Union rules on data protection and privacy. At the request of end customers, metering data on their electricity feed-in to the grid and their electricity consumption is made available to them in an easy-to-understand format that enables them to take up offers under the same conditions.

---

[105] *Stagnaro*, Second-generation smart meter roll-out in Italy: A cost-benefit analysis 2.
[106] https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007808.
[107] § 1 IME-VO.
[108] See *eldario.es*, España lidera la instalación de contadores inteligentes de la luz en la UE sin haber analizado sus beneficios, https://www.eldiario.es/economia/espana-instalacion-contadores-inteligentes-ue_1_1269659.html (6.9.2022); see also a report of the *European Commission, Directorate-General for Energy* and *Tractebel Impact*, elaborated by *Alaton/Tounquet* (eds), Benchmarking smart metering deployment in the EU-28: final report (2020), https://data.europa.eu/doi/10.2833/492070 (6.9.2022).
[109] https://www.boe.es/buscar/act.php?id=BOE-A-2007-22458 (6.9.2022).
[110] https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/prawo-energetyczne-16798478 (6.9.2022).
[111] Yet, the aim was not met, see 4.2.10.4.
[112] For privacy concerns, but also for the benefits of smart-meters see *De la Valle/Czako*, Empowering energy citizenship among the energy poor, Energy Research & Social Science 89 (2022), 102654 (6 f).

3.7.2.2 Specification

The European Directives must be transposed into national law by the member states. In Austria, for example, this has been done in § 83 ElWOG 2021. In addition, a Regulation has been issued that specifies the requirements for smart meters.[113]

In some Member States, for example in Austria, customers have the option of opting out of the "smart" functions when installing a smart meter.[114] If they choose to do so, only the basic functions of the electronic electricity meter will be available to them. In this case, the electricity data is measured only once a year instead of every 15 minutes, as was the case before the smart meter was installed. The intelligent functions of the smart meter are deactivated. However, these are a prerequisite for joining an energy community, which is not possible in the case of opting out.

3.7.2.3 Suggestion for improvement

In order to make the use of smart meters more attractive for end-users, all concerns must be addressed and thus removed and the operation of the devices must become as simple as possible. The user interface should be super-simple, important functions must stand out and there must be complete information about the advantages and benefits. Privacy and security concerns need to be educated and addressed. Therefore, it would be desirable to explain the use and related benefits of smart meters to customers in person (e.g. during installation). To encourage the emergence of energy communities, opting out must be made as unattractive as possible for customers, without denying them this right altogether.

3.7.3 Possibility of dynamic allocation of energy within the community[115]

3.7.3.1 Description of problem/situation

If one thinks of private households that generate energy from photovoltaics, the following problem can arise: The photovoltaic system produces energy mainly during the day when the sun is shining. However, people who are on the road or at work during the day cannot use this energy optimally. Either an expensive storage unit must be purchased or the energy must be fed into the grid.

3.7.3.2 Specification

Energy communities whose self-generated energy is primarily to be consumed by their members themselves can now counter this problem. They make it possible for private individuals to join forces with companies, for example. The company could, for example, invest in the photovoltaic system and bring it into the energy community, and one could agree on a dynamic distribution of the generated energy. This makes it possible that on weekends or at other times when the company is closed, the majority of the energy generated is allocated to private households and otherwise goes mainly to the company. The private households could participate in the energy community without a large initial investment and purchase the electricity generated within the community with a profit mark-up. The resulting surplus payments can be allocated to the company that brought the plant into the energy community and distributed to it in order to ensure the amortisation and profitability of the investment.

[113] Smart Meter-Requirements Regulation (*Intelligente Messgeräte-Anforderungsverordnung 2011*, IMA-VO 2011), https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007497 (6.7.2022).
[114] See § 1 (6) IME-VO.
[115] See 3.11.

3.7.3.3 *Suggestion for improvement*

The one-stop-shop already proposed above, chapter 3.1, should point to the possibility of involving companies and dynamic contracts.

3.8 Financial Incentives

Financial incentives are an important factor from the legal as well as the economic point of view.[116]

3.8.1 Description of problem

Participation in an energy community has to be at least cost-neutral for the individual. But forming an energy community might be expensive, especially in the starting phase.

3.8.2 Specification

Starting an energy community is time consuming. A group of interested participants has to be formed, knowledge on the ideal source of energy has to be collected, the ideal legal form has to be found, administrative procedures for the plants necessary have to be obtained, grid access has to be taken care of, etc. These questions can be answered by paid professionals, at a cost. Later, further costs might arise from the plants, as they have to be maintained.[117] Therefore, from the point of view of a prospective participant of the energy community, the savings from the energy obtained from the energy community must at least cover the cost of the energy community.

3.8.3 Best practice examples and suggestion for improvement

Regarding energy communities, different forms of public support can be identified. Whereas e.g. in Poland and the Netherlands net-metering was possible for a long time, in both countries the net-metering system will be abolished. Net-metering is positive for the individuals or energy communities, because the public grid can be used as a storing unit. Yet, the increase of decentralized renewable energy production units is a challenge for the conventional grid.[118] This is sometimes used as an argument against net-metering.[119] Yet, grid problems could be solved with storage systems, appropriate transformer stations or other technical solutions.[120] Abolishing of the net-metering system can lead to problems regarding the profitability of energy communities.[121] The comparison of the situation in different Member States shows, that there are other possibilities for support, which governments should make use of.

---

[116] See below 4.2.3.

[117] In Austria, the ElWOG specifies some of the steps that have to be taken, see § 16d ElWOG 2010, but this only covers legally relevant steps.

[118] *Smith* et al, The effect of renewable energy incorporation on power grid stability and resilience, Science Advances 8 (2022), 1; https://www.science.org/doi/10.1126/sciadv.abj6734 (6.9.2022).

[119] https://cleantechnica.com/2022/08/05/the-end-of-net-metering-may-be-good-for-community-resilience-natl-security/ (6.9.2022).

[120] See *Schäfer* et al, Taming instabilities in power grid networks by decentralized control, European Physical Journal - Special Topics 225, 3 (2016) 569 ff; https://doi.org/10.1140/epjst/e2015-50136-y (6.9.2022).

[121] This has been the case in Poland, regarding self-consumption, see https://globenergia.pl/fotowoltaika-i-net-billing-jak-spadlo-zainteresowanie-analizujemy-rynek-mikroinstalacji-pv/ (6.9.2022).

- Public support for help in the initial phase (e.g. with professional information) can reduce the cost in the initial phase. In Austria, such support is provided by publicly funded institutions, such as the "Energieinstitut Vorarlberg",[122] an association according to the Austrian Act on associations. Members are the government of the region of Vorarlberg, energy providers (ill-werke vkw), a grid operator (Vorarlberger Energienetze GmbH), the chamber of labour, the chamber of commerce, the chamber of agriculture, the association of municipalities on waste management and environmental protection, a water supplier (Stadtwerke Feldkirch), a bank (Vorarlberger Raiffeisenbanken) and a non-profit housing and housing development company (Vorarberger gemeinnützige wohnungs- und Siedlungsbaugesellschaft).[123]
- Energy communities can benefit from tax reductions/exemptions for the electricity shared, as it is the case for REC in Austria.[124]
- Energy communities can benefit from reduced grid fees, as it was the case e.g. for energy co-operatives in Poland,[125] and as it is the case for Austrian REC.[126]
- Funding for installations can be foreseen, see e.g. the Polish program "Solar rooftops" ("Słoneczne dachy") introduced in 2020, aimed at financing PV installations in multi-family homes.[127] If such programs are available for energy communities this can work as a facilitator.
- In Italy, public guarantee funds for loans (to make it easier for energy communities to obtain loans) were discussed. The objective was to establish a special fund, called "Guarantee Fund for the implementation of renewable energy communities", for a total of 15 million euros for the year 2022, 20 million euros for the year 2023, 25 million for 2024 and 30 million for the following years until 2030, in order to guarantee a "partial insurance to the credits granted by institutions for the implementation of renewable energy communities". The idea was to make this fund accessible by all renewable energy communities and collective self-consumption groups. However, this amendment did not pass.[128]
- Lastly, subsidies for the electricity sold to third parties can be foreseen. In Austria, e.g. REC can profit of the so-called market bonus (§ 80 (2) EAG). CEC can apply for funding according to the second main part of the second part of the EAG ("*2. Hauptstück des 2. Teils*"; see § 16b (4) ElWOG 2010), and also for the market bonus (§ 16b (5) ElWOG 2010). The market

[122] https://www.energieinstitut.at/ (6.9.2022).
[123] https://www.energieinstitut.at/ueber-uns/das-energieinstitut-vorarlberg/ (6.9.2022).
[124] § 2 Abs 1 Z 4 Elektrizitätsabgabegesetz. For the role of taxes and tax exemptions for renewable energy in general in the Spanish case see *Galán Vioque*, La integración de las energías renovables en el mercado energético, in Galán Vioque/González Ríos (eds), Derecho de las energías renovables y la eficiencia energética en el Horizonte 2020 (2017) 69 (93 f). For the so-called "impuesto al sol", a tax for self-consumption of energy and its effects, see *Ruiz Olmo*, La inconclusa regulación del balance neto para el autoconsumo eléctrico, in Galán Vioque/González Ríos (eds), Derecho de las energías renovables y la eficiencia energética en el Horizonte 2020 (2017) 135 (135 ff).
[125] Art 38c UOZE.
[126] Systemnutzungsentgelte-Verordnung 2018, § 5 (1a). See the explanatory materials for a more detailed explanation: https://www.e-control.at/documents/1785851/1811582/SNE-V_2te-Novelle_2021_Erlaeuterungen.pdf/1f845709-b0c0-5bbd-fc74-28b273afa730?t=1634897827315 (6.9.2022).
[127] https://www.gov.pl/web/nfosigw/100-mln-zl-na-sloneczne-dachy-dla-wielkopolskich-spoldzielni-i-wspolnot-mieszkaniowych (6.9.2022). Yet, the program was not very successful and therefore closed, for the reasons see here https://globenergia.pl/sloneczne-dachy-kontynuacja-spoldzielnie-fotowoltaika-nfosigw-wfosigw-w-poznaniu/ (6.9.2022).
[128] https://www.senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=Emendc&leg=18&id=1322893&idoggetto=1324002 (6.9.2022).

bonus is limited to a maximum of 50% of the total electricity quantity generated, which might be unconstitutional and against EU law.[129]

3.8.4 Suggestion for improvement from the co-creation workshops

In the co-creation workshops, e.g., land value tax incentives (Spain) were mentioned as motivating factors.[130]

3.9 Exclusion of large companies and electricity companies

3.9.1 Description of problem

Energy communities should be as citizen-centred as possible and provide environmental, economic or social community benefits to their members or the local areas in which they operate.[131] This should be done primarily through local investments that help increase consumer choice and citizen participation in the energy transition, thereby increasing the uptake of renewable energy.[132] The cooperation of citizens or local actors should be in the foreground, which is why the membership of larger companies[133] is prohibited in the case of RECs[134] or only permitted to a limited extent in the case of CECs.[135] Large companies may participate in a CEC, but only natural persons, local authorities, including municipalities, or small enterprises may exercise actual control over the CEC.[136]

3.9.2 Specification

The European provisions standardized at European level are to be transposed into national law by the Member States. Accordingly, the exclusion of large companies from RECs or the restriction to mere participation without the right of control for large companies in CECs must also take place in the Member States. However, it would often be larger companies (for example, a social housing company ~~or non-profit organizations~~) that have the time resources and organizational know-how to set up and run energy communities. The fact that participation in RECs is prohibited respectively participation in CECs is limited for large companies has the effect of making participation in an energy community generally unattractive for them. This of course means that their knowledge and organisational skills, which are urgently needed in energy communities, are not or only insufficiently brought into energy communities.

[129] *Nigmatullin*, Unionsrechtliche und verfassungsrechtliche Überlegungen zur Marktprämienförderung bei Energiegemeinschaften, RdU 2021, 62.
[130] See below 5.1.3.
[131] Art 2 no 16 lit c RED II, Art 2 no 11 lit b IMED.
[132] Recital no 70 RED II.
[133] According to Art 2 no 16 RED II, only SMEs may participate in a REC. SMEs are companies that employ fewer than 250 people and either have an annual turnover of no more than 50 million euros or an annual balance sheet total of no more than 43 million euros (Art 2 of the Annex to the Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises, OJ 20.5.2003 L 124/36).
[134] Art 2 no 16 lit b RED II.
[135] Recital no 44 IMED.
[136] Art 2 no 11 lit a IMED.

3.9.3 Suggestions for improvement

In order for EC to take advantage of the much-needed expertise and organizational skills that large companies have, the ban or restriction on the participation of such companies in energy communities should be dropped. For example, participation could be made conditional on certain requirements, such as cooperation with local citizens or certain consent requirements in decision-making, where local citizens are at least on an equal footing with large companies.

3.10 Bringing Self-Consumption and Community Consumption (in Whatever Form) Closer Together

3.10.1 Description of situation

One of the aims of renewable energy communities is local consumption of energy. Whereas self-consumption can be increased by changes of behaviour (e.g. using the washing machine when the energy production is the highest),[137] examples of energy communities show that the energy community might be an attractive way to share surplus energy, especially when net-metering is not possible (anymore).[138] It is therefore important to see self-consumption and energy communities as connected.

3.10.2 Specification

Connecting self-consumption and energy communities might help to make self-consumption more attractive. Self-consumers can share their surplus locally or regionally, and are not dependent on prices of the market or on a price subsidized by the government. At the same time an energy community which (only) stores or distributes energy does not have to have its own plants. In that sense, an energy community can be rather seen as platform for sharing energy.

A side effect could be that self-consumers who are already active regarding the energy transition and might already have the necessary knowledge and bring it into the community.

3.10.3 Suggestions for improvement

A common point of information can help explore the possibilities energy communities can offer for self-consumers.

3.10.4 Suggestions for improvement from co-creation workshops

During the co-creation workshops lack of knowledge has been mentioned as a discouraging factor.[139]

[137] For the optimization of self-consumption, see e.g. https://blog.kelag.at/photovoltaikanlage-optimieren (6.9.2022).
[138] See below 4.2.1.
[139] See below 5.2.3.

3.11 Peer-To-Peer Trading

P2P energy trade is also an economic issue.[140]

3.11.1 Description of problem

According to Art 2 (18) RED II“ ‘peer-to-peer trading’ of renewable energy means the sale of renewable energy between market participants by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction, either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator. The right to conduct peer-to-peer trading shall be without prejudice to the rights and obligations of the parties involved as final customers, producers, suppliers or aggregators.”

3.11.2 Specification

Peer-to-peer trading enables market participants, and therefore also energy communities, to freely sell their energy to other market participants. This might make energy communities more attractive, since they can negotiate with other market participants and in obtaining a better price might help them to work cost-neutral. The problem is, that in most of the Member States studied, no legal framework for peer-to-peer trading (and especially for smart contracts) is currently available up for the time being.[141]

3.11.3 Best practice example

Peer-to-peer arrangements with the use of smart-contracts are up until now only regulated in Italy. Article 2 (1) lit s Legislative Decree no 199/2021 contains the definition of renewable energy peer-to-peer exchange in Italy. The definition clarifies that “[t]he right to conduct peer-to-peer exchanges is without prejudice to the rights or obligations of the parties involved as end consumers, producers, suppliers or aggregators”. Yet, the Italian law is not specifying the role of the participants of such arrangements further.

3.11.4 Suggestion for improvement

A legal framework for smart contracts should be provided to provide legal certainty to market participants.

3.12 Strong Involvement of Municipalities

3.12.1 Description of situation

The directives allow municipalities to participate in energy communities.

3.12.2 Specification

Whereas citizens often do not have the necessary knowledge and the necessary funds for participating in an energy community, municipalities have easier access to knowledge and funding. Therefore,

[140] See below 4.2.10.
[141] For possible problems regarding Germany, see (with further references) *Ekardt/Rath*, Digitalisierung in der Wärmewende als Rechts- und Governance-Problem: Chancen und Grenzen, ZNER 3 (2022) 211 (218 f).

participation of municipalities in energy communities might help to facilitate access to energy communities for "normal" citizens.

3.12.3 Best practice example

In Austria, information and service institutions on energy (such as e.g. the mentioned "energy institute" of the region of Vorarlberg provides information not only to citizens, but also information tailored to the needs of municipalities.[142]

3.12.4 Suggestion for improvement

Information offers not only tailored to citizens, but also to municipalities; providing funding for municipalities which build energy communities.

3.13 Amendments to particular legal rules of private law

1. These rules should be preferably introduced at the level of EU law (IMED and RED amendments). If no amendment of EU law takes place or before such amendment, rules of national law to the same effect should be introduced.

   a. Contractual provisions restricting the rights granted to consumers and enterprises in the Directives (IMED and RED) with respect to energy consumption and energy communities are void and ineffective. The same applies to contractual provisions requiring consent of landlady or co-owners for the installation of energy producing plants or for the participation in an energy community.

   b. For the installation of energy producing plants on a building in which the person lives or for the participation in an energy community consent of a landlady or co-owner is not required.

   c. The installation of an energy producing plant on a piece of immovable property does not effect a change in ownership of the plant. Separate ownership of third persons of a plant in an energy community is possible with restrictions (to be named). One energy community may operate more than one plant. One plant can be operated by more than one energy community.
   d. Model statutes and legal forms particularly appropriate for the use by energy communities should be provided by the legal regulator.

2. Strong helping hand enabling and driving energy communities should be provided by the legislator

   a. One stop-shop with extended powers (public and private law support) should be provided at the provincial or community level – EU law level regulation (RED or IMED amendment) – ELIAS – the community or province administration as the strong driver and helping hand of ECs

   b. NPO and specialized companies should be enabled to support and drive energy communities (amendments on the national and EU level required)

[142] https://www.energieinstitut.at/gemeinden/ (6.9.2022).

3. Education – instruments (tools) with direct contact to citizens: could be also supported by appropriate legal provisions (EU and national level)

   a. Handling a smart meter: psychologically informed surface and introduction

   b. Approaching an EC: Websites, psychologically informed communication with citizens

   c. Living in an EC: organization handling, benefiting from it on a medium-term perspective, opportunities compared to staying outside

4 Barriers and Facilitators from the Economic Perspective

4.1 Overview on the barriers identified

1. Net-billing systems of settlements (Efficiency, Policy level)
2. Concerns about the RE technology and negative externalities (Fairness, Justice, Behaviour, Members level)
3. Allocation of public support for the energy transition (Fairness, Funding, Justice, Policy level)
4. Additional taxation and lack of opportunity for the VAT deduction (Efficiency, Policy level)
5. Unequal treatment of citizens; exclusion of groups of citizens from the energy transformation processes (Fairness, Justice, Policy level)
6. Energy oligopolies with significant influence on policymakers who slow down the development of energy communities (Efficiency, Policy level)
7. Regulated energy market: prices and citizens' lack of motivation caused by regulated electricity prices (Behaviour, Policy level)
8. Citizens' low income and savings; energy poverty (Investment, Members level)
9. Cost and access to the grid connection (Efficiency, Organisational, Policy level)
10. Lack of peer-to-peer (P2P) energy trade (Efficiency, Policy level)
11. Model of energy production and storage (Efficiency, Organisational, Policy level)
12. Energy community complexity (Organisational, Members levels)
13. A uniform profile of energy consumption among potential civic members of the energy community limits their efficiency (Efficiency, Organisational, Members levels)
14. Growing risk of a prolonged energy and economic crisis (Funding, Policy level)
15. No technical opportunity to establish PV modules on the buildings' roofs (Organisational, Funding, Members levels)
16. Little activity of citizens in creating energy communities (Behaviour, Organisational, Members levels)
17. Difficulties for the energy communities with access to land for renewable energy investments (Fairness, Justice, Policy level)

Table 1. Barriers dimensions

	Management issues			Financial issues		
	Behaviour	Organisational	Fairness, Justice	Efficiency	Investment	Funding
Policy level	7	9, 11	3, 4, 5, 17	1, 4, 6, 9, 10, 11		3, 14
Members level	2, 16	12, 13, 15, 16	2	13	8	15

4.2 Description and Analysis of the barriers identified

4.2.1 Net-billing systems of settlements

#finance #efficiency #policy

4.2.1.1 Definition

Net-billing system: When the prosumer in the photovoltaic installation or other RE technology overproduces electricity at a given moment (in comparison to the prosumer's needs), the electricity through the electricity grid is sold on a free competitive electricity market or market controlled by oligopolies. In this scope, the NB system treats the prosumer as any professional electricity producer and the electricity price reflects the wholesale price. In the opposite situation, i.e. when the prosumer of photovoltaic installation or other RE technology, produces too small amount of electricity in comparison to the prosumer's electricity demand, they must purchase electricity on the electricity market, and the final price consists of the wholesale electricity price, grid fees, and many other taxes and charges.[143]

Net-metering system: When the prosumer in the photovoltaic installation or other RE technology overproduces electricity at a given moment (in comparison to the prosumer's needs), the electricity is transferred to the electricity grid. This additional electricity can be "stored" in the electricity system for one year (eg. in Poland). For this service, the electricity operator takes some amount of electricity (20% in Poland). In the opposite situation, when the prosumer in the photovoltaic installation or other RE technology produces too small amounts of electricity in comparison to the prosumer's electricity demand, s/he can take from the grid their electricity previously added to the grid. The electricity operator does not monetise these electricity exchanges with the prosumer and no grid fees or taxes are charged to the prosumer.[144]

4.2.1.2 Description of the problem

NB is complicated and less profitable for citizens, and is based on the paramarket system. In the Netherlands, from 2023 to 2031, all energy prosumers shall gradually resign from the profitable net-metering system to the significantly less efficient net-billing system (for the government one crucial argument against net-metering is the lack of taxes; net-billing tax has been calculated).[145]
The Net Billing mechanism is supposed to influence balancing of energy production and consumption within the energy cooperative. As ECs come in different shapes and sizes, NB can overburden the EC management (in some cases, due being run by non-professionals) with risks that are connected with NB: price instability, costs of storage technology, innovative business models.

Similarly to the Netherlands, in Poland new PV installations established after 31 March 2022 bill energy according to the net-billing system.[146] Previous PV installation will account for the net-billing system in the next 15 years.
NB is based on dynamic prices on the market; hence it is very difficult to predict income (business has the tools and staff to calculate future income but citizens do not). There is a huge information asymmetry in the energy market between energy citizens and big energy companies. In forthcoming years, when the net-billing system will start to its full extent, we can expect that the net-billing system energy communities (EC) and energy citizens (ec) will sell electricity on the market for very low prices (in a pessimistic scenario, it will be below zero during the sunny days peak). Simultaneously,

[143] Own definition based on: *IRENA*, Innovation landscape brief: Net billing schemes, International Renewable Energy Agency, Abu Dhabi (2019), https://irena.org/-/media/Files/IRENA/Agency/Publication/2019/Feb/IRENA_Net_billing_2019.pdf (6.9.2022).
[144] Own definition based on: *Gautier/Hoet/Jacqmin/Van Driessche*, Self-consumption choice of residential PV owners under net-metering. Energy policy 128 (2019), 648-653; *Poullikkas*, A comparative assessment of net metering and feed in tariff schemes for residential PV systems. Sustainable Energy Technologies and Assessments 3 (2013), 1-8; https://www.emissions-euets.com/internal-electricity-market-glossary/1342-net-metering (6.9.2022).
[145] https://www.zonnefabriek.nl/en/solar-panels/net-metering-in-the-netherlands/ (6.9.2022).
[146] https://wysokienapiecie.pl/68320-net-billing-oplacalnosc-fotowoltaiki-od-1-kwietnia-2022/ (6.9.2022).

EC and ec will pay high prices for electricity in early mornings and late afternoons. Finally, EC and ec cannot predict income and costs and, in consequence, assess the return on investment. NB could be acceptable for energy sellers not for citizens who only balance energy production and consumption. NB forces EC and citizens to have an expensive energy storage system. The energy storage system doubles the investment spending.

From 1 April 2022, net-billing replaced net-metering in Poland. As a consequence, in April 2022, the number of monthly new PV installations sharply decreased by about 94% in comparison to March 2022.[147]

4.2.1.3 Specifications

To solve the problems created by the net-billing system, in some cases the net-metering system should be restored, i.e.:

1. For households in multi-family buildings consuming up to 3,000 kWh (average electricity consumption in a household in a multi-family building) that are members of energy communities. Limit should be extended to 7,000 kWh if heat and domestic hot water are also produced within the community by heat pumps.

2. For households in single-family buildings consuming up to 4,000 kWh, which are members of energy communities. Limit should be extended to 9,000 kWh if heat and domestic hot water are also produced within the community by heat pumps.

4.2.1.4 Best practice example

According to the Netherlands Authority for Consumers and Markets, prosumers' surplus solar energy should be sold for a "reasonable price," which means at least 80% of the energy price that prosumers pay to buy power from the grid, minus taxes.[148]

In 2021 in Greece, the scope of net metering was extended from 1 MW to 3 MW to accelerate the development of micro-installations and small PV installations.[149]

4.2.1.5 Suggestions for improvement

Net-billing systems should not be implemented in countries where ECs are not common (in every region or commune), or where the institution of the virtual prosumer is not implemented.

To accelerate the development of civic energy in Europe, it is necessary to introduce net metering at least for the period before the return on investment takes place. After the residents have achieved return on investment in the following years, the system can be gradually replaced by the net billing system.

Energy surplus from RES generated by EC and ec should pose priority in the energy market and should be accounted for in a decentralised, local electricity market (instead of a centralised electricity market).

147 https://globenergia.pl/zgloszono-94-proc-mniej-instalacji-pv-niz-w-marcu-enea-podala-dane-z-kwietnia/ (6.9.2022).

148 https://www.pv-magazine.com/2022/06/13/dutch-agency-probing-payments-for-surplus-solar-power/ (6.9.2022).

149 https://www.pv-magazine.com/2021/11/12/greeces-policy-reform-fever-storage-net-metering-and-sub-500-kw-solar/ (6.9.2022).

4.2.2 Concerns about the RE technology and negative externalities

#members #managerial #psychology #participation #energyjustice

4.2.2.1 Definition

Negative externalities mean the production process or product use results in a harmful effect on unrelated third parties or the environment.[150]

4.2.2.2 Description of the problem

Many citizens point out that renewable energy technologies solve the problem of energy from non-renewable sources.[151] Yet, they can create new social and environmental issues.[152] Among these concerns, the following can be distinguished:

1) Due to the short durability of many new devices and high investment expenditure on renewable energy technologies, many residents are afraid that the devices will break down before the return of the capital. Residents are also concerned about the following:
   - The roof damage due to improper installation of photovoltaic panels;[153]
   - increased fire risk associated with the photovoltaic installation on the buildings' rooftops (the risk concerns central inverters located in the building, where high voltage is generated);[154]
   - The decline in property value due to the proximity of wind farms and solar farms[155] ("Large windfarms can knock as much as 12% off the values of homes within a 2km radius, and reduce property prices as far as 14km away, according to research by the London School of Economics."[156]);
   - noise increase caused by wind turbines[157];
   - landscape aesthetics decrease caused by wind turbines[158].

2) Environmentally sensitive Inhabitants are concerned about problems related to the recycling of used and broken devices (mainly photovoltaic panels and blades from wind farms)[159], including:

[150] *Hutchinson*, Principles of Microeconomics (2017); *Cornes/Sandler*, The Theory of Externalities, Public Goods, and Club Goods (1986); *Ziolo/Filipiak/Bąk/Cheba/Tîrca/ Novo-Corti*, Finance, sustainability and negative externalities. An overview of the European context, Sustainability 11(15) (2019), 4249.

[151] *Franzen/Vogl*, Two decades of measuring environmental attitudes: A comparative analysis of 33 countries, Global Environmental Change 23(5) (2013), 1001-1008.

[152] *Rommel/Radtke/Von Jorck/Mey/Yildiz*, Community renewable energy at a crossroads: A think piece on degrowth, technology, and the democratization of the German energy system, Journal of Cleaner Production 197 (2018), 1746-1753.

[153] https://solarstack.com/do-solar-panels-ruin-roof/ (6.9.2022).

[154] *Miloua*, The Fire Risk in Green Building Caused by Photovoltaic Installations, in: Hatti (ed), Smart Energy Empowerment in Smart and Resilient Cities (2020), https://doi.org/10.1007/978-3-030-37207-1_49.

[155] *Sunak/Madlener*, The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model (May 1, 2012), FCN Working Paper No. 3/2012 (revised March 2013), https://ssrn.com/abstract=2114216 or http://dx.doi.org/10.2139/ssrn.2114216; see alsohttps://www.farms.com/ag-industry-news/ontario-court-says-wind-turbines-reduce-property-values-882.aspx (6.9.2022).

[156] https://www.theguardian.com/money/2014/apr/08/windfarms-reduce-house-prices-compensation (6.9.2022).

[157] *Onakpoya/O'Sullivan/Thompson/Heneghan*, The effect of wind turbine noise on sleep and quality of life: a systematic review and meta-analysis of observational studies, Environment International 82 (2015), 1-9; *Johansson/Kriström*, Welfare evaluation of subsidies to renewable energy in general equilibrium: Theory and application, Energy Economics 83 (2019), 144-155.

[158] *Mattmann/Logar/Brouwer*, Wind power externalities: a meta-analysis, Ecological Econonomics, 127 (2016), 23-36.

[159] https://hbr.org/2021/06/the-dark-side-of-solar-power (6.9.2022).

– reduction of the biologically active surface;
– wildlife population loses (wind turbines)[160].

Most of the existing wind farms were built mostly by energy companies and business entities and rarely by energy communities. In 2021 the wind capacity developed or operated by only the 10 biggest companies in the European Union (EU-27) covered 102,9 GW.[161] This represents 54,5% of cumulative wind capacity (188,9 GW) in the European Union (EU-27) only.[162] The problem of the residents' and local authorities' resistance against wind and solar farms is observed in many countries. Examples include Germany, where this type of investment is developing particularly intensively[163], as well as Spain[164]. Due to the fact that to meet the needs of the European Union countries, it is necessary to cover an area of about 100,000 km2 with photovoltaic panels (corresponding to the Portuguese territory), it can be expected that the problem will worsen. As a result, firstly we are losing valuable for agricultural land, and secondly energy communities will not find a suitable location for the RE installation in the forthcoming future.

4.2.2.3 Specifications

To reduce the residents' concerns and doubts about wind farms, some countries have introduced distance restrictions for this type of investment from human settlements. 10H rule in Poland[165] and similar rules in Bavaria and some countries in Austria make wind farm development on land slow down or stop.[166] As a consequence, in Poland the new installed wind power capacity was sharply decreased from 1,225 MW in 2016 to 41 MW in 2017 and 16 MW in 2018. In next years the tendency was changed and we can observe steady increase from 53 MW in 2019 to 430 MW in 2020 and 770 MW in 2021.[167] Currently in Poland, it is planned to reduce the distance to 500 m.[168]
Local communities, in the vicinity of which wind farms and photovoltaic farms are built, should be provided with participation in the ownership of these farms and the possibility of receiving the generated energy. Compensation in the form of financial or energy supplies will allow the recede the NIMBY[169] syndrome in local communities and compensate for external costs on the part of residents. Solar farms are built on green areas that are biologically active, and the environmental costs

[160] *May/Reitan/Bevanger/Lorentzen/Nygaard*, Mitigating wind-turbine induced avian mortality: sensory, aerodynamic and cognitive constraints and options. Renewable and Sustainable Energy Review 42 (2015), 170-181, 10.1016/j.rser.2014.10.002.
[161] https://www.statista.com/statistics/612390/windfarm-companies-capacity-eu/ (6.9.2022).
[162] *Komusanac/Brindley/Fraile/ Ramirez*, Wind energy in Europe - 2021 Statistics and the outlook for 2022-2026, windeurope.org, February 2022, 11.
[163] https://www.pv-magazine.de/2021/12/01/praxis-leitfaden-fuer-kommunale-buergerbeteiligung-fordert-transparenz-regionalitaet-und-digitale-prozesse/ (6.9.2022).
[164] https://www.pv-magazine.es/2021/05/06/moratoria-a-plantas-renovables-en-huesca-y-propuesta-en-la-rioja/ and https://www.pv-magazine.es/2021/05/10/el-ayuntamiento-de-mula-contras-las-megaplantas/ and https://www.lasprovincias.es/costera/plataforma-defensa-vall-20220812162558-nt.html (all 6.9.2022)
[165] https://www.cire.pl/artykuly/serwis-informacyjny-cire-24/185558-mrpit-ustawa-odleglosciowa-powinna-trafic-do-sejmu-we-wrzesniu-pazdzierniku (6.9.2022). The distance between a wind farm and a residential building or building used for residential purposes, must be at least ten times the height of the wind farm.
[166] https://resmonitor.eu/en/at/barriers/1493/; https://resmonitor.eu/en/pl/barriers/932/ (all 6.9.2022).
[167] https://www.gramwzielone.pl/energia-wiatrowa/108186/7-gw-mocy-w-polskiej-energetyce-wiatrowej-co-dalej#:~:text=Zgodnie%20z%20danymi%20Agencji%20Rynku,przyby%C5%82o%2048%20nowych%20instalacji%20wiatrowych (6.9.2022).
[168] https://www.cire.pl/artykuly/serwis-informacyjny-cire-24/185558-mrpit-ustawa-odleglosciowa-powinna-trafic-do-sejmu-we-wrzesniu-pazdzierniku (6.9.2022).
[169] "Not in my backyard", see https://dictionary.cambridge.org/de/worterbuch/englisch/nimby (6.9.2022).

associated with the construction and operation of these farms should also be reduced.[170] For this purpose, only Agro-Hydro-Energy farms should be approved for implementation.[171]

All large-scale projects located close to human settlements, implemented by both energy communities and enterprises, should take into consideration distributional, procedural, and information justice to respect citizen needs and agency. The process itself should be implemented with co-creation methods.to reduce potential conflicts and empower people by co-responsibility of the project.

4.2.2.4 Best practice example

Participation law in Mecklenburg-Vorpommern [172] introduced in 2016 introduced a mechanism obliging the operators of wind turbines to share the 20 percent stake in turbines revenue with residents and municipalities communities within five kilometers close to the site. As an alternative, operators may also offer annual financial compensation. This regulation was confirmed by Federal Constitutional Court in Karlsruhe.[173] From the management perspective, supported by research, energy transition in European countries can only succeed if the needs and expectations of local citizens are taken into account.[174]

France is the European one of leaders in the development of agro-photovoltaics establishing the world's first association dedicated to the promotion of agricultural PV.[175] In March 2020, support was provided to agri-photovoltaic projects with a total capacity of 40 MW.[176] In Poland, activities in the field of agro-photovoltaics were undertaken by the Polish Zkalster, which grows bear garlic (50 ha[177]) under solar panels. In April 2021, representatives of 15 agricultural companies, representatives of 15 agricultural and photovoltaic companies, research units, and certification units from Germany produced the DIN SPEC 91434 standard. It specifies the requirements for the main agricultural applications in agrivoltaic projects and includes principles for planning, operation, documentation, and operation supervision.[178] Italian renewable energy associations ANIE Rinnovabili, Italia Solare, and Elettricità Futura have published a joint document setting out a series of standards for agrovoltaic projects. Agri-PV system (co-locating PV modules above agricultural lands) can lower the water usage for agriculture as shield crops from heat reduce evapotranspiration[179].

[170] Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012), 1st edition - 9th March 2017, Natural England, https://www.gov.uk/government/organisations/natural-england; https://www.vox.com/2021/8/18/22556193/solar-energy-biodiversity-birds-pollinator-land (all 6.9.2022).
[171] https://www.farmer.pl/produkcja-roslinna/ochrona-roslin/przenosna-farma-fotowoltaiczna-na-wysokiej-konstrukcji,107942.html (6.9.2022).
[172]
[173]https://www.fachagentur-windenergie.de/aktuelles/detail/pflicht-zur-anwohner-und-gemeindebeteiligung-zulaessig/ (6.9.2022).
[174] https://www.pv-magazine.de/2021/12/01/praxis-leitfaden-fuer-kommunale-buergerbeteiligung-fordert-transparenz-regionalitaet-und-digitale-prozesse/ (6.9.2022).
[175] https://www.intersolar.de/news/innovative-agricultural-photovoltaic-projects-and-technology access: 27/08/2022 (6.9.2022).
[176] https://www.ise.fraunhofer.de/content/dam/ise/en/documents/publications/studies/APV-Guideline.pdf (6.9.2022).
[177] https://globenergia.pl/czosnek-niedzwiedzi-laki-kwietne-i-pszczoly-na-farmach-fotowoltaicznych-w-pol-sce/#:~:text=ZKlaster%20(Zgorzelecki%20Klaster%20Rozwoju%20Odnawialnych,upraw%C4%99%20rozpocz%C4%99to%20w%202021%20roku (6.9.2022).
[178] https://www.pv-magazine.com/2021/04/27/german-organizations-outline-new-standards-for-agrivoltaics/ (6.9.2022).
[179] https://www.solarpowereurope.org/interests/agrisolar (6.9.2022).

4.2.2.5 Suggestions for improvement

Ecologists, biologists, and environmental protection specialists should participate in the preparation of the project. Environmental authorities assessing the preparation of investments and issuing building permits should require pro-environmental applications that mitigate the negative impact of RES installations.

4.2.3 Allocation of public support for the energy transition

#financing #pubicaid #policy #managerial

Financial incentives are an important factor from the legal as well as the economic point of view.[180]

4.2.3.1 Description of the problem

Public financial support dedicated to big energy (oligopoly) that is not accessible to citizens makes the energy transition unfair, where citizens are forced to pay double. Big energy companies with oligopoly status receive public support not accessible for majority to energy citizens and energy communities. In 2020, photovoltaic farms in Poland received an average of 58% co-financing from the European Union funds for the total costs of the installation.[181] For instance, PGE Energia Odnawialna belonging to the PGE Group (the biggest Polish oligopoly) obtained an interest-free loan from the National Fund for Environmental Protection and Water Management for the construction of two photovoltaic farms, i.e. Gutki 1 and Gutki 2, with a total capacity of 24 MW. Co-financing in both cases comes from the EU-funded Operational Program Infrastructure and Environment 2014–2020. The value of each investment is PLN 16.4 million and the granted loans amount to PLN 13.9 million. The funding is to cover 85% of the investment costs. After the timely completion of the Gutki 1 and 2 photovoltaic power plants, part of the loan taken by the company, amounting to almost PLN 3.3 million, will be cancelled.[182]

This example shows that such public support is unfair for two main reasons. First, any citizen in Poland including those endangered by energy poverty cannot expect public support financing 85% of PV installation investment with no cost of the loan and, in addition, almost a 24% loan reduction option. This public support could be used to eliminate energy poverty in approximately 40,000 citizens and in 10,000 families. Second, citizens pay double for the energy transition. Public funds come mostly from citizens' taxation as final consumers. Citizens are the main clients of electricity producers and pay for energy directly and indirectly (buying goods and services). Thus, citizens pay double, i.e. through public funds that support oligopoly PV farm investments (Germany[183], Poland[184]) and they pay for electricity produced by such PV farms. According to the report of the European Court of Auditors from 2019 Member States over-subsidized renewable projects. For example, between 2008 and 2010, in Germany, Greece and Spain, feed-in tariffs for PV systems were 18-67% higher than the average cost of electricity, resulting in significant profits for producers[185].

[180] See above 3.8.
[181] https://enerad.pl/aktualnosci/dotacje-na-farmy-fotowoltaiczne-2021-skad-wziac-srodki/ (6.9.2022).
[182] https://www.gramwzielone.pl/energia-sloneczna/108194/dofinansowanie-na-farmy-fotowoltaiczne-pge (6.9.2022).
[183] https://www.pv-magazine.de/2019/01/25/aus-kohle-wird-photovoltaik-und-windkraft-ganz-ohne-foerderung/; https://www.pv-magazine.de/2021/03/05/was-wir-fuer-die-eeg-umlage-bekommen-haben-seid-stolz-be-proud/ (all 6.9.2022).
[184] https://enerad.pl/aktualnosci/dotacje-na-farmy-fotowoltaiczne-2021-skad-wziac-srodki/ (6.9.2022).
[185] Wind and solar power for electricity generation: significant action needed if EU targets to be met, European Court of Auditors, Special report 08/2019, https://op.europa.eu/webpub/eca/special-reports/wind-solar-power-generation-8-2019/de/index.html#box4 (6.9.2022).

In most of the surveyed countries (Germany[186], Italy[187], Spain[188], and The Netherlands[189]) the share of civic energy in the transformation is significantly lower than that of enterprises, and a significant part of public funds is allocated to projects serving large energy companies, not civic energy. In the bidding auction system in Germany the cooperatives are disadvantaged and loose in competition with commercial actors.[190] According to the German Association for the Environment and Nature (Bund für Umwelt und Naturschutz Deutschland), the Federal Network Agency (Bundesnetzagentur) insists on expanding the central network in favour of large corporations. There is no cost-benefit analysis or economic optimisation required by the Energy Act. Large part of the 80 billion euro grid expansion costs for hundreds of kilometres of high voltage direct current (HVDC) transmission lines could be saved and spent on better alternatives. BUND has long been calling for the expansion of energy networks in a decentralised manner serving the purpose of community energy.[191]

According to the 2021 study in Germany, carried out by the Civey opinion research institute on behalf of the eco-cooperative Green Planet Energy, 90% of respondents generally complain about the lack of access to the photovoltaic market, and 61% expect the federal government to create more options for the participation in the expansion of nearby solar systems; 65% want to use photovoltaic energy from the residential buildings' roofs. Thus, purchase of green electricity from a nearby solar park would increase the acceptance of this form of energy by 55%of surveyed citizens. But for this to be possible, public funds should be allocated, inter alia, to:

- ensuring active participation and co-creation by citizens in the photovoltaic expansion,
- reforming feed-in tariffs for smaller photovoltaic systems to ensure their profitability,
- changing fees, commissions and charges, so that self-sufficiency remains economic,
- financial participation of citizens in photovoltaic systems in their vicinity.[192]

4.2.3.2 Specifications

Public non-returnable or low-interest financing funds should not be used to support investments in solar farms implemented by energy oligopolies. Public funds can be allocated to the development of innovative niche technologies that are characterised by high risk. The construction and operation of photovoltaic farms do not meet these conditions. Additionally, solar farms are highly profitable ventures.[193]

---

[186] https://eu.boell.org/en/2018/04/24/citizens-many-drops-make-river, https://www.cleanenergywire.org/news/share-citizen-energy-projects-decline-funding-runs-out-and-big-investors-take-over (all 6.9.2022).

[187] https://www.infobuildenergia.it/wp-content/uploads/2021/07/Solare-Fotovoltaico-Rapporto-Statistico-GSE-2020.pdf (6.9.2022).

[188] *Capellán-Pérez/Campos-Celador/Terés-Zubiaga*, Renewable Energy Cooperatives as an instrument towards the energy transition in Spain, Energy Policy 123 (2018), 215-229.

[189] http://www.polderpv.nl/CBS_PV_NL_Provincies_gemeentes_RES_tm_2021_H1_10dec2021.htm#Accumulatie_capaciteit_per_segment_CBS (6.9.2022).

[190] https://www.dgrv.de/wp-content/uploads/2021/07/CEEAG.pdf (6.9.2022).

[191] https://www.pv-magazine.de/unternehmensmeldungen/energiewende-braucht-ein-neues-strommarktdesign-fuer-dezentrale-buerger-energie/ (6.9.2022).

[192] https://www.pv-magazine.de/unternehmensmeldungen/die-naechste-bundesregierung-muss-einen-buergerenergie-boom-entfesseln/ (6.9.2022).

[193] https://enerad.pl/aktualnosci/oplacalnosc-farmy-fotowoltaicznej-w-2021-roku/#:~:text=Zyski%20z%20farmy%20fotowoltaicznej%20w%20systemie%20aukcyjnym&text=97%25)%2C%20farma%20fotowoltaiczna%2C%20powinna,6%20mln%20z%C5%82; https://www.cleanenergywire.org/factsheets/solar-power-germany-output-business-perspectives (all 6.9.2022).

4.2.3.3 Best practice example

In 2022, the government of Thuringia will allocate 500,000 euros in loans to support community energy. Funds can be used for feasibility studies, site studies, surveys, environmental impact assessments, and other steps usually taken before building a renewable power plant[194].
The government of Mecklenburg-Vorpommern in August 2022 decided to spend EUR 10 million to support small photovoltaic power plants with a capacity of up to 600 watts. Residents can install them on apartment balconies without a permission (it is enough to notify the energy supplier). The household subsidy is limited to EUR 500.[195]
Austria doubled the budget for its residential solar subsidy programme (capacity up to 5 kW), bringing the rebate for installed grid-connected capacity to EUR 250 (USD 307) per kW, and for systems integrated into buildings – to EUR 350 (USD 429) per kW. Policies supporting solar-plus-storage explicitly link solar PV and energy storage. In 2020, Austria provided financial support for solar-plus-storage installations and launched a EUR 36–million–rebate programme for small solar-plus-storage installations[196]

Austria's subsidy scheme for large and innovative solar thermal projects again saw results in 2020, with the inauguration of three new solar district heating fields totalling a combined 4.7 MWth. This represented a change from 2019 when no solar district heating plants were commissioned in Austria.[197] Photovoltaic citizen participation initiatives (PV-CPI) in Austria have traditionally been implemented based on subsidised feed-in-tariffs (FIT) that the federal government provided.[198]

4.2.3.4 Suggestions for improvement

1. Big energy companies especially with oligopoly status should not receive public support for PV farms or for wind power plant purposes.

2. The public funds supporting PV installations through interest-free loans, covering a significant percentage (85%) of the investment costs and the rest in loans with reduction options, should be offered to citizens, especially those endangered by energy poverty.

4.2.4 Additional taxation and lack of opportunity for the VAT deduction

#taxes #finace #policy

4.2.4.1 Description of the problem

One of the barriers is the tax burdens related to the activities in the field of energy production, distribution, and other areas of energy community activities. For example, according to the new interpretation of the Polish Tax Authority, energy communities (collective prosumer in Poland) with

[194] https://www.pv-magazine.de/2022/05/02/thueringen-legt-fonds-fuer-buergerenergieanlagen-auf/ (6.9.2022).
[195] https://www.pv-magazine.de/2022/08/24/mecklenburg-vorpommern-will-photovoltaik-balkonkraftwerke-foerdern/ (6.9.2022).
[196] RENEWABLES 2021 GLOBAL STATUS REPORT, REN21, https://www.ren21.net/wp-content/uploads/2019/05/GSR2021_Full_Report.pdf (6.9.2022).
[197] RENEWABLES 2021 GLOBAL STATUS REPORT, REN21, https://www.ren21.net/wp-content/uploads/2019/05/GSR2021_Full_Report.pdf (6.9.2022).
[198] *Linhart/Rodin/Moser/Kollmann*, Citizen Participation to Finance PV Power Plants Focused on Self-Consumption on Company Roofs—Findings from an Austrian Case Study Energies, *14*(3) (2021), 738.

PV installation > 1MWp pay additional excise duty.[199] As a result of these regulations, citizens have been somehow punished for undertaking team-based (thus larger) energy initiatives.

In Poland, energy communities whose members consume all the energy produced are not able to recover VAT on the investment outlays. As a result, investments in renewable energy sources implemented by energy communities are higher in the VAT value than in the case of commercial investments. This makes investments in renewable energy sources less economically effective than similar commercial ventures.

4.2.4.2 Specifications

Not only should energy communities not be charged with additional fees and taxes, but they should also be able to recover the VAT paid. Alternatively, VAT could be recovered by members of the energy community.

4.2.4.3 Best practice example

In May 2020, the Italian government introduced an ecological bonus, increasing the spending limits of the installed photovoltaic systems and storage systems from 50 to 110% for tax relief purpose. The relief covers expenses incurred in the period from 1 July 2020 to the end of 2021, both in single- and multi-family houses. As part of this relief, it was possible to carry out investments in renewable energy sources without incurring expenses but assigning the value of the relief to installation contractors. The Italian government set a maximum price of 2,400 euros per kilowatt installed for solar PV systems and 1,000 euros per kilowatt hour for storage systems. In exchange for high tax relief, the non-consumed electricity surplus goes to the national grid without any financial compensation.[200]

In the beginning of 2021, a new subsidy "Federal Financing of Effective Buildings" (Bundesförderung für effiziente Gebäude – BEG) appeared in Germany. Citizens can choose whether they want an investment subsidy (30% return on investment) or a low-interest loan with a repayment subsidy. Citizens can only use the sub-programme measures if they want to use solar heating (thermal energy) in an existing building.[201]

In April 2022, the Council of the European Union adopted Directive 2022/542, according to which Member States are free to apply a reduced VAT rate from zero to five percent both on solar modules, their supply, and installation. Thanks to this, states can promote renewable sources and energy self-sufficiency.[202]

Also in April 2022, the German State Association of Solar Energy (Landesverband Solarenergie) called for the implementation of, *inter alia*, VAT exemption for solar systems. It should be noted, however, that for citizens and energy communities, the zero VAT rate is much more advantageous than the exemption from VAT.[203]

In Poland, owners of single-family houses have the option of deducting investment expenditures for a photovoltaic installation from the tax base of personal income tax. The drawback of this solution is

[199] https://www.gramwzielone.pl/energia-sloneczna/108147/akcyza-od-energii-zuzytej-na-wlasne-potrzeby-uwaga-na-granice-1-mw (6.9.2022).

[200] https://www.pv-magazine.de/2020/05/22/italiens-hausbesitzer-koennen-jetzt-kostenlos-photovoltaik-anlagen-installieren/ (6.9.2022).

[201] https://www.pv-magazine.de/unternehmensmeldungen/beg-foerderung-fuer-die-solarthermie-anlage-bis-zu-50-prozent-vom-staat-dazu/ (6.9.2022).

[202] https://www.pv-magazine.de/2022/04/13/eu-ermoeglicht-niedrigere-mehrwertsteuer-auf-lieferung-und-installation-von-solarmodulen/ (6.9.2022).

[203] https://www.pv-magazine.de/unternehmensmeldungen/landesverband-solarenergie-rheinland-pfalz-begruesst-das-oster-paket-von-bundeswirtschaftsminister-robert-habeck/ (6.9.2022).

that after the tax changes have been introduced in 2022, people with low income will not be able to deduct tax costs. And for people with very high income, the tax deduction will be the highest (up to PLN 53,000).[204] It is incomprehensible that the residents of multi-family buildings that will create an energy community cannot take advantage of the thermo-modernisation relief.

4.2.4.4 Suggestions for improvement

1. Citizens as well as energy communities should have the possibility to account for input and output VAT.[205] In addition, e.g. like in Poland, excise duty for energy communities' PV installations above 1MWp should be cancelled.

2. When Citizens and energy communities cannot deduct VAT, VAT on photovoltaic modules as well as their delivery and assembly used by both citizens and energy communities should be zero.

3. Inhabitants of multi-family buildings forming energy communities, e.g. like in Poland, should not be discriminated against in terms of taxation (excise duty) concerning the owners of single-family houses.

4. Citizens who have too little income to deduct expenditure on investing in renewable energy from income tax sources should receive adequate financial support in a different form.

4.2.5 Unequal treatment of citizens, exclusion of groups of citizens from the energy transformation

#exclusion #policy #management

4.2.5.1 Description of the problem

In the surveyed countries, a significant proportion of citizens, those who rent a flat (in Germany 48.9%, Austria 44.8%, the Netherlands 31.1%, Italy 27.6%, Spain 25.8%, and Poland 15.8%[206]) are excluded from participating in the energy transformation. According to the Institut für ökologische Wirtschaftsforschung in Germany, the participation of tenants in micro-installations on the roofs of buildings is scarce.[207] The existing solutions in this area do not target the problem efficiently.[208] Contrary to the position of the Federal Ministry of Economy, German organisations Bündnis Bürgerenergie and the Burgerenergie Altmark cooperative indicate that the new version of the EU Directive on renewable energy RED II providing the facilitation of the sharing of locally produced solar energy has not been implemented for German law. That prevents a large group of low-income households from participating in the benefits of their renewable energy production.[209] In Poland,

[204] https://www.podatki.gov.pl/pit/ulgi-odliczenia-i-zwolnienia/ulga-termomodernizacyjna/; https://wysokienapiecie.pl/37166-o-odliczeniu-paneli-fotowoltaicznych-od-podatku-sam-musisz-pamietac/ (all 6.9.2022).

[205] https://www.pv-magazine.de/2013/06/24/eu-gerichtshof-urteilt-ber-betrieb-von-photovoltaik-anlagen/ (6.9.2022).

[206] https://businessinsider.com.pl/finanse/makroekonomia/wynajem-a-wlasne-mieszkanie-bogaci-wybieraja-wynajem-my-odwrotnie/z6k1310 (6.9.2022).

[207] *Wiesenthal/Aretz/Ouanes/Petrick*, Energy Sharing: Eine Potenzialanalyse, Institut für ökologische Wirtschaftsforschung, Berlin, Mai 2022, https://www.ioew.de/publikation/energy_sharing_eine_potenzialanalyse (6.9.2022).

[208] https://www.pv-magazine.de/2021/08/20/kontinuitaet-und-visionen-wie-es-mit-dem-mieterstrom-nach-der-bundestagswahl-weitergehen-sollte/ (6.9.2022).

[209] https://www.pv-magazine.de/2021/07/14/buendnis-buergerenergie-erwaegt-beschwerde-gegen-bundesregierung-wegen-fehlender-umsetzung-der-eu-erneuerbaren-richtlinie/ (6.9.2022).

apartment tenants and apartment owners in multi-flat buildings are unequally treated by the state and regulators in comparison with single-family homeowners. Citizens, apartment tenants, have no opportunity to be electricity prosumers; they have no public support or tax deductions. Apartment owners in multi-flat buildings have lesser conditions to be electricity prosumers/energy citizens (limited PV power, net-billing instead of net-metering, higher electricity taxes) and no tax deductions in comparison to single-family homeowners.

4.2.5.2 Specifications

All citizens, regardless of their material status, should have the guaranteed possibility to generate energy for their own needs. In situations where a citizen does not have the technical conditions to install a PV installation on the roof of their building or is a tenant, energy generation in external locations should be legally allowed (virtual prosumerism).[210] A similar solution should apply to energy communities where there are no technical possibilities or where some members of the community are tenants.

4.2.5.3 Best practice example

In 2020, the concept of a virtual prosumer was introduced in Lithuania. Based on this solution, Ignitis (an energy concern operating in the Baltic States, Poland, and Finland) offered the citizens and companies to participate in photovoltaic projects (solar farms). At the end of 2021, 1.5 thousand people participated in 13 projects of this company with a total capacity of 9.5 MW under long-term contracts. The interest in this solution on the part of the inhabitants is very high and 5 more projects are being implemented[211]. By the end of 2021, there were 14,000 prosumers in Lithuania, most of which, i.e. approx. 93%, were natural persons. At the same time, as many as 4.5 thousand prosumers are virtual ones. Only in the first month of 2022, individuals and companies wishing to become a virtual prosumers submitted 4.8 thousand applications.[212]

At the request of the municipality, 48 citizens of the municipality of Simmelsdorf in Germany were allowed to participate in the 9.8 MW photovoltaic park "Am Judenhof" of the Nuremberg photovoltaic company Greenovative and in the crowdfunding of EUR 1,000[213].

In Spain, the idea of a virtual prosumer is offered by Solar Pack as part of the Click and Go offer. Inhabitants with no technical capabilities for PV micro-installations and tenants of apartments have the opportunity to participate in photovoltaic farms by renting several PV modules appropriately to the energy consumption. Users of this solution can utilise the energy produced in several locations, and they can also change the locations of energy consumption over time. According to the offer, it is possible to reduce electricity bills by 35%. Participants also could sell surplus energy. In the case of an average Spanish family with an energy consumption of 2,500 kWh per year, the participant invests EUR 1,620 net (excluding VAT) in PV modules to be available to him for 30 years (considering their gradual decrease in power) and then pays a monthly fee at the level of EUR 8 per month[214].

In the US, the Federal Department of Energy (DOE) announced new goals for the National Community Solar Partnership programme, i.e.:

---

[210] The solution, where the place of energy production and consumption is different, is called the virtual prosumer.

[211] https://www.gramwzielone.pl/energia-sloneczna/106900/wirtualny-prosument-litewskie-doswiadczenia-ignitis (6.9.2022).

[212] https://www.gramwzielone.pl/energia-sloneczna/107369/coraz-wiecej-wirtualnych-prosumentow-na-litwie (6.9.2022).

[213] https://www.pv-magazine.de/unternehmensmeldungen/nuernberger-unternehmens-trio-kooperiert-bei-984-mwp-grossem-solarpark-mit-buergerbeteiligung-in-simmelsdorf-ein-beispiel-regionaler-gruener-stromversorgung/ (6.9.2022).

[214] https://www.solarpackclickandgo.es/?utm_medium=corporativo&utm_source=solarpack&utm_campaign=link_solarpack.es&utm_content=banner&utm_term=banner_abajo_home (6.9.2022).

1. Make community solar accessible to every U.S. household.
2. Ensure community solar is affordable for every U.S. household.
3. Enable communities to gain additional meaningful benefits and value streams from community solar installations.

Thanks to this programme, by 2025, the community solar capacity will have increased from 3GW to 20GW, and 5 million households will have been covered. In addition, USD 1 billion will have been saved, which translates into a 20% reduction in electricity bills[215].

4.2.5.4 Suggestions for improvement

The mentioned benchmarks from Lithuania and Spain are business initiatives that make it easier for residents to become energy citizens. At the same time, initiatives of this type offering flexible solutions for residents should be developed by energy communities. Thanks to this, the long-term economic benefits for the members of the community would be much greater than in the mentioned commercial solutions.

4.2.6 Energy oligopolies with significant influence on policymakers who slow down the development of energy communities

#policy #finance #energyjustice #oligopoles

4.2.6.1 Description of the problem

In some European countries, there are oligopolies in the energy markets. In 2017 in Spain, Endesa and Iberdrola (energy companies) alone had an 80% of the electricity market share.[216] A similar situation is observed in Poland where PGE, Tauron, Enea, and Energa (state-owned energy companies) controlled in 2020 67% of electricity market production, and 93% of electricity market distribution. Each of these companies is a regional monopolist.[217]

Oligopolistic energy companies failed to reform and prepare energy networks to receive energy from renewable sources, inhibiting the development of prosumer energy. Power grids in the Netherlands[218], Spain,[219] and Poland are a bottleneck in the development of civic energy. The grid infrastructure is also a barrier to the EC development in Italy.[220] As a result, in the Netherlands, the power of PV installations is limited,[221] and in Poland, there is a growing problem of shutdowns of PV installations due to the overload of the power grid (too high voltage). The shutdown of photovoltaic installations at the production peak means that the production volume in the most favourable period is significantly lower and, as a result, the profitability of PV installations for citizens drops significantly. This type of

[215] https://www.energy.gov/communitysolar/about-national-community-solar-partner-ship#:~:text=The%20National%20Community%20Solar%20Partnership%20(NCSP)%20is%20a%20coalition%20of,increased%20resilience%20and%20workforce%20development (6.9.2022).
[216] https://www.tni.org/en/article/a-democratic-alternative-to-the-spanish-energy-oligopoly (6.9.2022).
[217] https://www.ure.gov.pl/pl/energia-elektryczna/charakterystyka-rynku/9659,2020.html (6.9.2022).
[218] https://www.pv-magazine.com/2022/02/21/the-netherlands-friesland-and-gelderland-regions-reach-maximum-grid-capacity/ (6.9.2022).
[219] https://www.pv-magazine.es/2022/07/12/el-39-de-las-inversiones-previstas-en-renovables-podria-no-ejecutarse-por-retrasos-administrativos/ (6.9.2022).
[220] EU Market Outlook For Solar Power 2021-2025, SolarPower Europe (2021), 35, https://www.solarpowereurope.org/insights/market-outlooks/market-outlook (6.9.2022).
[221] https://www.gramwzielone.pl/energia-sloneczna/105446/operatorzy-sieci-w-holandii-odmawiaja-przylaczania-fotowoltaiki (6.9.2022).

information discourages residents from creating energy communities. This problem occurs in locations where 1/3 of the buildings have micro PV installations.[222]

At the end of May 2022, the power of photovoltaic installations in Poland reached 10.2 GW (of which 7 GW were installed by households). According to the energy strategy adopted by the government in February 2021 (consulted with the professional energy sector but not with citizens), that level was to be achieved only in 2040.[223] Professional energy and oligopolistic energy concerns are not interested in the development of civic energy due to the reduction in revenues. Hence, they are not interested in the development of power grids and new transformer stations.

4.2.6.2 Specifications

There is a need for urgent modernisation of low and medium-voltage transmission networks and transformer stations for the growing production of electricity from renewable sources (mainly PV). Low-voltage power grids and transformer stations should be kept separate from large power generators to avoid conflicts of interest.

4.2.6.3 Best practice example

To counteract the inefficiency of the transmission networks and ensure the possibility of further connection of photovoltaic installations, both public and commercial, Enexis, a Dutch distribution system operator, announced in 2021 that it would install 11 mobile transformer stations in the northern Netherlands.[224] Another Dutch distribution network operator, Liander, in relation with connection problems of new PV installations in the North-East of the Netherlands and in order to ensure the possibility of connection to all prosumers, announced that it wanted to provide investors from the photovoltaic sector with connection capacities corresponding to only ¾.[225]

4.2.7 Regulated energy market: prices and citizens' lack of motivation caused by regulated electricity prices

#policy #prices #market

4.2.7.1 Description of the problem

Spanish and Polish electricity markets for households are regulated, with significant influence of politics[17, 18]. Thus, electricity prices are a political issue. Regulated electricity prices in a short term protect households and reduce energy poverty. In a long term, they slow down inevitable electricity prices increase. Low regulated electricity prices demotivate citizens who then delay necessary investment in the RE technologies. Regulation of the prices increases the risk of the prices rise in the long term when deregulation is in place.

[222] https://www.gramwzielone.pl/energia-sloneczna/108449/magazyn-energii-taurona-ma-pomoc-prosumentom (6.9.2022).
[223] https://wysokienapiecie.pl/73113-moc-fotowoltaiki-w-polsce/ (6.9.2022).
[224] https://www.gramwzielone.pl/energia-sloneczna/105446/operatorzy-sieci-w-holandii-odmawiaja-przylaczania-fotowoltaiki (6.9.2022).
[225] https://www.gramwzielone.pl/energia-sloneczna/105446/operatorzy-sieci-w-holandii-odmawiaja-przylaczania-fotowoltaiki (6.9.2022).

4.2.7.2 Specifications

Electricity prices are indicated as an element that motivates people to be active players in the renewable energy market[226]. Yet, the deregulation of the market and the prices rise endanger citizens with energy poverty.

4.2.7.3 Suggestions for improvement

The time left until electricity prices are deregulated should be used for policymakers to accelerate support for the energy communities' establishment and other activities that allow citizens to produce renewable energy for their own needs. Therefore, renewables affect energy prices.[227]

4.2.8 Citizens' low income and savings; energy poverty

#energypoverty #energyjustice #members #finance

This issue is one of the major problems identified in the co-creation workshops.[228]

4.2.8.1 Description of the problem

Low levels of citizens' income and savings (especially in Poland, Spain, and Italy [high unemployment rate in the south]) are not sufficient to finance PV installations in advance. Spanish household savings are 50% of the European Union average; in Poland, it is only 33%, and in Germany – 153%.[229] Simultaneously the average prices of solar modules in 2021 increased by 57%, from about USD 0.21/Wp to USD 0.33/Wp. In addition, in 2022, the prices of photovoltaic (PV) modules will continue to rise, and will reach USD 0.41/Wp.[230] The key disabler is a mechanism of financing PV installation in advance. The solution could be for the cost of investment to be deducted from tax and transferred to a contractor. The cost of capital (bank loan) captures all citizen profits (the lowest risk in Germany [3.5%] and in the Netherlands [5%]; next Austria [6%] and Italy [7%]; higher in Poland [8.7%], and the highest in Spain [9.3%]).[231] The paradox is similar in most countries, i.e. if one generates high income, they receive significantly lower costs of the loan than a low-income person.

The growing number of citizens with lower income and without savings have difficulties with paying for electricity and heat energy. In 2016, 17% of Italy's citizens could not keep their homes adequately warm. In comparison, 8% citizens in Spain, 6% in Poland, 4% in Germany, 3% in Austria and the Netherlands were not able to keep their homes adequately warm.[232]

---

[226] *Bauwens*, Explaining the diversity of motivations behind community renewable energy, Energy Policy 93 (2016), 278-290; *Punt/Bauwens/Frenken/Holstenkamp*, Institutional relatedness and the emergence of renewable energy cooperatives in German districts, Regional Studies 56(4) (2022), 548-562.

[227] *Ike/Usman/Alola/Sarkodie*, Environmental quality effects of income, energy prices and trade: the role of renewable energy consumption in G-7 countries, Science of The Total Environment, 721 (2020), 137813.

[228] See below 5.2.4.

[229] https://ec.europa.eu/eurostat/databrowser/view/sdg_08_10/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en; http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=earn_nt_net; https://ec.europa.eu/eurostat/databrowser/view/sdg_10_20/default/table?lang=en; https://ec.europa.eu/eurostat/databrowser/view/tec00131/default/table?lang=en (all 6.9.2022).

[230] https://www.gramwzielone.pl/energia-sloneczna/107059/ceny-paneli-fotowoltaicznych-w-2022-roku-znowu-wzrosna, https://www.rystadenergy.com/ (all 6.9.2022).

[231] *Ortner/Welisch/Busch/Resch*, Policy Dialogue on the assessment and convergence of RES Policy in EU Member States (2016).

[232] https://energy-poverty.ec.europa.eu/system/files/2021-09/epov_methodology_guidebook_1.pdf (6.9.2022).

The problem of energy poverty has been growing in the last few years and is increasing due to Covid-19 pandemic and Russian aggression on Ukraine related energy crisis; however, not only in the electricity market.[233] Due to the significant increase in the prices of fossil fuel energy, this problem also covers the market of system heat energy, which is particularly important in Germany (470 Terajoule [TJ] of energy production), Poland (260 TJ), Italy (150 TJ), Austria (75 TJ), and the Netherlands (70 TJ). According Germany's Federal Network Agency estimation consumers could see their monthly heating bills triple in 2023[234]. In 2022, approved by the Dutch Consumers and Markets Authority (ACM), the maximum rates that suppliers can charge for heat yearly increased by 155%[235]. In Austria, from September 1, 2022, the heat rates for residents will increase by 92% in Vienna[236] and 28% in Salzburg[237].[238]In Poland, the application submitted to the Energy Regulatory Office for approval of new tariffs for heat energy for households from 20.2 to 89.2% was presented[239]. The forecasts for the next year show that electricity and heat prices will increase significantly, which will aggravate the problem of energy poverty. According to the warning issued by the Energy Regulatory Office to the Polish government, tariff electricity prices in Poland in 2023 may increase by at least 180%[240] communities and this becomes a challenge for the upcoming time.[241]

4.2.8.2 Specifications

There is very little time to react and the problem of energy poverty will worsen in European countries. Therefore, national authorities should organise regional-level virtual energy communities (independent of the place of residence) for citizens at risk of energy poverty. It is also necessary to provide energy communities (including virtual communities) with cheap and stable financing. Energy communities should also, to a greater extent than at present, benefit from low-interest loans financed from funds obtained by national budgets from the sale of CO2 emission rights.

4.2.8.3 Best practice example

In Germany, the WIWIN Sustainable Investment Platform is a good example of how energy communities support the financing of renewable energy investments. Thanks to this platform, at the turn of February and March 2022, the social enterprise Bürgerwerke raised EUR 3 million for investments in renewable energy sources.[242]

---

[233] *Carfora/Scandurra/Thomas*, Forecasting the COVID-19 effects on energy poverty across EU member states. *Energy policy* 161 (2022), 112597; *Osička/Černoch*, European energy politics after Ukraine: The road ahead, *Energy Research & Social Science 91* (2022), 102757.

[234] https://www.dw.com/en/germany-consumers-can-expect-heating-bills-to-at-least-triple/a-62466158 (6.9.2022).

[235] *Autoriteit Consument & Markt*, Zaaknr. ACM/20/039419 / Documentnr. ACM/UIT/545404, https://www.acm.nl/nl/publicaties/tarievenbesluit-warmteleveranciers-2021; https://www.consuwijzer.nl/stadsverwarming-en-blokverwarming/warmtetarieven (all 6.9.2022).

[236] https://www.derstandard.de/story/2000138135133/fernwaerme-wird-in-wien-ab-september-um-92-prozent-teurer (6.9.2022).

[237] https://www.salzburg24.at/news/salzburg/salzburg-ag-erhoeht-preise-fuer-fernwaerme-ab-1-september-125425381 (6.9.2022).

[238] https://wysokienapiecie.pl/71567-biedne-cieplownie-patrza-na-rzad/ (6.9.2022).

[239] https://oko.press/ceny-pradu-o-180-proc-w-gore-w-2023-r-niepublikowane-dotad-prognozy-dla-rzadu-ujawniamy/?u=true (6.9.2022).

[241] *Fina/Fechner*, Transposition of European Guidelines for Energy Communities into Austrian Law: A Comparison and Discussion of Issues and Positive Aspects, *Energies*, *14*(13) (2021), 3922.

[242] https://www.pv-magazine.de/unternehmensmeldungen/drei-millionen-euro-wiwin-vermittelt-frisches-kapital-an-sozialunternehmen-buergerwerke/ (6.9.2022).

4.2.8.4 Suggestions for improvement

The improvements can be based on the following:

1. Zero VAT on purchase and installation of the renewable energy equipment (PV, heat pumps, thermal insulation, underfloor heating, energy storage) This will increase the affordability and availability of these technologies by the citizens.

2. stablishing public, regional, and specialised organisations supporting the creation of energy communities.

4.2.8.5 Suggestions for improvement from co-creation workshops

Economic struggles have been mentioned as a factor which discourages citizens to participate in an energy community.[243] At the same time, e.g., tax reductions have been mentioned as a motivating factor (e.g. in Spain).[244]

4.2.9 Cost and access to the grid connection

#costs #technology #equality

4.2.9.1 Description of the problem

The possibility of connecting to the network in terms of procedural and financial burdens and fees is complicated and time-consuming [245]. In some countries, entities wishing to connect a planned investment in renewables to the network are refused the grid connection or are not receiving the full planned capacity [246]. In the questionnaires[247] experts indicated severe delays and the possibilities of non-completion of projects caused by the lack of grid capacity on the higher and middle voltage levels[248].

In Poland, for example, in the first half of 2021, 1,246 grid connection refusals were issued. Only the official information of one of the distribution system operators (DSOs) in Poland shows that the number of refusals to connect RES installations to the grid throughout 2020 concerned 5% of submitted applications; in 2021, it was already approx. 25%.[249] In the context of, e.g., photovoltaic projects, the refusal to issue connection conditions applies to both projects with a capacity of several

[243] See below 5.2.4.
[244] See below 5.1.3.
[245] https://www.rescoop.eu/uploads/rescoop/downloads/REScoopEU-position-paper-Consultation-on-Permitting-for-Renewables.pdf (6.9.2022).
[246] *Engelken/Römer/Drescher/Welpe/Picot*, Comparing drivers, barriers, and opportunities of business models for renewable energies: A review, *Renewable and Sustainable Energy Reviews 60* (2016), 795-809; *Najwyższa Izba Kontroli*, Information on the inspection results, Barriers to the development of renewable energy sources, Supreme Chamber of Control 2021 https://www.nik.gov.pl/plik/id,24474,vp,27220.pdf (6.9.2022).
[247] The questionnaires were part of the research conducted in the earlier stages of the work.
[248] Questionnaires sent by Piotr Szymanski in December 2021 and filled by 2 energy cooperative experts and 1 CEO of Housing Cooperative Wrocław South and energy community.
[249] https://www.teraz-srodowisko.pl/aktualnosci/odmowa-warunki-przylaczenia-fotowoltaika-11742.html (6.9.2022).

dozen MW and small projects, often with a capacity of less than 1 MW.[250] According to the analysis of Client Earth Polska, between 2015 and 2021 domestic network operators issued a total of over 6,000 connection refusals. In the vast majority of cases, those refusals concerned RES installations with a total capacity of approximately 30 GW. This lost potential consists in approx. 50% of the current capacity of all Polish, mainly coal-fired, power plants.[251]

The other issue with the grid could be the restrictions in the area of operation. In Austria, Erneuerbare Energie Gemeinschaft (EEG – renewable energy community) may produce, store, consume, and sell energy (electricity, heat, or gas) from renewable sources. EEGs use the grid operator's facilities (like the electricity grid), but they must always be located within the concession area of a single grid operator, which can be perceived as a constraint.[252]

The conditions of access to the grid were indicated by experts as a demotivating or slightly demotivating factor in the questionnaires. The non-transparent system of allocating connection capacity has a demobilising effect on the civic energy sector as well as swift and efficient grid connections.[253]

4.2.9.2 Specifications

The model of energy networks requires a consistent transformation from centralised to decentralised, in which energy is produced locally. It is crucial for the development of energy communities that the energy system is flexible and prepared to receive energy from many sources.

4.2.9.3 Best practice example

In Germany, the Renewable Energy Act 2021 favours renewables in grid connections; for power plants producing electricity from renewable sources, the system operator should provide technical and administrative measures on time.[254]

In Austria, in contrast to the EEG, the BEG is not limited to renewable sources and can extend across the concession areas of several grid operators throughout the country.[255]

4.2.9.4 Suggestions for improvement

Transparent system favouring civic energy in access to the grid. No limits to the number of grid operators. Technical measures are required to upgrade the energy network as well as legal measures indicating the priority treatment of citizens and energy communities.

[250] https://www.teraz-srodowisko.pl/aktualnosci/odmowa-warunki-przylaczenia-fotowoltaika-11742.html (6.9.2022).
[251] https://www.clientearth.pl/najnowsze-dzialania/artykuly/nowy-raport-sieci-waskie-gardlo-transformacji-energetycznej/ (6.9.2022).
[252] Questionnaires sent by Piotr Szymanski in December 2021 and filled by 2 energy cooperative experts and 1 CEO of Housing Cooperative Wrocław South and energy community.
[253] Questionnaires sent by Piotr Szymanski in December 2021 and filled by 2 energy cooperative experts and 1 CEO of Housing Cooperative Wrocław South and energy community.
[254] https://clean-energy-islands.ec.europa.eu/countries/germany/legal/grid-electricity/connection-grid; https://www.cleanenergywire.org/factsheets/whats-new-germanys-renewable-energy-act-2021 (6.9.2022).
[255] *Cejka/Kitzmüller*, Rechtsfragen zur Gründung und Umsetzung von Energiegemeinschaften. 12. Internationale Energiewirtschaftstagung (IEWT) (2021), Conference paper, https://www.researchgate.net/publication/354462666_Rechtsfragen_zur_Grundung_und_Umsetzung_von_Energiegemeinschaften/link/6139c114a3a397270a8fad7b/download (6.9.2022).

4.2.10 Lack of peer-to-peer (P2P) energy trade

#technology #market #businessmodels #finance

P2P energy trade is also a legal issue.[256]

4.2.10.1 Definition

Peer to peer, i.e. prosumers directly engaged in energy exchange with one another, using a digital platform to construct a marketplace on a local level or virtually. Consumers and prosumers can exchange energy without the need for an intermediary[257].

4.2.10.2 Description of the problem

Peer-to-peer energy exchange is still very much in its infancy[258]. Peer-to-peer (P2P) electricity trading empowers prosumers and consumers, leading to the increased renewable energy deployment and flexibility in the grid. P2P platforms also aid in balancing congestion management and providing ancillary services.

4.2.10.3 Specifications

P2P energy trading could play a significant role in promoting renewable energies and enhancing system flexibility. In Austria, before RECs and CECs, it was possible to share surplus electricity. Now, citizens are allowed to generate electricity for their own consumption[259]. Citizens generating electricity on their own, wishing to sell surplus electricity to a neighbour through the public grid, shift from "consumers" to "providers" or "suppliers". Yet, that shift is bound with miscellaneous legal requirements.[260]

According to a study by DENA (Deutsche Energie-Agentur), for the decentralised energy transition to regain momentum in Germany, digital technologies such as smart metering, digital platforms, distributed ledger technologies, and smart contracts should be introduced as soon as possible (this recommendation applies to all countries) and the European directive on energy communities should be implemented swiftly.[261]

4.2.10.4 Best practice example.

Germany and the Netherlands have started trial P2P schemes[262]. In the Netherlands, energy communities are favoured by advanced digital market communication, which is highly automated and

---

[256] See above 3.11.

[257] *IRENA*, Innovation landscape brief: Peer-to-peer electricity trading, International Renewable Energy Agency, Abu Dhabi (2020); *Soto/Bosman/Wollega/Leon-Salas*, Peer-to-peer energy trading: A review of the literature, Applied Energy 283 (2021), 116268.

[258] *Zhou/Wu/Long/Ming*, State-of-the-art analysis and perspectives for peer-to-peer energy trading. Engineering, 6(7) (2020), 739-753; *Ableitner/Tiefenbeck/Meeuw/Wörner/Fleisch/Wortmann*, User behavior in a real-world peer-to-peer electricity market, Applied Energy 270 (2020), 115061.

[259] *Biresselioglu/Limoncuoglu/Demir/Reichl/Burgstaller/Sciullo/Ferrero*, Legal Provisions and Market Conditions for Energy Communities in Austria, Germany, Greece, Italy, Spain, and Turkey: A Comparative Assessment, Sustainability 13(20) (2021), 11212.

[260] *Biresselioglu/Limoncuoglu/Demir/Reichl/Burgstaller/Sciullo/Ferrero*, Legal Provisions and Market Conditions for Energy Communities in Austria, Germany, Greece, Italy, Spain, and Turkey: A Comparative Assessment, Sustainability 13(20) (2021), 11212.

[261] *Deutsche Energie-Agentur GmbH (dena)* (ed), Energy Communities: Beschleuniger der dezentralen Energiewende, Berlin, März 2022, as cited in https://www.pv-magazine.de/unternehmensmeldungen/dena-analyse-zu-energy-communities-veroeffentlicht/ (6.9.2022).

[262] *IRENA*, Innovation landscape brief: Peer-to-peer electricity trading, International Renewable Energy Agency, Abu Dhabi (2020).

standardised. Another important element is the well-developed digital infrastructure. In the Netherlands 98% of households have a broadband connection (compared to the EU average of 88%)[263],and the implementation of smart meters will amount to 80-90% by the end of 2022. Spain and Italy already had a better smart meter coverage of 100% in 2020, while there will be worse coverage in Germany at 23%, Austria at 17%[264] and Poland at 15% in the end of 2023[265]). This creates conditions for the creation of new business models by energy communities.
In Denmark, the generation of electricity and heat has been treated as a public good for many years. Especially community wind projects are widespread. Law for community energy has been in force since 2021 and allows dynamic network tariffs. Advanced, highly automated, and standardised market communication is in place in Denmark. Since 2016, billing processes among suppliers, distribution, and transmission system operators are carried out through a central data node. As of April 2021, it is freely available as an open-source project to engage the broad community and further develop the project. This system is open for use in other countries. The expansion of the digital infrastructure is very advanced, with 90% of households having broadband access and smart meters fully deployed.[266]

4.2.10.5 Suggestions for improvement

Enabling legal framework, digitalisation, development of smart grid, the emergence of new business models. Digital technologies, such as smart metering, digital platforms, distributed ledger technologies, and smart contracts, open new marketing opportunities for renewable energy and provide greater flexibility. However, implementing digital solutions requires professionalisation and extensive knowledge from energy communities.[267]

4.2.11 Model of energy production and storage

#policy #management #finance

4.2.11.1 Description of the problem

Along with the popularisation of the billing system based on net-billing, the government of many countries promotes the civic energy model that includes both energy generation using PV modules and energy storage based on battery systems. This model limits the development of community power for several reasons. First, it makes citizens take on the additional responsibility of managing and accumulating surplus energy. Second, the investment costs for a battery energy storage system (including home energy management system, energy management system) double the cost of investing in a photovoltaic installation[268]. Third, battery energy storage requires an additional ventilated space in the building (there are more expensive weatherproof versions)[269]. Fourth, battery

[263] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20200414-2#:~:text=In%202019%2C%20the%20vast%20majority,were%20located%20in%20the%20Netherlands (6.9.2022).
[264] https://smarten.eu/wp-content/uploads/2019/12/the_smarten_map_2019.pdf (6.9.2022).
[265] https://polskieradio24.pl/42/259/artykul/2930893,inteligentne-liczniki-energii-w-polsce-ambitne-plany-resortu (6.9.2022).
[266] *Deutsche Energie-Agentur GmbH (dena)* (ed), Energy Communities: Beschleuniger der dezentralen Energiewende, Berlin, März 2022, 57-58.
[267] https://www.pv-magazine.de/unternehmensmeldungen/dena-analyse-zu-energy-communities-veroeffentlicht/
[268] https://www.gramwzielone.pl/magazynowanie-energii/106383/ile-energii-mozna-zaoszczedzic-dzieki-domowemu-magazynowi-energii, https://www.energysage.com/energy-storage/should-you-get-storage/how-much-do-batteries-cost/
https://api.solarpowereurope.org/uploads/4721_SPE_BESS_report_08_mr_fae9b5f56b.pdf (all 6.9.2022).
[269] https://globenergia.pl/bezpieczenstwo-magazynow-energii-w-trakcie-powodzi-kolejne-instrukcje-branzowe/ (6.9.2022).

energy storage is of concern to potential users due to the risk of fire[270]. At the same time, these warehouses facilitate the storage of energy only for one day and do not solve the problem of seething seasonality of production (increased in spring and summer) and consumption (increased in autumn and winter). On the other hand, according to the Institute, home energy sources can reduce the peak supply of solar electricity by about 40% in the scale of the entire system. At the same time, 66% more PV system can be connected to the same section of the grid and the expenditure on grid expansion can be reduced[271].

4.2.11.2 Specifications

The solution to this problem may be the creation of energy storage infrastructure (battery and kinetic) at the local level, which would allow local communities to store electricity for a fee from several hours to several months. Due to the scale, this type of solution would be more economically and environmentally effective (better use of the battery capacity over time). At the same time, thanks to kinetic energy storage, it would solve the problem of the seasonality of energy production and consumption.

4.2.12 Energy community complexity

#management #members #finance

4.2.12.1 Description of the problem

If the policymakers have the conviction that it is enough to create legal and economic conditions and that energy communities may become a common phenomenon thanks to grassroots initiatives of the inhabitants, they are mistaken. Creating an energy community is a complex process that requires from the initiators both knowledge of, *inter alia*, economic law, economics, management, and technology. Before there are any benefits, the initiators must spend a lot of free time to prepare the project, not mentioning the fact that the management activities are time-consuming for the members involved.

Existing energy communities operating within one multi-family building often struggle with the problem of the lack of people who could take care of the management (the problem of free time and competencies)[272]. In such cases, it is very difficult to form a group with an initiative that would show entrepreneurial attitudes.

4.2.12.2 Specifications

The concept and logic of the functioning of energy communities are not common among citizens. The institution of the energy community itself is inherently a complex organisation; there is a need to both inform about the energy communities and initiate the creation of energy communities from the top.

---

[270] https://www.pv-magazine.com/2022/03/10/senec-remotely-switches-off-its-residential-batteries-after-explosion-in-germany/; https://www.gramwzielone.pl/dom-energooszczedny/108020/czy-magazyn-energii-jest-bezpieczny; https://www.cire.pl/artykuly/materialy-problemowe/108155-domowe-magazyny-energii (all 6.9.2022).

[271] *Hollinger/Wille-Haussmann/Erge/Sönnichsen/Stillahn/Kreifels*, Speicherstudie 2013, Kurzgutachten zur Abschätzung und Einordnung energiewirtschaftlicher, ökonomischer und anderer Effekte bei Förderung von objektgebunden elektrochemischen Speichern, Fraunhofer-Institut für Solare Energiesysteme ISE, Januar 2013, https://www.ise.fraunhofer.de/de/veroeffentlichungen/studien/speicherstudie-2013.html (6.9.2022).

[272] *Wierling/Schwanitz/Zeiß/Bout/Candelise/Gilcrease/Gregg*, Statistical evidence on the role of energy cooperatives for the energy transition in European countries, Sustainability 10(9) (2018), 3339; *Heras-Saizarbitoria/Sáez/Allur/Morandeira*, The emergence of renewable energy cooperatives in Spain: A review. *Renewable and Sustainable Energy Reviews 94* (2018), 1036-1043.

Both in the case of top-down and bottom-up initiatives, it is necessary to create an appropriate infrastructure at the national and regional levels to support the establishment and functioning of energy communities. Infrastructural support should be implemented both at the information level (concerning mainly legal and economic aspects), tools level (energy management, energy settlement, costs, and revenues), as well as the activity level, under which the community could outsource selected or all functions performed within the energy community for a fee.

To cover the fixed costs related, inter alia, to the management of the energy community (to provide an adequate cash equivalent to people devoted to working for the community), it is necessary to achieve an appropriate scale of operation.

4.2.12.3 Best practice example

In Spain, since November 2021, the Institute of Energy Diversification and Saving (IDAE), commissioned by the Spanish government, has been implementing an aid system for pilot projects of energy communities, covering the knowledge and science base, planning, and implementation[273]. This support was used by one of the first energy co-operatives in Spain – Fontcoop, which implements a photovoltaic installation with a capacity of 116 kWp, and which will cover from 30 to 40% of the electricity consumption of about one hundred families.[274]

In Spain, in the Basque region, the initiative of the Ministry of Economic Development, Sustainable Development and Environment was launched by the public-private Ekiola Cooperative. This initiative aims to promote and enable citizens to create and manage renewable energy for consumption purposes[275]. As part of this initiative, the Basque Energy Entity project is underway, in which 13 energy co-operatives from various Basque municipalities are building solar power plants. Each power plant with a capacity of about 5 MW is to meet the needs of about 400 families and is to be located mainly in degraded areas. The initiative is promoted by the City Council of Donostia and San Sebastian[276].

A private Polish organisation Coop Tech Hub, specialising in social initiatives, established the Energy Community Incubator (financed by a grant from the Foundation Open Society Institute)[277]. As part of the support package for future communities, there is a guide on how to conduct the process of creating a community, a 48-hour cycle of workshops, optimisation tools for energy management, and calculation tools for accounting for revenues and costs.

In Spain, the Red Eléctrica Group, with the support of the Magrea Energie cooperative, developed and published in May 2022 a manual that aims to help rural municipalities build energy communities, address the concerns of their inhabitants, city councils, SMEs, and other local actors when it comes to starting this type of production and participatory management of renewable energy for collective self-consumption.[278]

An alternative to typical energy communities established on the initiative of grassroots residents is hybrid solutions, in which the grassroots initiative of a group of residents is supported by a specialised organization. An example is the Spanish Aldea Energy, that after acquiring a group of residents with access to a suitable roof, deals with the entire organisation of the project for residents located within

[273] https://www.miteco.gob.es/es/prensa/ultimas-noticias/el-miteco-abre-a-audiencia-p%C3%BAblica-las-ayudas-a-proyectos-piloto-de-comunidades-energ%C3%A9ticas/tcm:30-532839 (6.9.2022).

[274] https://www.pv-magazine.es/2022/01/27/la-cooperativa-agricola-fontcoop-impulsa-la-creacion-de-la-comunidad-energetica-villalonga/ (6.9.2022).

[275] https://ekiola.eus/ (6.9.2022).

[276] https://www.pv-magazine.es/2022/01/25/ekiola-empezara-a-construir-las-plantas-para-cooperativas-en-septiembre/ (6.9.2022).

[277] https://www.hub.coop/en/inkubator/ (6.9.2022).

[278] https://www.pv-magazine.es/2022/05/11/red-electrica-publica-un-manual-para-crear-comunidades-energeticas-rurales/ (6.9.2022).

500 meters from the energy source (restriction resulting from Spanish law). Additionally, depending on the financial capacity of the residents, Aldea offers low-cost subscription options (from EUR 5.49 with energy consumption of up to 2,000 kWh to EUR 24.99 with consumption above 5,000 kWh) of participation in the community (allowing for savings on electricity at the level of around EUR 130 to EUR 670) and investment variants offering a 6-year return on investment.[279] The main advantage of this solution is flexibility and the ability to adapt the offer to the individual financial capabilities of the residents.[280]

A new UE plan – RePower Europe – assumes the duty to establish EC in every commune/municipality with over 10,000 inhabitants[281]. In addition, according to the strategy purposes, 20 million heat-pumps will have been installed by 2030 and 60 million by 2040. Extra 300 billion euros will be spent to accelerate the energy transition.[282]

4.2.12.4 Suggestions for improvement

It is necessary to define the minimum scale of energy community activity in individual countries (number of members, volume of energy production, and consumption) to be able to cover the organisational costs and day-to-day management of the energy community. In case of smaller communities, in order to reduce the fixed costs, one can establish single management over a group of communities. Alternatively, one can outsource the management of the energy community to professional management companies.

In countries where energy communities are of a niche character (Poland, Italy, Spain), the following should be created at the level of regional authorities:

1. A toolbox, where the entire process of establishing a community and its functioning is presented;

2. Software for the management and accounting of energy produced and consumed by energy communities.

4.2.13 A uniform profile of energy consumption among potential civic members of the energy community limits their efficiency

4.2.13.1 Description of the problem

Optimising energy production and consumption within the community as well as barter energy exchange between community members is very limited in the case of households, which generally have a very similar energy consumption profile (due to the rhythm of the day and working hours). As a result, energy communities are forced by net-billing to sell electricity on the market at the peak of the day when the energy is the cheapest or even negative and to buy electricity in the morning, afternoon, and evening hours when energy is the most expensive. Alternatively, communities can invest in very expensive energy storage or combine different renewable technologies virtual power plants, EVs as storage, and real-time data monitoring[283] .

[279] https://www.aldeaenergy.com/ (6.9.2022).

[280] https://www.pv-magazine.es/2022/07/14/aldea-energy-la-nueva-startup-que-vende-suscripciones-a-autoconsumos-compartidos-desde-549e/ (6.9.2022).

[281] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0221&from=EN (6.9.2022).

[282] https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131 (6.9.2022)

[283] https://www.rescoop.eu/toolbox/wisegrid-final-brochure (6.9.2022).

4.2.13.2 Specifications

To improve the efficiency and increase the economic sense of energy communities, it is crucial to enable energy communities to host entities with a different energy consumption profile, such as local public institutions, schools, kindergartens, production, and service companies. An alternative may be a barter of energy with these entities or barter of energy in the framework of created joint larger local organisations, such as energy clusters or Positive Energy Districts (PEDs).[284] The organisational solution could be enhanced by the technological ones.[285]

4.2.13.3 Best practice example

JPI Urban Europe runs the "Positive Energy Districts and Neighborhoods for Sustainable Urban Development" program in 20 EU Member States. This program supports the planning, implementation and replication of 100 positive energy districts by 2025[286].

4.2.13.4 Suggestions for improvement

Building a network of cooperatives that invest in diversified renewable energy sources, e.g. PV, elevator, biogas. Creating umbrella organisations that will connect and aggregate the supply and demand among residents. Business models of EC with storage systems and smart grid solutions, combining technologies wind power, solar power and storage systems are viable solution to the problem.[287] Expanding the scope of EC activities to cooperation/being a part of the Positive Energy Districts (PEDs).[288]

4.2.14 Growing risk of prolonged energy and economic crisis

#finance #policy

4.2.14.1 Description of the problem

Drastic increases in energy prices[289], higher costs for households[290], high inflation[291] and the increased interest rates set by the European Central bank[292] mean that not only the households' disposable income is rapidly declining - and thus their abilities for investing in renewable energy sources and establishing energy communities - but also the investment risk and uncertainty is growing. Such circumstances are the reasons why citizens might reduce the significant investment decisions.

---

[284] *Sareen/Albert-Seifried/Aelenei/Reda/Etminan/Andreucci/Neumann*, Ten questions concerning positive energy districts. Building and Environment 216 (2022), 109017; *Lindholm/Rehman/Reda*, Positioning Positive Energy Districts in European Cities, Buildings 2021, 11, 19, https://doi.org/10.3390/ buildings11010019.

[285] *Römer/Reichhart/Kranz/Picot*, The role of smart metering and decentralized electricity storage for smart grids: the importance of positive externalities, Energy Policy 50 (2012), 486-495.

[286] https://jpi-urbaneurope.eu/ped/ (6.9.2022).

[287] *Engelken/Römer/Drescher/Welpe/Picot*, Comparing drivers, barriers, and opportunities of business models for renewable energies: A review, Renewable and Sustainable Energy Reviews 60 (2016), 795-809.

[288] *Hearn/Castaño-Rosa*, Towards a Just Energy Transition, Barriers and Opportunities for Positive Energy District Creation in Spain, Sustainability 13(16) (2021), 8698.

[289] *Mišík*, The EU needs to improve its external energy security, *Energy Policy 165 (2022)*, 112930.

[290] https://www.ft.com/content/a0c81387-ba59-44c7-a490-d879d103c2c0 (6.9.2022).

[291] https://ec.europa.eu/eurostat/documents/2995521/14675415/2-18082022-AP-EN.pdf/03725c05-b76b-8faa-b9b9-2d867781e735?t=1660739117989 (6.9.2022).

[292] https://www.ecb.europa.eu/ecb/educational/explainers/tell-me-more/html/interest_rates.pl.html, https://www.nbp.pl/home.aspx?f=/dzienne/stopy.htm (6.9.2022).

4.2.14.2 Suggestions for improvement

To decrease the investment risk during an unstable economic situation, public authorities should:

1. Show a clear and long-term perspective for energy communities.
2. Give them access to low-interest (up to 3% per annum) 10-year annuity loans for households for investments in PV; this will make it possible to maintain electricity costs for households at the level from mid-2021 (before energy price increases).

3. Give them access to net-metering for households in multi-family buildings up to 3,000 kWh (average electricity consumption in a household in a multi-family building) that are members of energy communities. Limit should be extended to 7,000 kWh if heat and domestic hot water are also produced within the community by heat pumps.

4. Give access to net-metering for households in single-family buildings up to 3,000 kWh, which are members of energy communities. Limit should be extended to 7,000 kWh if heat and domestic hot water are also produced within the community by heat pumps.

4.2.15 No technical opportunity to establish PV modules on the buildings' roofs

#member #technology

4.2.15.1 Description of the problem

For many buildings in Europe due to shade or other reasons, it is not technically possible or it is not economical to install a PV power plant on the roof[293]. In Poland, it is estimated that the problem affects 60% of buildings[294]. Similar situation can be expected in other countries. For example in Germany in rural districts the majority of single and two-family houses are suitable for the construction of a photovoltaic system, simultaneously in urban areas the potential is limited to half of these types of buildings.[295.]

4.2.15.2 Specifications

The solution to this problem may be the concept of a virtual prosumer, which legally allows citizens, enterprises, and other organisations to produce electricity in a location other than the one it is consumed. This solution can also be used to solve the problem of apartment tenants who, thanks to the institution of a virtual prosumer, have the opportunity to be active energy citizens regardless of where they live and generate electricity for their own needs.

4.2.15.3 Best practice example

The virtual prosumer solution was introduced in Lithuania in 2019 and is very popular among citizens.[296] Lithuanian citizens can either invest in an individual PV installation in a location other than their own or buy shares in a photovoltaic installation built by another entity. As a result, every

[293] *Bódis/Kougias/Jäger-Waldau/Taylor/Szabó*, A high-resolution geospatial assessment of the rooftop solar photovoltaic potential in the European Union, Renewable and Sustainable Energy Reviews 114 (2019), 109309.
[294] https://www.gramwzielone.pl/energia-sloneczna/106900/wirtualny-prosument-litewskie-doswiadczenia-ignitis (6.9.2022).
[295] https://www.pveurope.eu/financing/eupd-research-germany-huge-solar-potential-residential-rooftop-installations-still (6.9.2022).
[296] https://www.cire.pl/artykuly/serwis-informacyjny-cire-24/158137-litwini-wprowadzili-koncepcje-wirtualnego-prosumenta (6.9.2022).

citizen, regardless of whether s/he has the technical ability to generate energy in their place of residence, can be an active energy citizen.[297]

Another solution for people who cannot install their photovoltaic systems because they do not have their roof surfaces is offered by the Municipal Works in Kassel, Germany. At the beginning of February 2022, they launched a model for citizens' participation in the form of photovoltaic crowdfunding called "Sonnen Team." City citizens have the option to both use the electricity produced by a 750-kilowatt solar PV plant on the roof of the Kasseler Verkehrs-Gesellschaft (KVG) depot at the Wilhelmshöhe depot as well as participate in the financing of new PV systems in the form of a subordinated loan of between EUR 500 and EUR 5,000. Investors will receive interest of up to 1.5 percent on the paid-up capital. The loan is granted for five years, according to municipal authorities.[298]

4.2.15.4 Suggestions for improvement

Building a network of cooperatives that would be able to resell shares in their network in exchange for using production. Necessary cooperation of the network operators.

4.2.16 Little activity of citizens in creating energy communities

#members #management #psychology

4.2.16.1 Description of the problem

The number of energy communities and the number of members of these communities in the analysed countries indicate that the activity of citizens in initiating this type of organisation is still small in Poland (several dozen semi ECs as a part of housing cooperatives)[299], Italy (approximately 49 ECs)[300], Spain[301], and moderate in Austria (282 ECs)[302], Germany (1750 ECs)[303] and The Netherlands (568 ECs)[304].

4.2.16.2 Specifications

There is an urgent need to activate residents, in particular multi-family buildings, to create energy communities. To do this, the following steps should be taken:

[297] https://www.renewableenergymagazine.com/pv_solar/lithuania-welcomes-worlda-s-first-online-consumer-20200325 (6.9.2022).
[298] https://www.pv-magazine.de/2022/02/01/staedtische-werke-starten-buergerbeteiligung-ueber-eigenes-photovoltaik-crowdfunding/ (6.9.2022).
[299] Estimates based on responses to questionnaires sent by Piotr Szymanski in December 2021 and filled by 2 energy cooperative experts and 1 CEO of Housing Cooperative Wrocław South and energy community.
[300] https://www.autorita.energia.it/allegati/docs/13/183-13.pdf (6.9.2022), *Magnani/Patrucco*, Le cooperative energetiche rinnovabili in Italia: tensioni e opportunità in un contesto in trasformazione, in: Osti/Pellizzoni (ed), Energia e innovazione tra flussi globali e circuiti locali (2018), 187-207, http://hdl.handle.net/10077/22316 (6.9.2022).
[301] *Heras-Saizarbitoria/Sáez/Allur/Morandeira*, The emergence of renewable energy cooperatives in Spain: A review. Renewable and Sustainable Energy Reviews 94 (2018), 1036-1043.
[302] *Wierling/Schwanitz/Zeiß/Bout/Candelise/Gilcrease/Gregg*, Statistical evidence on the role of energy cooperatives for the energy transition in European countries, Sustainability 10(9) (2018), 3339.
[303] *Caramizaru/Uihlein*, Energy communities: an overview of energy and social innovation, EU Science Hub, Luxembourg: Publications Office of the European Union (2020) 5, https://joint-research-centre.ec.europa.eu/index_en (6.9.2022).
[304] https://www.hieropgewekt.nl/initiatieven?page=2 (6.9.2022).

1. Making use of the existing residential property management organisations, such as housing associations, condominiums, and property managers, to organise and subsequently manage the energy community.

2. Offer public funds grants to initiative groups (local leaders) to finance their involvement in the creation of a housing community.

3. Disseminating in free access all know-how on how to create and manage an energy community.

4.2.16.3 Best practice example

In Poland, many housing co-operative boards take on the role of an organiser and manage the energy community within individual apartment blocks. An example may be SM Wrocław Południe (a power plant with a capacity of 739MWp in 35 buildings), Spółdzielnia Mieszkaniowa Energetyk in Wrocław (a power plant with a capacity of 870MWp), Spółdzielnia Skarbowiec in Wrocław (a power plant with a capacity of 46 MWp), Wrocławski Dom Housing Cooperative (a 40MWp power plant), SM Śródmieście-Prasa in Wrocław (32MWp power plant), SM Kopernik in Toruń (272MWp power plant on 21 buildings).[305] As a result, additional effort and time commitment of the residents are limited to the necessary minimum.

In Spain, Sapiens Energía is an integrated cooperative established in January 2020 in Canet d'En Berenguer (Valencia region), which specialises in the establishment and management of a Renewable Energy Community, and comprehensive management of collective self-consumption facilities. By June 2022, they already established over 40 such communities throughout Spain. By the end of 2022, they plan to create another 30 communities in 28 municipalities of the Valencia region. The participatory process of creating a community involves residents and the technical team of Sapiens Energía and Valfortec, which has global experience in the development and operation of solar farms.[306]

An additional financial impulse for citizens to act for energy communities and investments in renewable energy is the 5-year real estate tax exemption offered by the City of Wrocław.[307]

The German Institut für ökologische Wirtschaftsforschung recommends, for the rapid development of energy sharing in Germany:

1. The involvement of citizens in the energy transformation to counteract the weakening in many places of the acceptance of citizens for power plants located in their vicinity.

2. Creating a new market framework for energy sharing.

3. Sharing energy needs to be attractive and simple for citizens, to lower the entry barriers and lower the costs for the community.[308]

[305] https://www.gramwzielone.pl/energia-sloneczna/106998/wroclawskie-spoldzielnie-maja-juz-kilka-tysiecy-paneli-fotowoltaicznych and https://www.gramwzielone.pl/energia-sloneczna/106565/spoldzielnia-mieszkaniowa-ograniczy-koszty-energii-o-120-tys-zl (6.9.2022).

[306] https://www.pv-magazine.es/2022/06/10/valfortec-y-sapiens-planean-una-avalancha-de-comunidades-energeticas-en-la-comunidad-valenciana/ (6.9.2022).

[307] https://www.wroclaw.pl/przedsiebiorczy-wroclaw/zwolnienia-z-podatku-od-nieruchomosci-z-tytulu-instalacji-wykorzystujacej-energie-odnawialna-fotowoltaika-pompy-ciepla-gruntowe-wymienniki-ciepla-kolektory-sloneczne-rekuperacja (6.9.2022).

[308] https://www.ioew.de/fileadmin/user_upload/BILDER_und_Downloaddateien/Publikationen/2022/IOEW-Impulse_3_Energy_Sharing.pdf (6.9.2022).

4.2.17 Difficulties for the energy communities with access to land for renewable energy investments

4.2.17.1 Description of the problem

Large localised renewable energy installations do not serve local communities[309]. In the six countries studied, investments in wind and solar farms have been dominated by domestic and foreign energy companies for many years (Poland [310], Germany[311], The Netherlands[312], Austria[313], Spain[314], Italy[315]) The energy generated under these projects is sold under long-term contracts to industrial customers or supplies the nationwide energy system. As a result, there is a growing problem of access to suitable land where such investments can be carried out. Because the roof potential is insufficient t cover the energy demand of the local community (mainly in urban areas), civic energy communities have difficulties accessing suitable areas[316]. The solutions in Poland are particularly bizarre, where in August 2021 public authorities guaranteed access to domestic land resources by law to the largest state-controlled energy companies with the oligopoly status.[317]

4.2.17.2 Specifications

Access to public areas where renewable energy installations can be built should favour investments made by civic energy communities that consume energy locally.

4.2.17.3 (Optional) Best practice example

In Spain, in the Basque country, under the initiative of the Ministry of Economic Development, Sustainable Development and Environment, the public-private Ekiola Cooperative is implementing a

[309] *Lennon/Dunphy/Sanvicente*, Community acceptability and the energy transition: a citizens' perspective, Energy, Sustainability and Society 9, 35 (2019), https://doi.org/10.1186/s13705-019-0218-z.

[310] https://enerad.pl/fotowoltaika/najwieksze-farmy-fotowoltaiczne-w-polsce-ranking/#:~:text=Od%20ko%C5%84ca%202021%20roku%20najwi%C4%99ksza,odbiorc%C3%B3w%20indywidualnych)%20oraz%20PAK%20Serwis, https://ieo.pl/pl/aktualnosci/1566-ieo-podnosi-prognoze-nowych-mocy-dla-fotowoltaiki (all 6.9.2022).

[311] https://www.cleanenergywire.org/factsheets/solar-power-germany-output-business-perspectives, https://www.gramwzielone.pl/energia-sloneczna/105284/to-bedzie-najwieksza-elektrownia-pv-w-niemczech (all 6.9.2022); *Holstenkamp*, Definition und Marktanalyse von Bürgerenergie in Deutschland, Leuphana Universität Lüneburg/Trend: Research GmbH (2013), *Schreuer*, Dealing with the diffusion challenges of grassroots innovations: the case of citizen power plants in Austria and Germany (2015).

[312] http://www.polderpv.nl/CBS_PV_NL_Provincies_gemeentes_RES_tm_2021_H1_10dec2021.htm#Accumulatie_capaciteit_per_segment_CBS, https://www.wnp.pl/energetyka/rusza-najwieksza-farma-wiatrowa-w-holandii,434562.html (all 6.9.2022).

[313] https://www.igwindkraft.at/?xmlval_ID_KEY[0]=1159, https://renewablesnow.com/news/austrian-utility-breaks-ground-on-120-mw-solar-project-in-burgenland-788744/ ; https://web.archive.org/web/20210416200040/; http://www.evn-naturkraft.at/Oekostrom/evn-naturkraft-(1)/Zahlen-Fakten.aspx (6.9.2022) and *Schreuer*, The establishment of citizen power plants in Austria: A process of empowerment?, Energy Research & Social Science 13 (2016), 126-135; *Schreuer*, Dealing with the diffusion challenges of grassroots innovations: the case of citizen power plants in Austria and Germany (2015).

[314] https://www.power-technology.com/marketdata/olmedilla-solar-park-i-spain/; https://www.renovaliaenergygroup.com/renovalia-has-completed-puertollanos-pv-plant-construcition/; https://www.isastur.com/en/procinsa/type/view/53 (all 6.9.2022).

[315] https://www.infobuildenergia.it/wp-content/uploads/2021/07/Solare-Fotovoltaico-Rapporto-Statistico-GSE-2020.pdf (6.9.2022).

[316] *Meister/Schmid/Seidl/Klagge*, How municipalities support energy cooperatives: survey results from Germany and Switzerland, Energy, sustainability and society 10(1) (2020), 1-20.

[317] https://www.gramwzielone.pl/energia-sloneczna/106120/grunty-kowr-pod-fotowoltaike-wynajmie-tylko-panstwowa-energetyka (6.9.2022).

photovoltaic solar park for the energy cooperative in Vizcaya, for the Lea Artibai area, consisting of the municipalities of Berriatua, Etxebarria, Ispaster, and Markina-Xemein. It is located in a public area near a water treatment station[318].

[318] https://www.pv-magazine.es/2022/01/25/ekiola-empezara-a-construir-las-plantas-para-cooperativas-en-septiembre/ (6.9.2022).

5 Barriers and Facilitators from the Citizens´ Perspective (Co-Creation Workshops)

Co-Creation workshops[319] on the general motivation to establish or join an energy community took place in Arterra Bizimodu, Navarra, Spain (8.4.2022), Groningen, Netherlands (19.4.2022), Prusice, Poland (8.6.2022) and Scalenghe, Italy (26.3.2022). The factors presented below are the result of an analysis of the notes taken at the Co-Creation workshops. The aim of the Co-Creation workshops was to know more about the motivation of citizens and stakeholdergroups, and to add this perspective to the analysis of legal and economic barriers and facilitators.

Factors that do or do not motivate people to establish or join an energy community can be grouped around different topics. The most important motives for (not) joining an energy community or (not) to establish an energy community can be summed up as follows.

5.1 Motivating factors

5.1.1 Environmental concerns

The first group of arguments are related to environmental concerns of citizens. Citizens mentioned, e.g., the climate crisis or sustainability as motivating them to engage in energy communities.

Arguments in detail:

- Climate crisis and the need for an urgent energy transition (AB, p 2)
- desire for development (PR, p 8)
- energy independence (PR, p 9)
- the energy transition has to go faster, get rid of gas (GR, p 3)
- loves mother earth, involved in sustainability (GR, p 3)
- Russia-Ukraine war (AB, p 7); increased awareness of human and environmental values (AB, p 7)

5.1.2 Personal motives and group motivation

The second group of arguments motivating participation in an energy community and to get active are personal motives, such as personal growth or the power of the group.

Arguments in detail:

- Personal growth (AB, p 2), willingness to show yourself to others (PR, p 8)

[319] In the following, when referring to notes of Arterra Bizimodu AB, of Groningen GR, of Prusice PR and of Scalenghe SC will be used. Page numbers are referring to the respective notes taken in each workshop by the facilitators of the workshop.

- Power of the group (SC, p 3)
- enthusiastic about the plans of a small group of initiative-takers (GR, p 3)
- existing community structures (AB, p 8)

5.1.3 Political, legal and economic reasons

The third group of arguments which motivate citizens to participate in the energy transition and energy communities are more political reasons (participation) as well as legal and economic advantages.

Arguments in detail:

- More opportunities as a legally constituted group (SC p 4)
- collective investment and access to EU funds (AB, p 7)
- Democratization of the relationship between local administration and citizens (SC 4),
- strengthening the municipality (GR, p 3)
- Interest in sustainability techniques (GR, p 3)
- Fight against energy poverty (AB, p 7)
- Having your own energy (AB, p 8)
- Existing support for participatory processes (Navarra) (AB, p 8)
- Land Value Tax Incentives (in Spain) (AB, p 9)

5.2 Factors that are keeping people away from establishing or joining an energy community

5.2.1 Political factors

Discouraging factors entail political circumstances, such as propaganda against renewable energy and a lack of community culture and awareness.

Arguments in detail:

- Prevailing ideology/propaganda (PR, p 6)
- individualism/lack of community culture (AB, p 7)
- lack of energy awareness (AB, p 9)

5.2.2 Legal factors

Demotivating factors include unclear laws, contradicting laws or no laws at all.

Arguments in detail:

- Unclear and changing laws (PR p 6, 7)
- lack of implementation (Spain) (AB, p 7)
- lack of clear laws (regarding collective self-consumption) (AB, p 7)
- lack of EC´s own legal form (AB, p 9)
- Protected building regulations/heritage laws (AB, p 7)

- urban planning regulations (AB, p 9)
- in Spain: 500m rule for collective self-consumption (AB, p 9)
- Fixed distribution coefficients (AB, p 9)

5.2.3 Lack of knowledge

One of the main group of factors which discourage people from participating in an energy community is a lack of information.

Arguments in detail

- Lots of knowledge required (GR, p 2)
- lack of awareness about energetic themes, lack of knowledge about the different renewable energy sources (SC, p 2)
- Lack of economic knowledge (PR, p 6)
- Difficult organization (GR, p 2); authorizations and licenses/delays (AB, p 7)
- Dependent on local needs (GR, p 2), lack of understanding local needs (SC, p 2)

5.2.4 Lack of public support/economic resources

Economic circumstances might also inhibit activity of citizens. Participating in an energy community can be costly and support is needed.

Arguments in detail:

- Need of public financial support (SC, p 2)
- lack of public financial support/high cost of installation/high loan cost (PR, p 6, 7)
- lack of economic resources at the beginning (AB, p 7)
- lack of funds (especially vulnerable families) (AB, p 9)

5.2.5 Personal factors

Some factors are rather related to personal reasons for not participating or not getting active.

Arguments in detail:

- Reluctance to act and reluctance to invest (PR, p 6)
- Lack of time (AB, p 9)

5.2.6 Market factors

Additionally, sometimes the market makes it difficult for citizens to get active, e.g., when it comes to delivery problems of renewable energy devices.

Arguments in detail:

- Spanish electricity oligopoly and lack of support for the energy transition (AB, p 7)
- Lack of net-balance between production and collective self-consumption in Spain (AB, p 7)

- difficulties in vending energy (AB, p 9)
- Scarce materials for renewables (AB, p 9)

5.3 Linking the citizens´ perspective to the legal analysis and the market analysis

The citizens' perspective provided by the Co-Creation workshops both supports and strengthens the findings of our legal and economic analysis. Concerning barriers, the legal factors (5.2.2), the lack of knowledge (5.2.3), the lack of public support/economic resources (5.2.4) and the market factors (5.2.6) were barriers also addressed in the legal and economic analysis. Actions to amend these factors on behalf of the legislators are therefore needed. Moreover, the citizens' perspective has shown that both a legal system that people perceive as accessible for their questions and concerns and economic conditions which are supportive for their endeavours and can work as facilitators and motivating factor.
Yet, not all barriers can be overcome by political and legal action or better economic support. Additional focus should be placed on motivating and demotivating factors regarding energy citizenship and energy communities. For example, citizens mentioned personal factors, such as a lack of interest in topics of energy transition or ideological factors, as individual barriers to overcome.

6 Bibliography

Ableitner/Tiefenbeck/Meeuw/Wörner/Fleisch/Wortmann, User behavior in a real-world peer-to-peer electricity market, Applied Energy 270 (2020), 115061

Amann et al, STROMBIZ (2016)

Artmann/Rüffer, Grundriss des österreichischen Gesellschaftsrechts (2017)

Bauwens, Explaining the diversity of motivations behind community renewable energy, Energy Policy 93 (2016), 278

Beteiligung der Gemeinde an einer Bürgerenergiegesellschaft mit Zuschlag für Windenergieanlagen im Rahmen der Ausschreibung (2018, updated 18.4.2019), https://www.fachagentur-windenergie.de/fileadmin/files/Veroeffentlichungen/FA_Wind_Gemeindebeteiligung_BEG-Zuschlaege_07-2018.pdf

Biresselioglu/Limoncuoglu/Demir/Reichl/Burgstaller/Sciullo/Ferrero, Legal Provisions and Market Conditions for Energy Communities in Austria, Germany, Greece, Italy, Spain, and Turkey: A Comparative Assessment, Sustainability 13(20) (2021), 11212

Blank/Börstinghaus in *Blank/Börstinghaus* (eds) Miete[6] (2020)

Bódis/Kougias/Jäger-Waldau/Taylor/Szabó, A high-resolution geospatial assessment of the rooftop solar photovoltaic potential in the European Union, Renewable and Sustainable Energy Reviews 114 (2019), 109309

Böhm/Pletzer/Spurzina/Stabentheiner (eds), GeKo Wohnrecht II (Version 15.12.2018, rdb.at).

Boos, Umsetzung der EU-Richtlinie zur Förderung der Eigenversorgung aus Erneuerbaren Energien und der Erneuerbare-Energie-Gemeinschaften durch das EEG 2021? Rechtliche Stellungnahme, ordering party: Bündnis Bürgerenergie e.V (updated version, 3.8.2021)

Capellán-Pérez/Campos-Celador/Terés-Zubiaga, Renewable Energy Cooperatives as an instrument towards the energy transition in Spain, Energy Policy 123 (2018), 215

Carfora/Scandurra/Thomas, Forecasting the COVID-19 effects on energy poverty across EU member states. *Energy policy* 161 (2022), 112597

Cejka/Kitzmüller, Rechtsfragen zur Gründung und Umsetzung von Energiegemeinschaften, 12. Internationale Energiewirtschaftstagung (IEWT) (2021), Conference paper, https://www.researchgate.net/publication/354462666_Rechtsfragen_zur_Grundung_und_Umsetzung_von_Energiegemeinschaften/link/6139c114a3a397270a8fad7b/download

Cornes/Sandler, The Theory of Externalities, Public Goods, and Club Goods (1986)

Dellinger (ed), Genossenschaftsgesetz [2] (Version 07.2014, lexis360.at)

De la Valle/Czako, Empowering energy citizenship among the energy poor, Energy Research & Social Science 89 (2022), 102654.

Deutsche Energie-Agentur GmbH (dena) (ed), Energy Communities: Beschleuniger der dezentralen Energiewende, Berlin, März 2022, 57

Ekardt/Rath, Digitalisierung in der Wärmewende als Rechts- und Governance-Problem: Chancen und Grenzen, ZNER 3 (2022) 211 (218 f).

Engelken/Römer/Drescher/Welpe/Picot, Comparing drivers, barriers, and opportunities of business models for renewable energies: A review, Renewable and Sustainable Energy Reviews 60 (2016), 795

Eule, Niederlande in *Frank/Wachter* (eds), Handbuch Immobilienrecht in Europa[2] (2015) 807

European Commission, Directorate-General for Energy and Tractebel Impact, elaborated by Alaton/Tounquet (eds), Benchmarking smart metering deployment in the EU-28: final report (2020) https://data.europa.eu/doi/10.2833/492070

Fajardo, El autoconsumo de energía renovable, las comunidades energéticas y las cooperativas, Noticias de la economía pública, social y cooperativa 66 (2021) 34

Fina/Fechner, Transposition of European Guidelines for Energy Communities into Austrian Law: A Comparison and Discussion of Issues and Positive Aspects, Energies, 14(13) (2021), 3922

Franzen/Vogl, Two decades of measuring environmental attitudes: A comparative analysis of 33 countries, Global Environmental Change 23(5) (2013), 1001

Gaier (ed), Münchener Kommentar zum BGB[8] Bd 8a (Version 1.1.2021, beck-online.beck.de)

Galán Vioque, La integración de las energías renovables en el mercado energético, in Galán Vioque/González Ríos (eds), Derecho de las energías renovables y la eficiencia energética en el Horizonte 2020 (2017) 69 (93 f).

Gallego Córcoles, Comunidades de energía y transición energética (2022)

Gautier/Hoet/Jacqmin/Van Driessche, Self-consumption choice of residential PV owners under net-metering, Energy policy 128 (2019), 648

González Ríos, Las "Comunidades energéticas locales": un nuevo desafío para las entidades locales, Revista Vasca de Administración Pública 117 (2020) 147

Hau/Poseck (eds), BeckOK BGB[59] (Version 1.8.2021, beck-online.beck.de)

Häublein/Hoffmann-Theinert (eds), BeckOK HGB[33] (Version 15.7.2021, beck-online.beck.de)

Hearn/Castaño-Rosa, Towards a Just Energy Transition, Barriers and Opportunities for Positive Energy District Creation in Spain, Sustainability 13(16) (2021), 8698

Henssler/Strohn (eds), Gesellschaftsrecht[5] (2021)

Heras-Saizarbitoria/Sáez/Allur/Morandeira, The emergence of renewable energy cooperatives in Spain: A review. *Renewable and Sustainable Energy Reviews 94* (2018), 1036

Hoffmann, Erneuerbare- und Bürgerenergiegemeinschaften im EU-Winterpaket – who is who? EnWZ 2021, 299

Hogenschurz (ed), BeckOK WEG[46] (Version 1.1.2021, beck-online.beck.de)

Höhne/Jöchl/Lummerstorfer, Das Recht der Vereine[5] (2016) 113

Hollinger/Wille-Haussmann/Erge/Sönnichsen/Stillahn/Kreifels, Speicherstudie 2013, Kurzgutachten zur Abschätzung und Einordnung energiewirtschaftlicher, ökonomischer und anderer Effekte bei Förderung von objektgebunden elektrochemischen Speichern, Fraunhofer-Institut für Solare Energiesysteme ISE, Januar 2013, https://www.ise.fraunhofer.de/de/veroeffentlichungen/studien/speicherstudie-2013.html

Holstenkamp et al, Bürgerenergiegesellschaften in Deutschland, in Holstenkamp/Radtke (eds), Handbuch Energiewende und Partizipation (2018) 1061

Hutchinson, Principles of Microeconomics (2017)

IDAE, Guía para el Desarrollo de Instrumentos de Fomento de Comunidades Energéticas Locales, Marzo 2019 (2019)

Ike/Usman/Alola/Sarkodie, Environmental quality effects of income, energy prices and trade: the role of renewable energy consumption in G-7 countries, Science of The Total Environment, 721 (2020), 137813

Johansson/Kriström, Welfare evaluation of subsidies to renewable energy in general equilibrium: Theory and application, Energy Economics 83 (2019), 144

Kalss/Nowotny/Schauer (eds), Österreichisches Gesellschaftsrecht[2] (Version 1.6.2017, rdb.at)

Keinert, Funktion und Kompetenzen der Mitgliederversammlung des Vereins, RdW 2012, 24

Kletecka/Schauer (eds), ABGB-ON[1.04] (Version 1.7.2018, rdb.at)

Kment, § 13 Energierecht, in Schmidt/Wollenschläger (eds), Kompendium Öffentliches Wirtschaftsrecht (2019) 641

Koller/Kindler/Roth/Drüen (eds), HGB[9] (2019)

Komusanac/Brindley/Fraile/ Ramirez, Wind energy in Europe - 2021 Statistics and the outlook for 2022-2026, windeurope.org, February 2022, 11

Kreuzer, Die Beteiligung der Wohnungseigentümergemeinschaft an Unternehmen, ZWE 2010, 163

Kuchmacz/Mika, Description of development of prosumer energy sector in Poland, Polityka energetyczna – Energy Policy Journal 21/4 (2018), 5

Lange/Ländner, Errichtung und Betrieb von Photovoltaikanlagen in der zivilgerichtlichen Entscheidungspraxis, EnWZ 2019, 99

Lennon/Dunphy/Sanvicente, Community acceptability and the energy transition: a citizens' perspective, Energy, Sustainability and Society 9, 35 (2019), https://doi.org/10.1186/s13705-019-0218-z

Lindholm/Rehman/Reda, Positioning Positive Energy Districts in European Cities, Buildings 2021, 11, 19; https://doi.org/10.3390/ buildings11010019

Linhart/Rodin/Moser/Kollmann, Citizen Participation to Finance PV Power Plants Focused on Self-Consumption on Company Roofs—Findings from an Austrian Case Study Energies 14(3) (2021), 738

Magnani/Patrucco, Le cooperative energetiche rinnovabili in Italia: tensioni e opportunità in un contesto in trasformazione, in: Osti/Pellizzoni (eds), Energia e innovazione tra flussi globali e circuiti locali (2018), 187-207, http://hdl.handle.net/10077/22316

Mattmann/Logar/Brouwer, Wind power externalities: a meta-analysis, Ecological Econonomics, 127 (2016), 23

May/Reitan/Bevanger/Lorentzen/Nygaard, Mitigating wind-turbine induced avian mortality: sensory, aerodynamic and cognitive constraints and options. Renewable and Sustainable Energy Review 42 (2015), 170-181

Mehde, Art. 28 Abs. 2 GG, in *Dürig/Herzog/Scholz* (eds), Grundgesetz – Kommentar (95th supplementary delivery 2021)

Meister/Schmid/Seidl/Klagge, How municipalities support energy cooperatives: survey results from Germany and Switzerland, Energy, sustainability and society 10(1) (2020), 1

Miloua, The Fire Risk in Green Building Caused by Photovoltaic Installations, in: Hatti (ed), Smart Energy Empowerment in Smart and Resilient Cities (2020), https://doi.org/10.1007/978-3-030-37207-1_49

Mišík, The EU needs to improve its external energy security, Energy Policy 165 (2022), 112930

Mora Ruiz, La acción municipal de lucha contra el cambio climático tras la Ley 7/2021, de 20 de mayo, de Cambio Climático y Transición Energética: ¿un modelo suficiente para la Administración local?, Anuario de Derecho Municipal 2021 (2022), 115 (126)

Nigmatullin, Unionsrechtliche und verfassungsrechtliche Überlegungen zur Marktprämienförderung bei Energiegemeinschaften, RdU 2021, 62

Öhlinger/Eberhard, Verfassungsrecht[12] (2019)

Onakpoya/O'Sullivan/Thompson/Heneghan, The effect of wind turbine noise on sleep and quality of life: a systematic review and meta-analysis of observational studies, Environment International 82 (2015), 1

Ortner/Welisch/Busch/Resch, Policy Dialogue on the assessment and convergence of RES Policy in EU Member States (2016)

Osička/Černoch, European energy politics after Ukraine: The road ahead, *Energy Research & Social Science 91* (2022), 102757

Pöhlmann/Fandrich/Bloehs (eds), Genossenschaftsgesetz[4] (2012)

Potacs/Rogatsch, Energieanlagenrecht, in *Potacs/Holoubek* (eds), Öffentliches Wirtschaftsrecht, volume II[4] (2019) 1465

Poullikkas, A comparative assessment of net metering and feed in tariff schemes for residential PV systems, Sustainable Energy Technologies and Assessments 3 (2013), 1

Presicce, Las competencias de los ayuntamientos para impulsar el autoconsumo fotovoltaico en el sector doméstico: especial referencia a Cataluña, Revista de Investigações Constitucionais 8/1 (2021), 77

Punt/Bauwens/Frenken/Holstenkamp, Institutional relatedness and the emergence of renewable energy cooperatives in German districts, Regional Studies 56(4) (2022), 548

Römer/Reichhart/Kranz/Picot, The role of smart metering and decentralized electricity storage for smart grids: the importance of positive externalities, Energy Policy 50 (2012), 486-495.

Rommel/Radtke/Von Jorck/Mey/Yildiz, Community renewable energy at a crossroads: A think piece on degrowth, technology, and the democratization of the German energy system, Journal of Cleaner Production 197 (2018), 1746

Ruiz Olmo, La inconclusa regulación del balance neto para el autoconsumo eléctrico, in Galán Vioque/González Ríos (eds), Derecho de las energías renovables y la eficiencia energética en el Horizonte 2020 (2017) 135 (135 ff).

Sareen/Albert-Seifried/Aelenei/Reda/Etminan/Andreucci/Neumann, Ten questions concerning positive energy districts. Building and Environment 216 (2022), 109017

Sauter/Schweyer/Waldner, Der eingetragene Verein[21] (2021)

Schopper/Weilinger (eds), Vereinsgesetz (Version 1.10.2018, rdb.at)

Schubert (ed), Münchener Kommentar zum BGB[9] Bd 1 § 22 margin no 44 (Version 1.4.2021, beck-online.beck.de)

Soto/Bosman/Wollega/Leon-Salas, Peer-to-peer energy trading: A review of the literature, Applied Energy 283 (2021), 116268

Sunak/Madlener, The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model (May 1, 2012), FCN Working Paper No. 3/2012 (revised March 2013), https://ssrn.com/abstract=2114216

Welsch/Woinar, Veräußerung von Immobilien mit Photovoltaikanlagen aus zivilrechtlicher und steuerrechtlicher Sicht, LSK 2014, 161

Schäfer et al, Taming instabilities in power grid networks by decentralized control, European Physical Journal - Special Topics 225, 3 (2016) 569 ff; https://doi.org/10.1140/epjst/e2015-50136-y

Smith et al, The effect of renewable energy incorporation on power grid stability and resilience, Science Advances 8 (2022), 1; https://www.science.org/doi/10.1126/sciadv.abj6734

Storr, Energierecht (2022)

Wierling/Schwanitz/Zeiß/Bout/Candelise/Gilcrease/Gregg, Statistical evidence on the role of energy cooperatives for the energy transition in European countries, Sustainability 10(9) (2018), 3339

Wiesenthal/Aretz/Ouanes/Petrick, Energy Sharing: Eine Potenzialanalyse, Institut für ökologische Wirtschaftsforschung, Berlin, Mai 2022, https://www.ioew.de/publikation/energy_sharing_eine_potenzialanalyse

Zhou/Wu/Long/Ming, State-of-the-art analysis and perspectives for peer-to-peer energy trading. Engineering, 6(7) (2020), 739

Ziolo/Filipiak/Bąk/Cheba/Tîrca/ Novo-Corti, Finance, sustainability and negative externalities. An overview of the European context, Sustainability 11(15) (2019), 4249