



JRC SCIENCE FOR POLICY REPORT

Energy Communities and Energy Poverty

The Role of Energy Communities in Alleviating Energy Poverty

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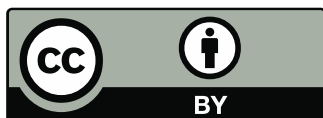
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Abstract

This JRC report examines the potential of energy communities to alleviate energy poverty, which affects an estimated 50 million households in the EU. Through a review of existing literature, cases, surveys and findings of key EU projects, we identify the main drivers and barriers to the participation of energy-poor households in community energy initiatives. We find that energy communities (legal entities that empower citizens, small businesses and local authorities to produce, manage and consume their own energy) have the potential to provide affordable and sustainable energy services to low-income households, while also promoting energy democracy and social cohesion. However, significant challenges remain, including the limited awareness and accessibility of energy communities, regulatory barriers, and funding constraints. To overcome these challenges, a range of policy and practical measures is needed, including targeted financial support, capacity-building for energy communities, and streamlined regulatory frameworks. We conclude that energy communities can play a crucial role in tackling energy poverty, but require concerted efforts from policymakers, energy providers, and civil society to realise their full potential.

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Executive summary

This report discusses the pivotal role of energy communities in addressing energy poverty, shedding light on their transformative potential in creating pathways towards equitable energy access. Energy poverty, defined as the inability of households to access essential energy services, has far-reaching implications for human well-being, societal development, and environmental sustainability. A lack of access to reliable energy sources affects not only basic comfort but also impacts health, education, and economic opportunities. Energy communities, characterised by collective efforts to generate, distribute, and manage energy resources, emerge as a promising solution to combat energy poverty. These grassroots initiatives bring together citizens and institutions to co-create sustainable energy systems tailored to the specific needs of the community.

Policy context

The urgency of addressing energy poverty has been acknowledged through strategic policy initiatives by the EU that emphasize social inclusion, environmental sustainability, and innovation. The EU's commitment to the United Nations Sustainable Development Goals, particularly Goal 7 ("Affordable and Clean Energy") and Goal 11 ("Sustainable Cities and Communities"), underscores its dedication to eradicating energy poverty while promoting resilient and vibrant societies. The proclamation of the European Pillar of Social Rights (principle 20 on access to essential services) further reinforces this commitment, while recent EU legislative packages require that in National Energy and Climate Plans, energy poverty in Member States is identified and addressed. Through directives such as the Clean Energy for All Europeans Package, the EU sets the legal framework for renewable energy communities that encourages Member States to prioritise the role of energy communities as essential partners in achieving energy access and reducing inequalities as part of the energy transition.

Key conclusions

Energy communities that prioritise inclusivity can facilitate equitable access to clean, affordable energy solutions, thus breaking down barriers to development and to social progress. They can create local job opportunities, fostering economic resilience and skills development, thereby stimulating economic development within underserved areas, while collaborative energy projects strengthen social ties fostering a sense of ownership, pride, and shared responsibility. However, to fully harness the potential of energy communities in tackling energy poverty, policymakers and stakeholders need to further promote awareness about the benefits and opportunities of energy communities, develop supportive policy frameworks that incentivise the establishment and growth of energy communities, ensure access to financing, technical assistance, and regulatory guidance, provide training and capacity-building initiatives to leaders with the knowledge and skills necessary to drive successful energy projects, and foster collaboration between governments, non-governmental organisations, private sector entities, and citizens to leverage diverse resources and expertise.

Main findings

By collectively generating, managing, and sharing energy resources, energy communities can provide their members with access to reliable and affordable energy, a common space to acquire knowledge about the energy transition and opportunities to collaborate on issues of climate and energy justice. Nevertheless, while there is wide recognition of this potential it seems that the number of energy communities actively addressing the issue of energy poverty remains rather limited, while more research is needed to assess their actual social impact. At all policy levels, from European to local, dedicated policies should address the barriers preventing vulnerable and low-income households from participating in energy communities and for energy communities to become more inclusive of vulnerable and low-income households.

Related and future JRC work

In recent years, several JRC publications have explored the role of energy communities (e.g. "Energy communities: an overview of energy and social innovation") and the impact of energy poverty (e.g. "Energy poverty, transport poverty and living conditions", "Energy poverty, new insights for measurement and policy"). As the energy transition accelerates, the JRC will continue exploring the role energy communities will play in alleviating energy poverty and strengthening a just and inclusive energy transition.

Quick guide

Section 1 provides an introduction and background on the key concepts of the report while section 2 breaks down the key energy poverty and energy community policy initiatives in the EU. Section 3 offers examples of how energy communities are tackling energy poverty across the EU along with the challenges faced, while section 4 outlines the conclusions.

1. Introduction and background

The European Pillar of Social Rights (Principle 20) indicates energy services among the essential services everyone shall have access to, calling for support measures for those in need¹. The United Nations Sustainable Development Goals (in particular, Goal 7) also address access to affordable, reliable, sustainable and modern energy for all. In this perspective, energy poverty can be recognised as a serious condition that undermines social inclusion, wellbeing, and people's ability to participate actively in and benefit from the energy transition. Thus, addressing energy poverty is not only a matter of social justice but also crucial for achieving sustainable development and ensuring a dignified quality of life for all.

Energy poverty is commonly understood as the inability of a person or family to afford basic energy services such as heating, cooling, lighting, mobility and power to guarantee a basic standard of living². It is a particular type of poverty driven by a multitude of factors and the policy impact it poses makes it a challenging problem to both comprehend and address. As a multi-dimensional concept, it is not easily captured by a single indicator and in order to measure its extent and intensity, a variety of energy poverty indicators have been developed and are applied in several countries and at European Union (EU) level³.

Energy poverty affects millions of people worldwide, particularly in marginalized and economically disadvantaged communities and is impacting a substantial share of the population across the EU. Survey-based indicators show that 6.9 % of the EU population is unable to keep their homes adequately warm, in 2021, and 6.4 % have fallen into arrears in their utility bills. The same indicators suggest that the situation has improved in most of the countries between 2015 and 2021, nevertheless, in 2021, energy poverty still affected nearly 30 million people in the EU⁴.

As with traditional poverty indicators, also in energy poverty rates considerable differences exist within the EU as both indicators show a high variability across countries. In the case of inability to keep houses adequately warm values range from 1.3 % in Finland to 23.7 % in Bulgaria. The use of microdata⁵ reveals important regional differences behind national aggregated figures. Figure 1 depicts the percentage of households unable to keep their home adequately warm at NUTS 1 level and indicates significant variation in particular among Italian and Spanish regions. This suggests that energy poverty is not evenly spread in the territories and tend to be a "local" phenomenon and concentrated in specific areas.

Today, energy poverty is even more in the spotlight as the issue has gained significant attention on both local and global scales. The health, social, and economic crisis caused by the COVID-19 pandemic has pushed more people into poverty⁶ and increased the number of households unable to afford energy services. In parallel, 2021 and 2022 are marked by a record-breaking surge in energy prices significantly affecting the wellbeing of vulnerable and low-mid income households across Europe. Low and low-middle income households in most countries are the majority of the ones reporting unable to keep home adequately warm (Menyhert, 2022).

In line with the complexity of the phenomenon, a wide variety of legislative interventions have been proposed to tackle and mitigate energy poverty in EU Member States⁷. They range from income subsidies to energy price mitigation to more structural measures of incentives to building energy renovations.

In this report, we will focus on and assess the potential of energy communities to alleviate energy poverty. Energy communities, often referred to as community energy initiatives or cooperative energy projects, are grassroots organisations set up by individuals, businesses, households, and local stakeholders to produce, manage, and distribute energy resources on a common basis. They place a high value on democratic decision-making, involvement of the community, and pursuing positive social, economic, and environmental outcomes.

¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people/jobs-growth-and-investment/european-pillar-social-rights/european-pillar-social-rights-20-principles_en

² <https://www.eumayors.eu/support/energy-poverty.html>

³ During its duration (2016-2020) the EU Energy Poverty Observatory (EPOV) project selected a set of indicators to measure energy poverty. Four different primary indicators for energy poverty are identified, of which two are based on self-reported experiences of limited access to energy services (based on EU-SILC data) and the other two are calculated using household income and/or energy expenditure data (based on HBS data). Additionally, a set of 19 secondary indicators are extracted from different data sources, mainly the Eurostat (ESTAT) website, SILC and the Building Stock Observatory (BSO). The EPOV Methodology Guidebook (Thema and Vondung, 2020), shows the calculation, interpretation and detailed database of all indicators. For a comprehensive assessment of the indicators used to measure energy poverty see also the latest European Poverty Advisory Hub (EPAH, formerly EPOV) report "Energy Poverty National Indicators" https://energy-poverty.ec.europa.eu/discover/publications/publications/energy-poverty-national-indicators-insights-more-effective-measuring_en

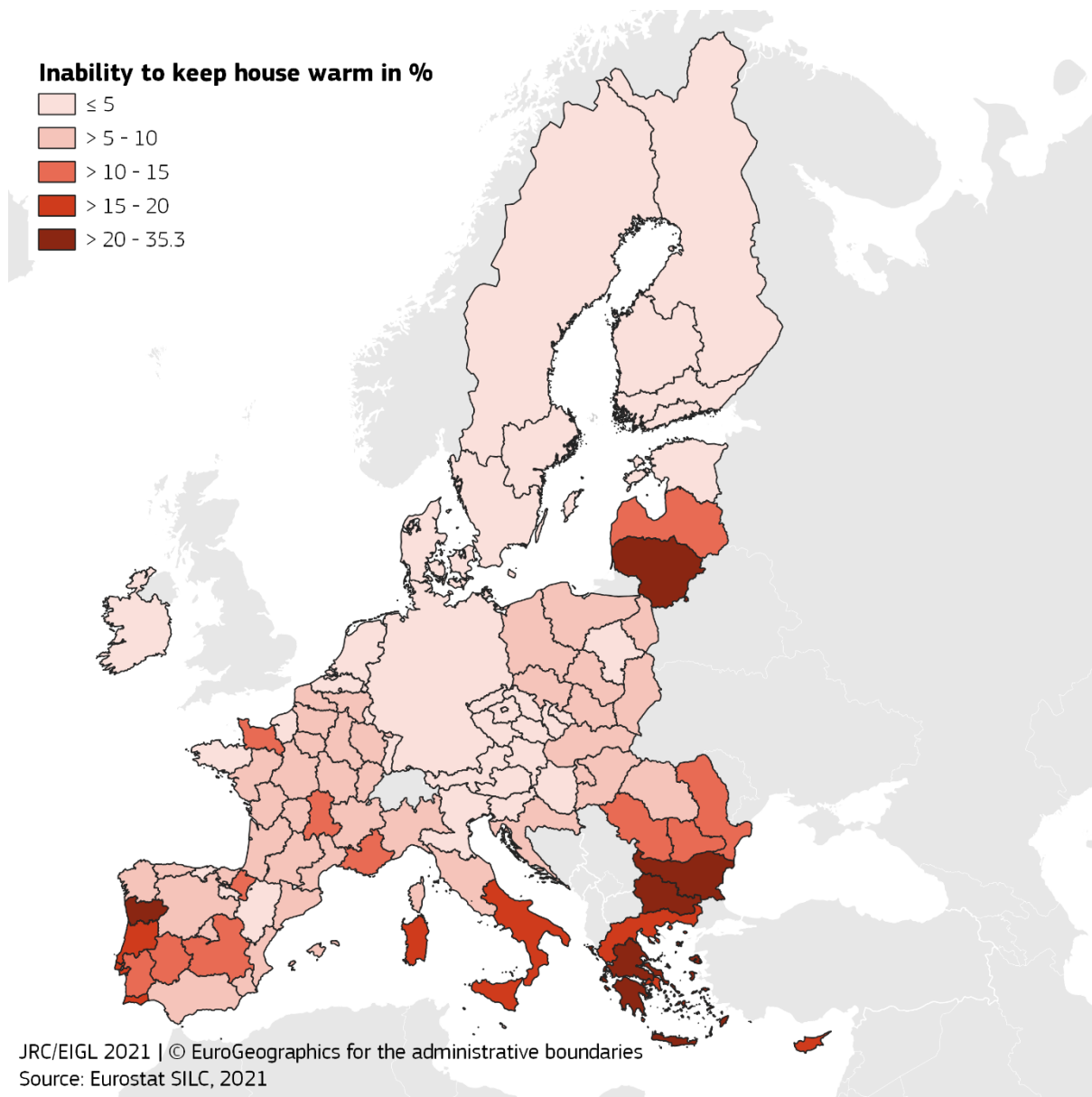
⁴ https://energy-poverty.ec.europa.eu/index_en

⁵ Based on the SILC Microdata from EUROSTAT. In this case % of households (not population) is indicated. Data available only at country level for DE and NL.

⁶ The World Bank estimates that 150 million people worldwide have slipped back into poverty as a result of the COVID19 pandemic (Lakner, Christoph and et al., 2022).

⁷ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/eu-action-address-energy-crisis_en

Figure 1. Inability to keep home adequately warm as a percentage of households at NUTS1 level in EU28



Source: JRC elaboration on EU-SILC (2021). Note: Data at country level for DE and NL.

1.1 Energy communities in the framework of energy justice

Parallel to the roll out of renewable energy technologies and the increasing need to make fundamental changes to the ways we consume, produce and distribute energy services, the energy system has seen significant changes in the past years. From a centralised system controlled by a certain number of corporate actors (Pearson, 2018), the current energy system is transitioning into decentralised production of renewable energy (Pinson et al., 2017) with new possibilities for citizens and communities to produce their own energy and demand control over the energy transition (Lennon et al., 2020). In the last years, there has been a rise of localised energy initiatives led by civil society groups and active citizens. These initiatives have been labelled as “energy democracy” movements, as they reflect an “ideal political goal, in which citizens are the recipients, stakeholders (as consumers/producers) and accountholders of the entire energy sector policy” (Szulecki, 2018), p. 35). Particularly, they aim at greater citizen involvement and control in the energy systems (Van Veelen and Van Der Horst, 2018). Simultaneously, participating in a renewable energy community represents one of the highest expressions of energy citizenship, a concept which is linked to the active role that citizens could play in

the energy transition, beyond their passive consumer role (Lennon et al., 2020). Although these concepts (energy democracy, energy citizenship etc.) are not as such included in the EU policy legislation so far, they are at the core of the EU (energy) transition (DellaValle and Czako, 2022; Mengolini and Masera, 2021). In particular, they are a translation of the democracy principle and the rule of law to the energy field that are the foundations of the European Union, and are at the service of a just society (Vitéz and Lavrijssen, 2020) and a just transition where *no one is left behind*⁸ (Bielig et al., 2022).

The European Commission positioned energy communities as central to achieve a just energy transition⁹. Additionally, an increasing stream of research is pointing to their potential in addressing energy injustices and, thus, energy poverty (Hanke, Guyet, and Feenstra, 2021; DellaValle and Czako, 2022).

Energy systems have been increasingly considered as social justice matters (Sovacool et al., 2016), and this has become even clearer in the last couple of years. In particular, the current energy price crisis proved even more that the current structure of energy systems is unfit for protecting both the planet and its inhabitants. That is why, the energy justice frameworks (such as the one based on the triumvirate of the distribution, recognition and procedure tenets (McCauley et al., 2013), have been advanced as key-tools to guide energy planners and citizens on how to make choices that could address social inequalities (Sovacool et al., 2017).

As an example, when decision-makers make policy decisions guided by the principles of energy justice they can better address complex challenges, such as energy poverty. Energy poverty is itself a manifestation of energy (distributional) injustice, wherein the unequal distributions in i) income, ii) energy prices, and iii) energy efficiency (Walker and Day, 2012), shape the inability both to afford an essential level of energy services, and to choose freely which energy consumption and investment decisions to undertake (DellaValle and Czako, 2022).

This form of distributional energy injustice is further underpinned by a lack of recognition and procedural injustices (DellaValle and Sareen, 2020). In particular, the energy poor are likely to be excluded from the energy decision-making processes at different scales, from the local community to the more international energy policy (procedural injustice), and to see their energy needs not acknowledged in the energy system (recognition injustice)(Jenkins et al., 2016).

Energy communities can help address those energy injustices and, thus, reduce energy poverty (Hanke, Guyet, and Feenstra, 2021; DellaValle and Czako, 2022). They represent new or reinvented types of socio-economic organisation at local/community level aiming to address societal challenges. As such, they fall within the contested conceptual, analytical and operational scope of social innovation, which can be perceived both as a process and as a strategy capable of matching technological innovation with innovation in social practices and relations for a low carbon energy transition to occur in time (Koukoufikis, Giorgos, 2021). Through this social innovation, it is expected that nearly half of the EU population could potentially be able to become an energy producer individually or collectively by 2050 (Kampman, Blommerde, and Afman, 2016), and will inevitably lead to shifts of power dynamics.

By enabling to shift power relationships and to participate in a process that sets the basis to reshape the relationship between citizens and their relevant energy contexts, energy communities have, thus, the potential to address the **procedural energy injustices** faced by the energy poor (DellaValle and Czako, 2022). In addition, by enabling to control and access to energy, as well as to get engaged in the energy community activities, energy communities have the potential to address the **distributional** and **recognition energy injustices** faced by the energy poor (DellaValle and Czako, 2022). Overall, energy communities might enable the energy poor to i) afford to consume energy and invest in energy efficiency (distributional justice), ii) see their specific energy needs recognised in the energy system (recognition justice), and iii) be actively involved in relevant energy decision-making process (procedural justice).

Finally, as social innovations, energy communities can address social inequalities also by enabling to push for further adaptation of the socio-economic structure, and to cultivate new civic traditions and positive co-benefits. As highlighted by Mikkonen et al., 2020: social innovations in the energy transition (such as energy communities) can contribute positively in jobs and wealth creation; citizens participation and democratic empowerment; increased social acceptance of renewables; increased energy security; higher awareness of sustainable practices; challenging the status quo of existing social technical regimes; strengthening social networks and social movements; gender equality.

However, beyond a couple of exemplary cases, an empirical confirmation of this potential is still largely lacking with a majority of energy communities currently having a limited outreach among the energy poor (Hanke,

⁸ https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1551.

⁹ https://energy-communities-repository.ec.europa.eu/index_en

Guyet, and Feenstra, 2021; DellaValle and Czako, 2022). These might fail to do so because of financial and legal barriers, a lack of understanding of energy poverty and common misperceptions. As an example, some initiatives share a belief that energy poor and vulnerable citizens generally do not care about participating in this type of initiatives or that they should be engaged only through social policy (Hanke, Guyet, and Feenstra, 2021). Therefore, despite the current policy framework has implemented changes enabling the diffusion of initiatives that can shift the power from a centralised energy system to one led by citizens, further changes might be required to ease the active engagement and inclusion of more citizens and especially the energy poor.

*In the last years, a growing number of **energy community initiatives** started in EU Member States in parallel with dedicated policy interventions. Because of differences in national contexts and legislations and the small size and local dimension of many of the collective projects it is difficult to compile a complete inventory of energy communities in Europe. However the 2021 State of the Energy Union Report highlighted the magnitude of the phenomenon: following the results of the preliminary estimates at European and country-level¹⁰, at least 2 million people in the EU are involved in more than 7700 energy community projects. Energy communities have contributed to up to 7 % of nationally installed capacities, with estimated total renewable capacities of at least 6.3 GW. It is estimated that they have invested a total of at least 2.6 billion EUR¹¹.*

1.2 Aim and scope of the report

The aim of this report is to contribute to the current debate on the role of energy communities in fighting energy poverty, reviewing and analysing the issues at stake and taking a snapshot of the efforts in the field. While the interest on the topic and the potential contribution of energy communities is high¹², as documented also by a growing number of policy measures and a few notable case studies, evidence seems to be still limited and not univocal. In particular, concerns about the concrete impact of energy communities in tackling energy poverty indicate the need of deeper investigations and understanding. In this report, we contribute to this debate. While we do not provide a quantitative assessment of the potential that energy communities have for addressing energy poverty, we aim to clarify the barriers and challenges, and provide points for a future research and policy agenda.

¹⁰ Schwanitz, V. J., Wierling, A., Zeiss, J. P., von Beck, C., Koren, I. K., Marcroft, T., Dufner, S. (2021, August 22). *The contribution of collective prosumers to the energy transition in Europe - Preliminary estimates at European and country-level from the COMETS inventory*. More on the COMETS H2020 Project: <http://www.comets-project.eu/>

¹¹ State of the Energy Union 2021 – Contributing to the European Green Deal and the Union's recovery (COM(2021) 950 final) https://ec.europa.eu/energy/sites/default/files/state_of_the_energy_union_report_2021.pdf

¹² See: Empowering people – the role of local energy communities in clean energy transitions: <https://www.iea.org/commentaries/empowering-people-the-role-of-local-energy-communities-in-clean-energy-transitions>

2. Energy poverty and energy communities: policy initiatives in the EU

2.1 Addressing energy poverty - EU legislation and MS policies

2.1.1 EU legislation

The first references to customer vulnerability in the European legislation can be traced back to the Second Energy Package (adopted in 2003)¹³. Both the Electricity Directive and Gas Directive obliged Member States to take appropriate measures to protect vulnerable customers and to avoid disconnections. The concept of energy poverty was introduced in the EU energy policy agenda during the preparation and the adoption of the Energy Package for the functioning of the internal energy markets in 2009¹⁴. However, the European Commission made it a policy priority with the introduction of the Clean Energy for all Europeans legislative package. Published in the course of 2018 and 2019, it updates the EU energy legal and policy framework to deliver the Union's commitments to the Paris Agreement¹⁵. It sets out a new approach for the protection of vulnerable consumers, and also, for the first time, acknowledges citizens as active participants in the energy system, both as individuals and collectively.

Energy poverty, now, stands as a cross-cutting issue in the Clean Energy Package. The Package includes provisions addressing energy poverty mitigation through direct binding schemes, such as the monitoring and reporting obligation for energy poverty. It also lays down targets for energy savings with a long-term renovation strategy and with improvements in the functioning of retail electricity markets to tackle consumers' vulnerability.

2.1.2 Member State legislation

In the EU framework context, Member States have so far adopted a variety of measures to address energy poverty and protect vulnerable consumers. These can be grouped in four main categories: (i) financial measures; (ii) consumer protection measures; (iii) energy efficiency measures, and (iv), information provision measures. In addition, recent studies (DellaValle, 2019, Kearns et al. 2019) have proposed an additional category of measures to counter energy poverty: the behaviourally informed ones.

Financial measures

Financial measures support payment of energy bills of targeted vulnerable households. These include the direct government support for the cost of energy either via general social welfare payments or through direct payments. They also include negotiations with utilities. In particular, utilities are required to offer vulnerable consumers a fair price and to guarantee they have access to energy (Pye et al., 2015). These interventions might, however, not be exploited by vulnerable individuals, because of targeting and active choice. In particular, identification of energy poverty is complex, and some individuals might be left out by the program (Dubois, Ute, 2012), and hassle factors or fear of being stigmatized might discourage individuals from applying to such programs (Bertrand, Mullainathan, and Shafir, 2004; Sen, 1992). Energy prices play a major role as a contributing factor to the phenomenon of energy poverty. They have risen over the last decades mainly driven by a growth in network charges, taxes and levies. This trend, together with the lower incomes resulting from the economic crisis that began in 2008 has burdened many households' ability to pay their energy bills. By contrast, higher income households spend proportionally less on energy products although they spend higher amounts in absolute terms¹⁶. Governments have used energy prices as a channel to mitigate energy poverty. Many MS have attempted to do so through subsidized energy prices or social tariff policies (Ürge-Vorsatz and Tirado Herrero, 2012). However, despite the fact that these solutions provide a temporary result, if they are not combined with energy efficiency measures in the building stock, they may prove to be counterproductive (Ürge-Vorsatz and Tirado Herrero, 2012) and potentially drive households to lock in effects. We especially refer to the vulnerable to energy poverty households, either owners or tenants, as the tariffs or subsidies remove incentives to implement energy renovations of the housing stocks.

¹³ Second electricity Directive 2003/54/EC, second gas Directive 2003/55/EC, and Regulation (EC) No 1228/2003 on conditions for access to the network for cross border exchanges in electricity.

¹⁴ Electricity Directive 2009/72/EC and gas directive 2009/73/EC. The package also included three regulations on ACER, cross-border access and access to natural gas transmission networks.

¹⁵ https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

¹⁶ https://energy.ec.europa.eu/study-energy-prices-costs-and-subsidies-and-their-impact-industry-and-households_en

Consumer protection measures

Consumer protection measures are implemented by the regulator and utility companies to reduce the risk of disconnection due to unpaid bills. These measures might be implemented in the form of debt management, customer engagement and disconnection prohibition (i.e. disconnection safeguards), especially when disconnection would be harmful (i.e. in winter, or summer) (Pye et al., 2015).

Energy efficiency measures

Energy efficiency measures enable a decrease of energy costs in the long-term by improving the efficiency of buildings, and appliances. The high energy costs in Europe are particularly due to the low refurbishment rate of buildings and the low rate of replacement of appliances¹⁷. Since the share of income spent on energy costs is much higher for vulnerable individuals compared to high-income ones, energy efficiency measures, like those that improve the insulation of walls, are powerful tools to lower energy bills.

However, as vulnerable individuals often rent their apartment, the landlord-tenant problem should be addressed to avoid backfiring effects (Bird, Stephen and Hernandez, Diana, 2012). Overall, energy efficiency measures offer enormous potential for addressing energy poverty, but this can only be fully exploited if they are designed taking into account the underlying factors that affect the behaviour of the individuals who daily interface with those interventions (DellaValle, Bisello, Adriano, and Balest, Jessica 2018).

Information provision measures

Information provision measures play a significant role in improving not only vulnerable consumers' awareness of their rights and available market tariffs, but also in enhancing their understanding of energy-related problems in the context of everyday life and awareness of energy efficiency (Costanzo et al., 1986). They are implemented in the form of information campaigns, provision of advice, and increased information on bills and tariffs, by making billing more transparent, and by providing price comparisons or energy saving tips (Pye et al., 2015). Like energy efficiency measures, information provision measures have the potential to bring economic benefits to vulnerable individuals. As an example, providing information on how to save energy might promote better energy consumption behaviours and, thus, cost savings (Luyben, 1980). Compared to the measures mentioned above, information provision and education measures acknowledge that individuals can contribute to address energy poverty with their own behaviour. However, they may result to be insufficient in changing behaviours (Schultz, 2014).

Behaviourally informed measures

Behaviourally informed measures are tools that policy makers can use to influence collective behaviour in addition to the traditional ones mentioned so far. Traditional measures rely on the assumption that individuals would change their behaviour only by changing economic incentives and providing more information. Conversely, behaviourally informed measures, by acknowledging that individuals do not only react to incentives and information, aim to improve the environment in which individuals make their decisions (*nudging*) (Thaler and Sunstein, 2008), and to enhance the set of core competences necessary to make optimal decisions (*boosting*), (Hertwig, 2017).

Exemplary interventions that aim to promote better energy efficiency decisions, energy consumption behaviour and budgeting capacity by improving the choice environment are: (i) default options (i.e. introduction of automatic enrolment to existing subsidy programs); (ii) commitment devices or reminders (i.e. committing to pay the bills within a certain time frame and publicly announcing it, or receiving text message reminders about saving money to pay the bill); and (iii) social norms (i.e. building community trust to create new positive socially accepted rules of behaviour) (Della Valle, 2019). However, these interventions can only be effective under certain conditions. For example, an institutional setting is required that prevents malevolent actors pulling individuals in self-defeating behaviours (as an example, to increase their profits private actors might exploit people's tendency to inertia by designing unethical privacy default options and misuse their energy consumption data) (Della Valle, Gantioler, and Tomasi, 2021).

If these conditions do not hold, interventions that target individual core competences might be preferable to those that target behaviour through nudging (DellaValle and Sareen, 2020). These boosting interventions might result in equipping individuals with statistical and risk literacy, deliberative capacities, or in providing rules of thumb (Caballero and Ploner, 2022). While it is true that these competences can be applied to a wide range of domains, they can be used also to tackle energy poverty. As an example, training people on practices of democratic deliberation (e.g., citizen panels, participatory budgeting) (Button, 2018) or facilitating

¹⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014SC0020R%2801%29&qid=1616407748963>

communication (Fehr and Gächter, 2000) to sustain collective action initiatives, like community solar energy ones (Ferster, Macht, and Brownson, 2020), can be an effective way to tackle energy poverty. Of course, all these behaviourally informed interventions need to be combined by structural mechanisms that enhance relations of downward accountability, to avoid shifting responsibilities to already burdened categories. If that is the case, these interventions might also increase vulnerable individuals' degrees of freedom to act (DellaValle and Sareen, 2020).

2.2 Foster energy communities' development

2.2.1 EU legislation

With the entry into force of the Clean Energy Package in 2019 and the introduction of new concepts such as active customers, renewables self-consumption and energy communities, the position and role of citizens in the energy system advanced from passive consumers to active participants and stakeholders (REScoop.eu & Client Earth, 2020). Energy communities came to be defined as Citizen Energy Communities (CECs) in the Electricity Market Directive (EU) 2019/944 and Renewable Energy Communities (RECs) in the Renewable Energy Directive (EU) 2018/2001¹⁸.

Table 1. Legal definition of renewable energy communities and citizen energy communities

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

Source: Renewable Energy Directive, Electricity Market Directive table derived from REScoop.eu & Client Earth (2020) Energy Communities under the Clean Energy Package.

While there are a number of differences between RECs and CECs, both are defined as non-commercial entities whose primary purpose is to provide environmental, economic or social benefits to its members or the local community (REScoop.eu and ClientEarth, 2020). Both definitions emphasise participation and effective control by citizens, local authorities or smaller businesses whose primary economic activity is not the energy sector (Frieden et al., 2021). Energy Communities are thus an organisational concept with stringent non-commercial,

¹⁸ The Directive on common rules for the internal electricity market (EU 2019/944) includes new provisions that enable active consumer participation, individually or through citizen energy communities, in all markets, either by generating, consuming, sharing or selling electricity, or by providing flexibility services through demand-response and storage. The directive aims to improve the uptake of energy communities and make it easier for citizens to integrate efficiently in the electricity system, as active participants. In addition, the revised Renewable Energy Directive (2018/2001/EU) aims to strengthen the role of renewables self-consumers and renewable energy communities. EU countries should therefore ensure that they can participate in available support schemes, on equal footing with large participants.

governance and control requirements (with local rooting for RECs), which distinguishes them from other collective initiatives and energy market participants (REScoop.eu & Client Earth, 2020).

Importantly, the definitions of energy communities in the recast Electricity Market Directive and recast Renewable Energy Directive come with a legal obligation for Member States to put in place enabling frameworks for energy communities to ensure a level playing field and promote their development. While both directives state the potential of energy communities to tackle energy poverty in the recitals, the Renewable Energy Directive specifically enshrines the participation of vulnerable and low-income households in renewable energy communities. Article 22, explicitly states that Member States must ensure, through their enabling frameworks for RECs, that the “participation in renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households.”¹⁹ This means that Member States are required to put in place policies and measures to remove potential barriers that might prevent low-income or vulnerable households from (voluntary) participation in RECs, so that they are able to benefit from RECs on an equal footing with other potential members (REScoop.eu and ClientEarth, 2020)²⁰.

To fully exploit their potential as active players in the energy system, the implementation of the Electricity Market Directive and the Renewable Energy Directive will be closely followed. Under Article 20 of the Governance Regulation, Member States are obliged to include in their NECP progress reports (i) a summary of the policies and measures under the enabling framework put in place by Member States to promote and facilitate the development of renewable energy communities and (ii) information on national trajectories and objectives on renewable energy communities. Concerted Actions are used to support their progressive creation and diffusion into different areas and across Member States. The Commission will further explore how to promote energy communities and disseminate good practices.

2.2.2 Member State legislation

REScoop.eu’s transposition tracker²¹ maps how Member States’ are progressing in the transposition of provisions on energy communities in the Electricity Market Directive and Renewable Energy Directive²². While many Member States adopted measures and policies for community ownership, such as experimenting regimes, or are in the process of developing regulatory frameworks, implementation has overall been relatively slow. This makes it hard for citizens and communities to claim their rights to participate in the market.

Connecting energy communities to energy poverty alleviation or ensuring accessibility towards low-income and vulnerable households remains a challenge for all Member States. So far, only Spain, Portugal, Italy and Greece explicitly link energy poverty alleviation with RECs in their NECPs (Hanke, Guyet, and Feenstra, 2021). At the time of writing, only a small number of Member States put in place concrete measures to strengthen accessibility of energy communities towards low-income and energy poor households (good practices listed in Box 1). Certain countries such as Cyprus and Slovakia have included this requirement into their national legislation, but did not translate it into concrete action yet.

Some good practice examples are presented in the following text box.

¹⁹ Directive (EU) 2018/2001, Article 22

²⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001>

²¹ <https://www.rescoop.eu/transposition-tracker>

²² For updates on Member States’ progress on implementing provisions on energy communities in their national legislative frameworks see the REScoop.eu transposition tracker: <https://www.rescoop.eu/policy#transposition-tracker>. See also (Frieden et al., 2021) for a recent assessment also on the challenges in the transposition of the Directives.

Box 1. Member States' good practices in transposing and implementing the Internal Electricity Market Directive and Renewable Energy Directive²³

So far only **Greece** has concretely embedded the reduction of energy poverty as a prime goal of energy communities in its legal framework, in the transposition of the Directives (Electra Energy, 2019). In particular, the inclusion of vulnerable or poor households in the Greek net metering scheme without requiring membership in the energy community may be a powerful approach to reduce barriers for these groups.

The overall transposition of REC and CEC provisions into **Italian** national legislation can be considered a good practice. Specifically with regards to accessibility of RECs, Article 31,1 d) of the Legislative Decree 199/2021 states that participation in RECs is open to all consumers, including low income or vulnerable households. Article 11(7) of the legislative decree for CECs specifies that the local authorities that participate in CECs should adopt initiatives to promote participation in the communities of vulnerable customers, so that the latter can access the environmental, economic and social benefits ensured by the community itself.

While much of the enabling frameworks for RECs remains to be transposed, the incentive framework for collective self-consumption in **Spain** is quite favourable and has helped the development of energy community projects for energy sharing. The National Strategy against Energy Poverty 2019 establishes collective self-consumption as a measure to mitigate situations of vulnerability and energy poverty. Furthermore, Spain aims to direct a considerable amount of Resources under its Recovery, Transformation and Resilience Plan towards promoting the development of RECs. One of the criteria for financial assistance is their contribution to the fight against energy poverty. The participation of vulnerable households is prioritised through the involvement of (mainly) municipal administrations in specific RECs.

A report from the Horizon 2020 project CEES (Community Energy for energy solidarity), points out that **Portugal** has made good progress in linking energy communities to energy poverty alleviation and integrating both as a policy priority in its NECP. The Plan includes, for instance, the aim to promote the development of energy communities and specifically support the establishment of energy communities in partnership with municipalities, especially with those that have a higher rate of energy poverty. Nevertheless, energy communities in Portugal are currently still challenged by many barriers (Schockaert, 2022).

2.3 Gradual alignment of energy communities and energy poverty

2.3.1 Recent developments under the European Green Deal

In 2019, the European Commission presented its new growth strategy, setting out a roadmap towards climate neutrality in 2050: the European Green Deal. It succeeds the 2015 Energy Union Strategy which set the framework for the Clean Energy Package. The Green Deal promises to “leave no one behind”²⁴. It aims to address energy poverty and to ensure all consumers benefit and are involved in the clean energy transition.

Since its publication, the EU legislative framework on energy poverty and energy communities became more established. Of particular relevance are the following initiatives, measures and strategies:

The Renovation Wave strategy, published on 14 October 2020 as part of the Green Deal, put strong emphasis on the problem of energy poverty: renovation should be used as a lever to address energy poverty and ensure access to healthy housing for all households²⁵. Additionally, it underlined the fact that energy communities are not only an important means for increasing the share of renewables used in buildings for electricity, heating and cooling consumption. A community approach may also help lift society's most vulnerable people out of energy poverty and support them in using their untapped potential as active players in the energy system. Part of the Commission's strategy to achieve the Renovation Wave objectives is to examine the implementation process of provisions on energy communities and support and promote their dissemination across Europe²⁶. Alongside the Renovation Wave, the European Commission published an **Energy Poverty Recommendation**²⁷ on how to address energy poverty and how to make sure that vulnerable consumers are included in the proposed measures. The Recommendation is accompanied by a **Staff Working Document**,

²³ For more examples and details about national transpositions see REScoop.eu (2023). Enabling Frameworks for Renewable Energy Communities. Report on Good Practices. <https://www.rescoop.eu/toolbox/enabling-frameworks-for-renewable-energy-communities-report-on-good-practices>

²⁴ COM(2019) 640 final Communication from the Commission The European Green Deal

²⁵ COM(2020) 662 final. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Renovation Wave for Europe – greening our buildings, creating jobs, improving lives.

²⁶ COM(2020) 662 final.

²⁷ https://ec.europa.eu/energy/sites/ener/files/recommendation_on_energy_poverty_c2020_9600.pdf

which provides guidance on indicators of energy poverty. Member States are to use this guidance to update their NECPs. Another key component of the Renovation wave is **The Affordable Housing Initiative (AHI)**. It is aimed at revitalising 100 neighbourhoods as lighthouse renovation projects across the EU in the coming years, with social, cooperative and public housing providers as leading force.

The European Commission ran the **EU Energy Poverty Observatory (EPOV)** from 2018 to 2020 entrusted with the task of providing energy poverty related data on a European level and to support Member States in their efforts to alleviate energy poverty. Following-up on the EPOV experience and achievements, the Commission established in 2021 an **Energy Poverty Advisory Hub**²⁸ with the objective to become the centre of energy poverty experience and expertise in Europe. It will start with assisting 80 individual municipalities with direct support to scale up.

With the **European Climate Pact**, launched in December 2020, the Commission aims to foster collaborations between citizens, regions, local communities, civil society, industry and schools in their fight against climate change. Energy communities are mentioned as an innovative way to build such collaborations and strengthen citizen engagement towards a sustainable future.

The European Pillar of Social Rights Action Plan, launched by the Commission in March 2021, sets out initiatives to turn the European Pillar of social rights into reality, such as a proposal for a Council Recommendation on minimum income, guidance on ex-ante distributional impact assessments and a report on access to essential services²⁹. Preceding the Action Plan, the Commission published a Communication entitled *A Strong Social Europe for Just Transitions*, as a roadmap towards the Action Plan. This Communication highlighted the importance of the social economy (which also covers energy communities) to bring forward innovative solutions and generate engagement, initiatives and returns to local communities³⁰.

Building on its Recommendations on Energy Poverty, the Commission is establishing **an energy poverty and vulnerable consumers' coordination group** to enable Member States to exchange best practices and engage in coordinated efforts, so that any analysis based on indicators at EU or national level could be complemented with related EU policies such as energy efficiency and the renovation wave.

In June 2022, the EU Council published the **Council Recommendation on ensuring a Fair Transition towards Climate Neutrality**. It provides Member States with further guidance on how to strengthen commitments and implementations of just transition policies and aims to streamline EU and Member State efforts. Although not specifically referencing provisions on energy communities and energy poverty in the Renewable Energy Directive, it does recommend promoting energy communities as a way forward for empowering vulnerable citizens and increasing access to renewable energy for vulnerable households.

The **Energy Community Repository**³¹ and an **Advisory Hub for Rural Energy Communities**³², both launched in 2022 to further facilitate the development of citizen and renewable energy communities, in respectively urban and rural areas. Both offer services and activities such as technical assistance, sharing of best practices and mapping of energy communities across Europe.

The Energy Communities Facility, which the Commission aims to set up “to provide cascade funding to energy community projects in the EU, under the LIFE programme”³³.

2.3.2 Recent developments under the Fit for 55 and REPowerEU

As the European Green Deal³⁴ highlights the empowerment of energy communities and the inclusion of vulnerable consumers as a way to address energy poverty (European Commission, 2019) further opportunities for support are expected to derive from ongoing developments at the EU level.

In July and December of 2021, the European Commission presented a package of proposals to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net greenhouse gas emissions by at

²⁸ https://energy-poverty.ec.europa.eu/index_en

²⁹ <https://op.europa.eu/webpub/empl/european-pillar-of-social-rights/en/>

³⁰ COM(2020) 14 final

³¹ https://energy-communities-repository.ec.europa.eu/index_en

³² https://rural-energy-community-hub.ec.europa.eu/index_en

³³ EU Solar Energy Strategy, COM/2022/221 final

³⁴ COM(2019) 640 final

least 55 % by 2030, compared to 1990 levels ('Fit for 55' package)³⁵. At the time of writing, most of the interinstitutional negotiations have been concluded.

The interinstitutional negotiations on the revision of the **Renewable Energy Directive** resulted in an increase of the binding target for renewable energy to 42.5 % (this is 2.5 % lower than aimed for by the Commission in its original proposal). The final text also sets a new binding annual growth rate target of renewable energy in the heating and cooling sector. The measures Member States take to reach these targets should be accessible to all consumers, especially those in low-income or vulnerable households. The articles supporting the mainstreaming of renewable energy in buildings suggests that Member States should cooperate with renewable energy communities to anticipate the skills that will be needed and urges for national measures to substantially increase energy communities and their RES production. The article on Renewable Energy Communities was not reopened³⁶.

The final text of the **Energy Efficiency Directive** establishes the first European-wide definition of energy poverty in EU law, this highlights the central role that energy efficiency plays in mitigating energy poverty. Compared to the last version of the EED, energy communities are now mentioned several times throughout the directive. Most importantly, energy communities are included in Article 8, which creates an obligation for Member States to consider and promote the role of RECs and CECs to achieve the energy savings obligation. Energy communities are furthermore mentioned in Article 21 on information and awareness raising, and Article 22 on heating and cooling. While Recital 92 highlights that “energy communities can help fight energy poverty through facilitation of energy efficiency projects, reduced energy consumption and lower supply tariffs”, this recognition is not reinforced in Article 22 on empowering and protecting vulnerable consumers and alleviating energy poverty.

With the establishment of a **Social Climate Fund**, the Commission intended to address some of the clean energy transition’s distributional impacts, in particular those of the proposed extension of the Emissions Trading System to buildings and transport. The Social Climate Fund is the first dedicated EU Fund providing support to vulnerable households, transport users and micro-enterprises in the sustainable energy transition. Energy communities are specifically recognised as a way to achieve the objectives of the Fund. To mobilise the Fund, Member States will need to submit Social Climate Plans by 30 June 2025. These will need to be prepared in close consultation with a diverse set of stakeholders, ensuring inclusive governance over the Fund³⁷.

The European Commission’s proposal for a revision of the Buildings Directive, or Energy Performance of Buildings Directive (EPBD), is a key initiative presented in the Renovation Wave strategy to reach our climate targets. Energy efficiency improvements are a great tool to accelerate the transition, while enshrining resilience into our building stock. Some of the core debates in the revision of the EPBD revolve around energy poverty, most notably on the framework for Mandatory Energy Performance Standards (MEPS). The current proposal, still being negotiated at the time of writing of this report, recognises and supports the role of energy communities in renewable energy generation and neighbourhood approaches. Moreover, it highlights the role that energy communities play in transforming our building stock into zero-emission buildings.

On the 14th of March 2023 the Commission proposed to reform the EU’s **electricity market design** to accelerate a surge in renewables and the phase-out of gas, make consumer bills less dependent on volatile fossil fuel prices, better protect consumers from future price spikes and potential market manipulation, and make the EU’s industry clean and more competitive³⁸. This proposal includes a new article on energy sharing, which specifically proposes a paragraph stating that Member States shall take appropriate and non-discriminatory measures to ensure that energy poor and vulnerable households can access energy sharing schemes. Those measures may include financial support measures or production allocation quota. This text is not final, as the EMD file is currently being negotiated between the European Parliament and Council, but there are indications that this reference will be strengthened to make sure that energy sharing projects of local authorities are also made accessible to vulnerable consumers.

Finally, as a response to the current fossil fuel crisis and Russia’s invasion of Ukraine, the Commission published its **REPowerEU plan**. The plan builds on the Fit for 55 proposals and aims to align ongoing policy processes with today’s rapidly changing reality. Several parts of the REPowerEU package are relevant to energy communities and energy poverty, both in their own right and as reinforcing concepts. In this sense, REPowerEU, and to be more precise the Solar Strategy, the Commission Recommendation and Guidance on permitting

³⁵ https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541

³⁶ COM(2021) 557 final

³⁷ Regulation (EU) 2023/955

³⁸ https://ec.europa.eu/commission/presscorner/detail/en/IP_23_1591

procedures and power purchase agreements and the Save Energy Communication, represent an opportunity to further elaborate links between energy communities, an inclusive energy transition, and combating energy poverty (Schockaert, 2022). It creates further leverage points for claiming recognition and support for energy communities as vehicles for realising energy efficiency, renewable energy and energy poverty objectives.

3. Energy communities tackling energy poverty

In this chapter, we will explore the potential for energy communities to contribute to the alleviation of energy poverty. We will examine different examples of energy communities and other collective action initiatives in the energy domain, the challenges they face, and the benefits they can provide to their members and their acts or intention to contribute to energy poverty alleviation. Additionally, we will discuss the role of government, NGOs, and the private sector in supporting the development and scaling of energy communities as well as the barriers they face.

3.1 The contribution of energy communities to tackling energy poverty: conflicting evidence

Across Europe examples can be found of energy communities tackling energy poverty through a broad range of activities, while a number of European funded projects are investigating community energy and collective, citizen-led schemes towards energy poverty alleviation. Examples of the latter are EU Horizon 2020 projects such as STEP ('Solutions to Tackle Energy Poverty'), the cost action ENGAGER project³⁹, CEES (Community Energy for Energy Solidarity), Powerpoor, Sun4All and BECoop among others.

As a concrete example of an energy community engaging in energy justice, Portuguese renewable energy cooperative Coopérnico has set up a scheme that harnesses solar power to create social value for its local community. By renting the rooftops of socially-oriented institutions for its photovoltaic installations, Coopérnico provides them with additional income, lower energy costs and, ultimately, a free solar PV installations at the end of the leasing period.

In the POWERPOOR H2020 project, pilot energy poor support programmes/schemes, designed, developed, and implemented in eight countries across Europe, are led by a network of certified Energy Supporters and Energy Communities Mentors. Energy Supporters engage citizens suffering from energy poverty, provide advice and enable them to plan, secure funding and implement energy efficiency interventions. Energy Communities Mentors provide support and expertise in all key areas associated with the operation and/or creation of an energy community/cooperative, comprised of citizens alleviating energy poverty⁴⁰.

In France, Enercoop, a cooperative clean energy supplier with over 100,000 clients, launched Énergie Solidaire, a solidarity fund that encourages microdonations from consumers and renewable energy producers to donate their surplus production. Enercoop consumers can donate 1 cent per kWh from their energy bills. Énergie Solidaire then allocates the funds to associations that fight against energy poverty⁴¹.

ZEZ, the Green Energy Cooperative based in Croatia, set up a project training young and unemployed people to become energy advisors to help low-income households take energy efficiency measures in their homes. Collaborating with the City of Križevci, a group of these young advisors was able to find employment under a Public Works programme for Energy Advisors.

Going beyond the EU, London-based Brixton Solar allows tenants, through its community power project in social housing, to make smaller investments and gives them a limited amount of the produced electricity for free. Part of the revenues are collected in an energy efficiency fund to further guide and advise people on cutting their energy bills and reducing energy waste. The cooperative also offers internship and training opportunities for youth living in the local community.

An inspiring case of collaboration between citizens and local authorities can be found in the Belgian City of Eeklo. By collaborating with Ecopower, an energy cooperative with nearly 60,000 members that powers over 50,000 homes with 100 % renewable energy, the City of Eeklo was able to provide 750 citizens with one pre-financed share of Ecopower. This lowered the barrier for people with less financial leeway to get all the advantages that come with a full membership of Ecopower, such as lower electricity bills.

³⁹ For insights please see: Guyet, R., Hanke, F. and Feenstra, M. (ENGAGER) (2021, March). *Energy Communities and Energy Poverty: Moving towards a New Social and Ecological Contract?* available at: <http://www.engager-energy.net/wp-content/uploads/2021/03/WG4-policy-brief-March-31.pdf>, and Hesselman, M. et al. (ENGAGER) (2020, September). *European Energy Poverty. Policy Brief No. 4: New Narratives and Actors for Citizen-led Energy Poverty Dialogues*.

⁴⁰ See: <https://powerpoor.eu/about/project>

⁴¹ The project was launched in 2014 by Les Amis d'Enercoop (<http://www.lesamisdenerecoop.org>) and it also engage suppliers such as EDF and Engie, to promote initiatives to increase donations. See more on: <http://energies-solidaires.org/>

Som Energia from Spain, similarly investigates ways to lower barriers for different social groups to join the cooperative and works together with municipalities to identify people struggling with energy poverty. It can also pay the energy bill together with the cooperating municipalities for members that struggle to cover their energy costs. The cooperative also allows members to share their membership with five people without extra costs, benefiting people of lower incomes⁴².

In some cases energy communities involve associations of tenants, housing association, etc., and are specifically oriented to address energy poverty through a reduction in tariffs. This is the case, for instance, for BürgerEnergieBerlin⁴³, a German energy cooperative, with around 1000 members which uses the Mieterstrom framework (Moser et al., 2021) to offer solar panels on one multi-family house of a housing cooperative in Berlin – Neukölln, and other smaller projects so that tenants can benefit from electricity with a price 10 % below the basic energy provider’s tariff (Grundversorger).

An interesting case of energy community specifically addressing vulnerable, energy poor, citizens is described in details in (Torabi Moghadam et al., 2020). The authors promote the use of Consumer Stock Ownership Plan (CSOP) as a financial model, as it is being implemented in the Susa Valley – Oulx (Italy) and it is one of the pilot projects of the SCORE H2020 Project, to encourage the active role of consumers in RES investments⁴⁴.

A recent JRC report on social innovations for the energy transition highlighted how social innovation projects can directly or indirectly alleviate energy poverty. In some of the cases analysed, affordable energy is provided by new energy companies where social tariffs schemes are present; while in two projects focused particularly on solving the energy poverty issues, one in Hungary and another one in Bosnia and Herzegovina via biomass utilisation and engagement with the local community (Mikkonen et al., 2020).

Going beyond individual good practices, a number of scholars and projects have attempted to quantify and capture the benefits of participating in an energy community and energy communities’ social impact.

Looking at economic benefits, it is found that participation in energy communities may generate additional income from selling energy (services), reduce the costs of energy consumption and lead to energy efficient behaviour, as energy that is not self-consumed can be potentially sold (Hanke, Guyet and Feenstra, 2021). On a community level, energy communities are associated with local job creation and community development through the reinvestment of revenues in the local community, thereby avoiding outflow of financial resources from the region (Kunze and Becker, 2014; Caramizaru and Uihlein, 2020).

However, as multidimensional entities, energy communities have not only an economic dimension, but also an environmental and social one. Their activities, objectives, and impacts may go well beyond the economic benefits for their participants and local environment: they indeed provide collective gains and “intangible” benefits through local engagement, social innovation⁴⁵ and community and social activities and wider benefits (Mikkonen et al., 2020; Hasanov and Zuidema, 2018; Hewitt et al., 2019). This is also highlighted in a recent study on energy communities’ social impact by Énergie Partagée⁴⁶. Based on survey responses from about 650 people involved in energy communities across France, the study concludes that the impacts of such projects on local communities and the energy system as a whole are multifaceted and generally beneficial, with respondents reporting impacts such as increased knowledge and skills on energy and climate issues, an overall increase in citizen commitments towards the energy transition and stronger collaborations between different local actors on a variety of topics.

Summarising studies on community empowerment through energy communities, Bielig et al. (2022) similarly found that energy communities indeed lead towards more social cohesion, development of knowledge and skills and community confidence. However, they also point out that the current distribution of benefits associated with energy communities may not be accessible to certain social groups as it remains a challenge for energy communities to be more inclusive towards marginalised groups and vulnerable households.

A recent study by Lazoroska, Palm, and Bergek (2021) on gender engagement in 11 solar energy communities in Sweden, for instance, reveals in that regard how, despite their relative potential of inclusion, they in reality raise justice concerns on the procedural dimension, in particular in terms of access, capacity and opportunity to

⁴² <https://energy-democracy.net/som-energia-the-first-energy-cooperative-which-provides-an-alternative-to-the-traditional-energy-suppliers/>

⁴³ <https://www.buerger-energie-berlin.de/>

⁴⁴ <https://www.score-h2020.eu/>

⁴⁵ Social innovation broadly can be described as “new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations” (European Commission, 2010). Social Innovation in the energy transition can be defined as “innovation that is social in its means and which contributes to low carbon energy transition, civic empowerment and social goals pertaining to the general wellbeing of communities”. However, as there is a plurality of definitions and approaches regarding social innovation, also in the energy domain it difficult for research and practice to reduce its scope and agree on a single definition (de Geus and Wittmayer, 2019; Mikkonen et al., 2020).

⁴⁶ <https://energie-partagee.org/wp-content/uploads/2023/03/Etude-Impact-social-EnRc-Energie-Partagee.pdf>

engage in decision-making. Some studies reported evidence that participation to energy communities is higher for higher income people. (Wierling et al., 2021) analysis over a sample of almost 500 energy communities in Germany and Italy finds that they are predominantly located in richer regions.

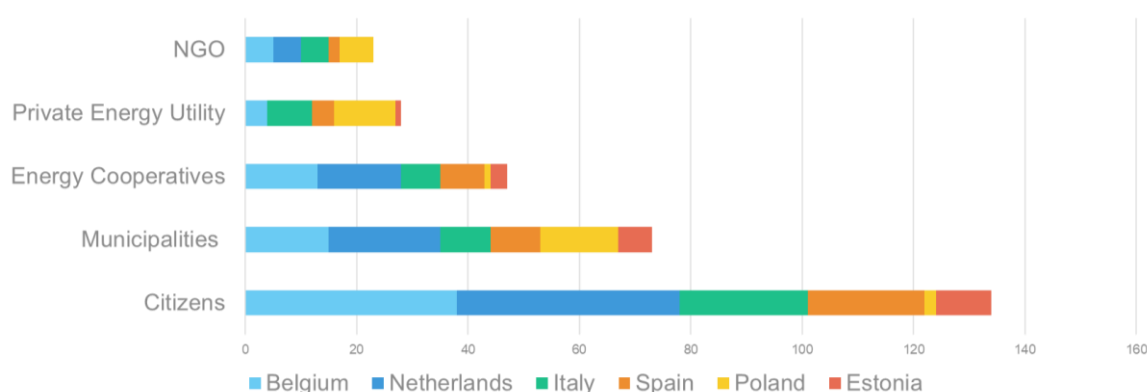
During a mapping exercise of energy communities in Greece that took place two years after the introduction of the new energy communities' law, Electra Energy (2020) found that 1 out of 4 plans to offer energy support to vulnerable social groups. Hanke, Guyet and Feenstra (2021) similarly point out the willingness of energy communities to address energy poverty. However, only a few cases mindfully fulfilled their potential to empower and engage vulnerable households in the energy transition.

The RECs that did not address vulnerable groups or energy poverty, reported that they had limited resources and lack of understanding of energy poverty or ways to reach vulnerable groups, but they also showed biases concerning low-income groups. In particular, some RECs assumed vulnerable groups to be not interested in participating to such collective energy projects, or that RECs should not engage in social roles. The authors thus conclude that “referring to RECs as equity-enhancing actors of a just transition and contributing to energy justice must be done more carefully than is currently the case” (Hanke, Guyet, and Feenstra, 2021, p. 8).

Also Barroco Fontes Cunha, et al., (2021) in their analysis on whether energy communities help to create a fair energy transition by including vulnerable groups, similarly conclude that several barriers currently hinder this important contribution.

An example of a project that tried to quantify the impact of energy communities is the H2020 project COMETS (Collective Action Models for the Energy Transition and Social Innovation)⁴⁷. It included a survey across over 200 Collective Action Initiatives (CAIs)⁴⁸ (including, but not limited to energy communities as formally defined by the EU) across six European countries completed, and presents a European scenario of collective action initiatives characterised by high level of participation of involvement of citizens. Survey results presented in Figure 2, highlight the strong role of citizens in promoting and financing collective action initiatives. Citizens, and the vulnerable ones among them, are reported as the main beneficiaries of the initiatives' activities.

Figure 2. Main actors at the origin of Collective Action Initiatives



Source: (Lupi et al., 2021)

The contribution of collective action initiatives to the energy transition through a series of activities beyond their primary ones along the energy supply chain (e.g. renewable energy production, energy supply, energy efficiency services) has emerged within the recent COMETS project survey. As an indication, the majority of CAIs active across 6 European countries are involved in environmental care activities in knowledge and skills creation (K&S), and in civil society mobilization activities)(Lupi, Candelise, and Sciallo, 2021). Moreover, the survey also highlights the involvement of CAIs in activities targeting wider social objectives, including social inclusion and local communities' development (Table 2). These indicate the multidimensionality with which energy communities and other types of bottom up energy initiatives can contribute to energy justice and empowerment.

⁴⁷ <http://www.comets-project.eu/>

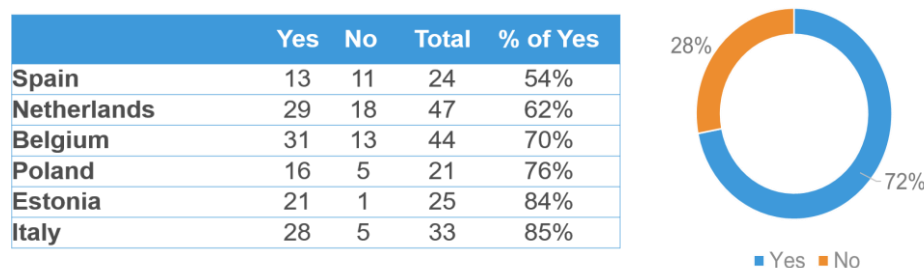
⁴⁸ CAIs are understood as citizen-driven initiatives that engage collective activities favouring the energy transition at a social, economic, and environmental level (Lupi et al, 2021)

Table 2. Collective Action Initiatives main social objectives

	Belgium	Netherlands	Italy	Spain	Poland	Estonia	Total
Support local projects	23	30	17	14	7	5	96
Social inclusion genders	8	2	4	10	1	0	25
Empower youth	4	4	7	7	3	0	25
Support groups	6	4	3	2	2	0	17
Empower women	0	1	3	11	0	0	15
Social inclusion elderly	4	2	2	5	1	0	14
Multiculturalism	3	1	2	5	2	0	13
Reduce unemployment	1	2	1	2	1	0	7

Source: (Lupi et al., 2021)

Finally, Figure 3 shows that a relevant share (72 %) of CAIs in the six MSs considered in the survey reported to have adopted concrete actions against energy poverty, however, the percentage varies significantly across countries, ranging from 54 % in Spain to 85 % in Italy.

Figure 3. CAIs in six MSs considering actions against energy poverty

Source: (Lupi et al., 2021)

In general despite some exemplary cases and research both highlighting and questioning energy communities' potential towards energy poverty alleviation, their social impact remains largely unexplored. As a consequence it is difficult to make generalisations about energy communities' social impact and their role in tackling energy poverty (Bielig et al, 2022). However, despite the scarcity of evidence of their contribution towards energy poverty alleviation so far, the benefits that have been researched indeed show their potential as vehicles for a just transition and thus the necessity to strengthen energy communities' accessibility towards all social groups. Many barriers exist for energy communities to become more inclusive and for vulnerable households to benefit from or participate in community energy schemes.

3.2 Barriers and challenges

Barriers that hamper the potential of energy communities to be an effective instrument in fighting energy poverty and strengthening energy justice are intertwined and relate to communities, citizens and institutions. In order for energy communities to meaningfully fulfil a social role towards people in vulnerable situations, and for vulnerable groups to participate in and benefit from collective energy schemes, still a lot needs to be done in terms of overcoming barriers and restrictions faced by both (Barroco Fontes Cunha, et al., 2021).

3.2.1 Barriers for vulnerable groups to join, set-up or benefit from community energy schemes

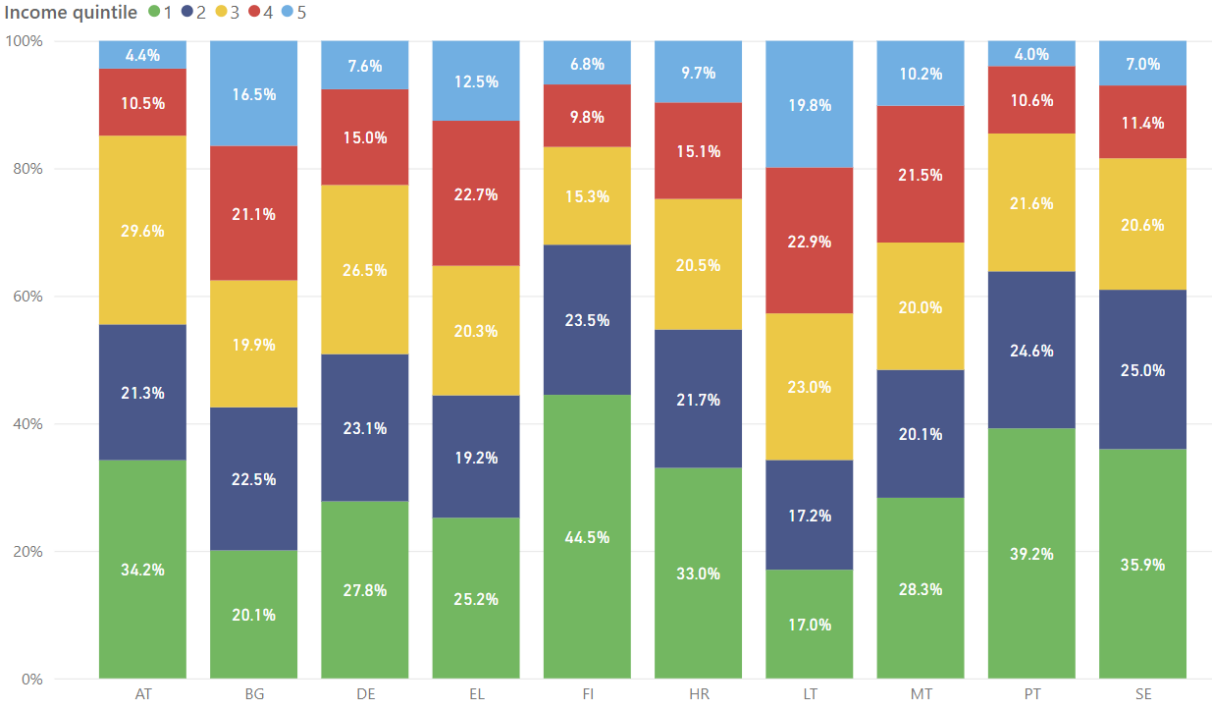
3.2.1.1 Multiple dimensions of energy poverty and vulnerability

Energy poverty has significant impacts on the quality of life of citizens in Europe – health, indoor comfort and air quality, social attainment and more (Kearns et al. 2019, DellaValle, 2019). This is a result of several combined factors that could be identified as causes. These include insufficient income of occupants, energy prices, poor quality of dwellings and the energy behaviour of vulnerable households (Santamouris, 2016; Ürgen-Vorsatz and Tirado Herrero, 2012, Kearns, Whitley, and Curl, 2019; Koukoufikis and Uihlein, 2022). Thus, energy poverty can't be reduced to simply as another type of poverty even if income and material deprivation are major drivers since low income households face significantly higher energy poverty rates (Figures 6 and 7). It has to be understood and examined within the broader socioeconomic challenges of the energy transition.

Indeed, energy poverty, at least in the EU countries, is caused by three main factors: a) low incomes, b) poor energy performance of buildings, and c) high energy costs (Kyrianiou et al., 2019). As shown in Figure 5, there are multiple interconnections and mutual relationships between these determinants: poor energy efficiency in residential buildings, low income and high energy bills can combine to form a vicious cycle in which energy poverty occurs and it is reinforced.

Deprivation and marginality⁴⁹, in cases linked to low education and poor health⁵⁰ may be a reason that cause persons in those conditions to fall into poverty traps⁵¹. Such self-reinforcing vicious mechanisms, or poverty traps, may affect people's self-perception and awareness of the problems and the possibility of being engaged and benefit from access to services and tools. People in those situations may not consider energy as their most pressing issue and may fail in recognising the severity of their problems and the availability of possible solutions, including participation in community projects.

Figure 4. Distribution of population unable to keep home warm by income quintile in selected EU countries (2021)



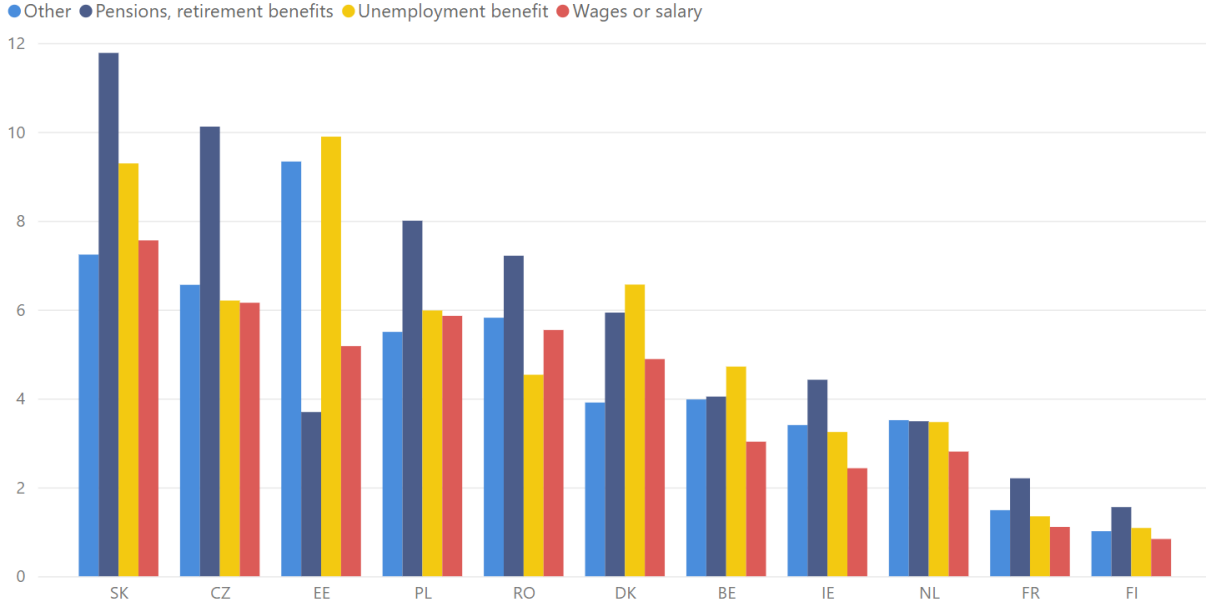
Source: JRC calculation on Eurostat data

⁴⁹ See, for instance, on the inter-related dynamic process of poverty and social exclusion. Clayton et al. (2015) demonstrate an interdependent relationship between debt and health.

⁵⁰ An increasing body of empirical evidence highlights a relationship between energy poverty and poor general and mental health (See for instance: Awaworyi Churchill, Smyth, and Farrell, 2020; Kahouli, 2020; Rodriguez-Alvarez, Orea, and Jamasb, 2019).

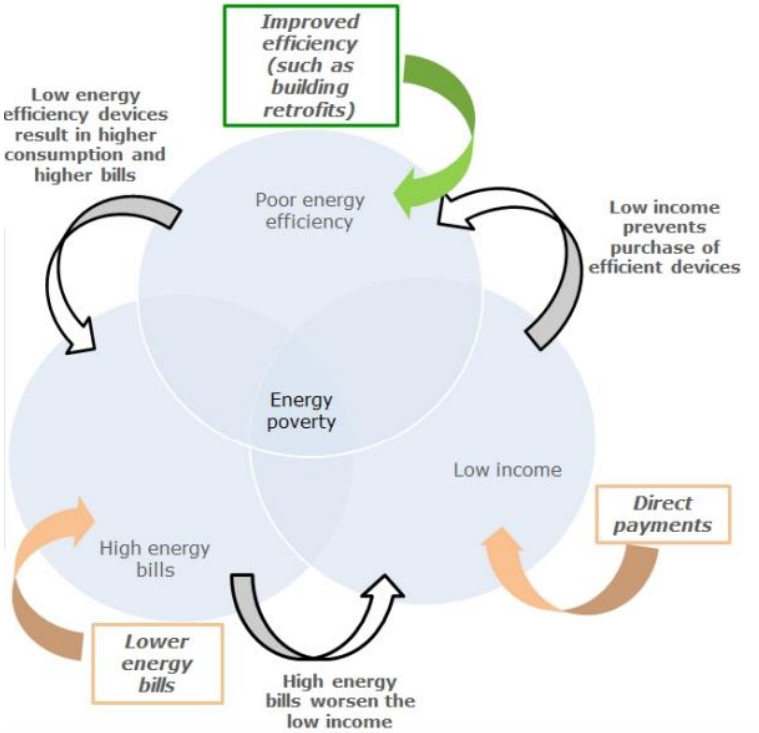
⁵¹ (Tovar Reaños, 2021) using Irish microdata, found significant evidence on a reverse causality between income poverty and energy poverty.

Figure 5. Share of expenditure for heating fuels by main type of income in selected EU countries (2019)



Source: Koukofikis and Uihlein, 2022

Figure 6. The complexity of energy poverty



Source: European Parliament - Energy Efficiency for Low-Income Households 2016

In this regard, the field of behavioural economics has helped to uncover some behavioural factors that drive energy poverty by affecting the quality of individual decisions, such as those that relate to the budgeting ability, energy consumption and energy efficiency adoption. More closely, understanding energy poverty through the

behavioural economic lens does not imply that vulnerable individuals are responsible for their poor decisions, but rather it is living in conditions of scarcity that makes them more exposed to poor decision-making, as these conditions impose a tax on cognitive resources that will be less available for other decisions requiring mental effort (Mani et al., 2013). The field of behavioural economics offers useful insights on the limitations of the current approach in legislation and on how to leverage behavioural factors to promote better decisions, like those relevant to energy use.

3.2.1.2 Policy issues

Hanke and Lowitzsch (2020) point out that, although EU legislation made significant strides forward towards re-envisioning consumer empowerment, energy communities are to a large extent considered as an investment choice and consequently fit into the traditional framing of empowerment as a freedom as ‘a consumer’ to choose in the market, with an emphasis on transparency and access to information, and to create competition for more options (Schockaert, 2022). They warn that “while empowerment in form of choice can be liberating, choice is also disciplining and potentially paralysing,” (Hanke and Lowitzsch, 2020, p. 19) and that you need access to certain requirements to make certain choices. In the case of energy communities, requirements such as an initial investment, time commitments, skills and an ability to take certain risks, may deprive people in vulnerable situations from a choice to become involved in a community energy project. Their vulnerability context thus overshadows the benefits that joining an energy community may bring, meaning that, as van Bommel and Höffken, (2021, p. 1) point out: “*not all societal groups are equally positioned to benefit from policies focused on community initiatives*”.

Policy makers can use insights from behavioural economics to

- Understand the context in which vulnerable households make their everyday decisions and how it might be a barrier to access certain rights and benefits in the energy transition. This might reveal policy frameworks which may disincentivise vulnerable households from exploring community energy schemes. For example, becoming a member of an energy community may in some cases jeopardise low-income and vulnerable households’ right to social welfare programmes as it is considered a form of asset creation (Hanke and Lowitzsch, 2020). This is for example the case in Croatia, where unemployed people may lose their unemployment status and entitlements when they join a cooperative (Schockaert, 2022). This is the result of a mismatch between social and energy policies. To identify these barriers it is crucial to prioritise discourse and collaboration with local stakeholders (Schockaert, 2022). The EU should encourage, collect, and aggregate such participatory efforts and dialogues.
- Improve the environment in which individuals make their everyday decisions with the nudging approach with the aim to mitigate the factors that deplete cognitive capacity (Thaler and Sunstein, 2008). In addition to target behaviour, policy makers can also target individual competencies with the boosting approach (DellaValle and Sareen, 2020). This latter corresponds with a capabilities approach and with socio-psychological understandings of humans as intrinsically capable of acquiring greater abilities as they access degrees of freedom to act (Middlemiss et al., 2019), and is particularly central for vulnerable individuals, who, while needing assistance, they should not be treated as passive recipients of top-down measures but rather accompanied and empowered to benefit from bottom-up, community initiatives.

The complexity of energy poverty suggests the need of institutional, structural and multifaceted interventions. Energy poverty can thus not be solved by mere financial measures and one-size-fits-all approaches. Energy communities are well-suited to deliver integrated services such as flexibility, education and training services, solidarity initiatives, and citizen-led renovation programs and energy efficiency measures. By providing spaces, such as stakeholder platforms, working groups, and task forces, that bring together social economy actors, energy communities can inform effective policies for a just transition (Schockaert, 2022).

However, the success of citizen- and community-owned energy has depended upon variable support from national governments (Hoicka et al., 2021). EU legislation refrains from specifying what an enabling framework for energy communities should look like. This provides flexibility to Member States to develop frameworks that fit their own complex path dependent traditions of renewable energy and the social economy (Hoicka et al., 2021). Nevertheless, scholars warn that even with the RED II enshrining equal access for all social groups into renewable energy communities’ provisions, if justice concerns are not fully taken into account by national legislators, energy communities may not equally progress benefits or participation for everyone (Creamer et al.,

2018; Hoicka et al, 2021). So far only a small number of Member States have specifically linked energy communities with energy poverty alleviation in their NECPs (as mentioned above). This has contributed to challenges to extend participation in and benefits from energy communities to people in vulnerable situations (Hanke, Guyet, and Feenstra, 2021). An enabling framework that provides benefits to energy communities fulfilling a social role could provide those initiatives with more capacity to engage in energy justice (Hanke, Guyet, and Feenstra, 2021). From the very beginning, there should be a focus on ensuring that business models and policy designs allow for the full participation of disadvantaged and vulnerable consumers (Hanke, Guyet, and Feenstra, 2021; Hoicka et al, 2021).

Finally, while it is paramount that energy poverty alleviation and collective empowerment get further recognition as mutually reinforcing elements within the energy transition (Schockaert, 2022) it is important to consider that purely bottom-up approaches may not, alone, deliver energy justice (Catney et al., 2014). Therefore, at all policy levels, from the European down to the municipal level, stronger alignment between energy and social policy is necessary (Schockaert, 2022). Coordination across energy, social, housing, and health sectors is considered one of the more important bottlenecks to energy poverty policy implementation by the EU Energy Poverty Observatory over the next several years (EPOV, 2020).

3.2.1.3 Lack of data and knowledge

As a barrier for energy communities to engage in a social role, Hanke et al. (2021), assessing how 71 energy communities' engage in a social role (a majority of cases in the sample coming from Germany) point to a lack of knowledge among energy communities about what it means to experience energy poverty and found that they showed a lack of understanding of the financial constraints these groups often face. Furthermore, although Member States have a legal obligation to define the concept of vulnerable consumers, not all Member States differentiate energy poverty from income poverty, such as Germany, Denmark and Sweden (Hoicka et al. 2021). This can lead to a lack of data on energy poverty in a specific context, to difficulties gaining access to certain types of data or to a lack of recognition for certain activities targeted towards energy poverty alleviation. This, in turn leads to constraints in terms of effectively acting on energy poverty or implementing measures which may increase the inclusiveness of their energy community (Hanke et al. 2021).

As a starting point for tackling this problem, Hoicka et al. (2021) point to the need for stronger capacity building and technical assistance for Member States, regional and local level authorities to ensure effective implementation and address shortcomings in the national frameworks on both energy communities and energy poverty. Moreover, energy communities themselves due to resource limitations often lack the capacity (technical, administrative, knowledge etc.) to engage with energy poverty alleviation projects. As the COMETS project indicated the majority of CAIs (61%) are small, with less than 100 persons involved and only 9% of the CAIs have more than 1000 participants. This size limitation is evident across the EU as most energy communities remain small.

3.2.1.4 Business models

The European legal framework on energy communities does not prescribe a specific ownership model or legal entity. A number of different business models for energy communities exist. It makes it easier for citizens, together with other market players, to team up and jointly invest in energy assets (REScoop.eu & Client Earth, 2020). They can take any form of legal entity, for instance, that of an association, a cooperative, a partnership, a non-profit organisation or a small/medium-sized enterprise (REScoop.eu & Client Earth, 2020). However, as indicated by JRC, energy communities organized as energy cooperatives remains the most common in Europe (Caramizaru and Uihlein, 2020). The European federation of citizen energy cooperatives (REScoop.eu), counts about 1,900 citizen energy cooperatives among their current members.

In all its different shapes and sizes, each individual energy community may have different thresholds for financial and time commitment, for knowledge and skills required and for the amount of risks you should be able to bear as an individual member. It then becomes a question which business model is most appropriate to address the needs of energy poor citizens (Hanke and Lowitzsch, 2020).

To date, a number of challenges for becoming more inclusive or extending benefits towards vulnerable households remain common amongst many initiatives across Europe.

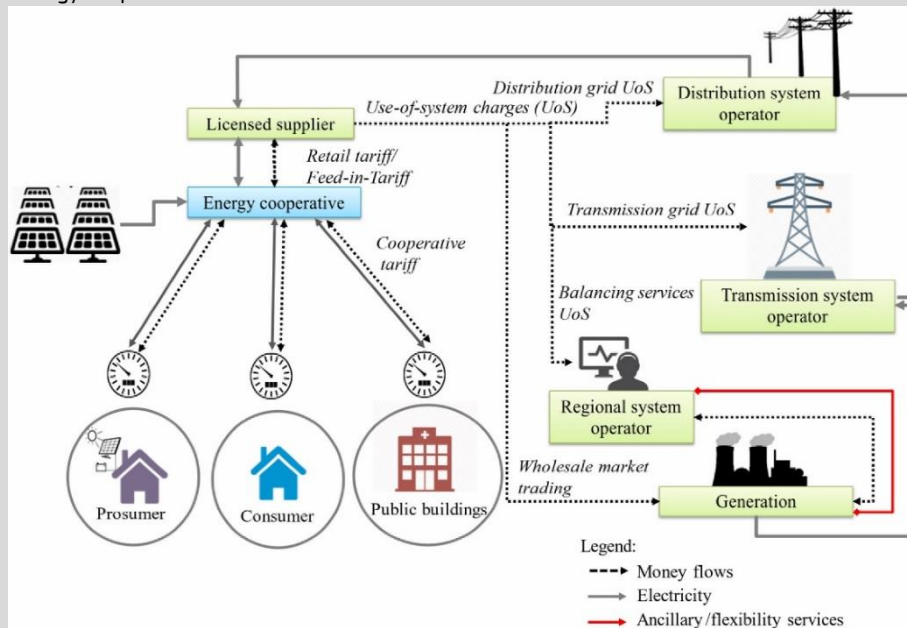
First of all, energy communities often tend to rely heavily on volunteer work, which may limit capacity and stability (Hoicka et al, 2021; Bielig et al, 2022). While in most Member States it remains a challenging endeavour to set up an energy community, little time and resources may be left to engage in activities beyond ensuring

their survival in a competitive energy market, which was not designed with small businesses in mind (Hanke, Guyet, and Feenstra, 2021; Schockaert, 2022).

Box 2. Energy cooperative business model

Even if based on commercialising energy, a cooperative business model has a different approach than a traditional utility (Bryant, Straker, and Wrigley, 2018). The aim is not to maximise profits but rather to reinvest them in the community and provide services to its members. If the net income is allocated as a return on capital shares, the profit redistribution is usually subject to a cap (Bauwens, Gotchev, and Holstenkamp, 2016; Caramizaru and Uihlein, 2020). Although all citizen energy cooperatives are based on voluntary and open membership rules, democratic control by participants and the economic participation of members (Wierling et al., 2018; F.G. Reis et al., 2021), various organisational forms and financing models exist within the cooperative business model.

Figure 4. Energy cooperative business model



Source: Reis et al., 2021

Second, while people living in energy poverty often struggle with low-incomes, this may run counter to many energy communities' reliance on investments from their members, as loans from financial institutions are often conditional upon the strength of a business case and government subsidies often involve time-intensive administrative efforts and complex application procedures. Thus, while accessing benefits of an energy community project often requires being a member, the requirement of an initial investment by participants may exclude most vulnerable and lowest-income people. This underlines the need for stronger enabling frameworks with appropriate tools to access finance for energy communities and more flexible membership rules (Hanke, Guyet, and Feenstra, 2021). To overcome this barrier on access to capital, when traditional loans are also not viable, alternative financing schemes are explored and being applied.

All over Europe crowd-investing platforms pop up aiming to support sustainable energy projects. The peer-to-peer investment platforms, connects investors wishing to have financial gains with energy communities and projects at a local level and support can be drawn from people across countries or internationally. Thus, an energy community via crowdfunding can be more inclusive allowing disadvantaged members to be part of a project as equal partners and investment capital to be transferred even in the most spatially isolated community.

One such platform operating in Greece is "Genervest" offering a way to invest ethically and socially while earning market rate returns by supporting energy communities on financing their renewable energy projects. In the platform selected projects ask for finance for a period of 3 to 6 months. Investors browse and select a project that offers a fixed rate or return and chooses the amount of investment. After a project becomes operational and according to the investment agreement, the investor gradually receives the return⁵².

⁵² See: <https://genervest.org>

The H2020 project POWER UP!⁵³ aims at encouraging and supporting local authorities (cities) going beyond their planning role to sustain the creation of local energy market players with a social agenda. Among the objectives of the projects is the implementation of pilot schemes for households in energy poverty, so that they benefit from renewable energy production and energy efficiency measures, without having to bear the financial risks. Six pilot schemes⁵⁴ will be co-created with energy-poor households and local stakeholders (cities, social organisations, energy utilities, citizen energy communities etc.), leading to at least 2.5 Million EUR investment in sustainable energy before the end of the project (2025) and involving more than 55,000 energy poor consumers.

The H2020 Project PowerPoor⁵⁵, aims at supporting programmes for energy poor citizens and encouraging the use of alternative financing schemes (e.g. crowdfunding). POWER FUND is a web-based tool developed by the POWERPOOR project to help energy poor citizens across Europe to identify and learn about Collective Innovative Actions to tackle energy poverty and take direct action. It provides users with an online open space to learn about innovative financial instruments like crowdfunding, and about how to use the potential of collective finance to overcome the economic and financial barriers hindering energy poor citizens from taking part in the energy transition⁵⁶.

Two other platforms currently active in promoting energy community projects targeting energy poor citizens are Ecrowd⁵⁷ and Crowder.PRO⁵⁸.

Another example of an innovative financing scheme is described by Hanke and Lowitzsch (2020): Ærø Windpark set up a local bank loan system to finance the participation of all the Islands' residents in the project, including, through low-interest loans, the participation of low-income households.

Finally, the Consumer Stock Ownership Plan (CSOP), is considered a business model particularly fit for supporting engagement of low-income households in joint ventures (Hoicka et al., 2021). It does not require an upfront payment to become a member. Participants repay the acquisition loan of their share from the future earnings of the investment (Hanke and Lowitzsch, 2020). Third parties, in the form of investors (also collective investors – crowdfunding) or facilitators (local / regional authorities; supporting schemes, housing associations, etc.) thus play an important role. In particular, the role of public institutions and associations as catalysts and facilitators may be essential for the successful involvement of vulnerable groups in community energy projects (DellaValle and Czako, 2022).

3.2.1.5 Technology focus

Energy poor people often reside in social or non-profit housing that is often badly maintained and of poor thermal quality. The thermal quality, energy and environmental standards of the social housing in Europe is of lower quality than the average building stock. The lack of energy efficiency is a key factor driving vulnerability to energy poverty because of the potential high loss of useful energy during energy conversions in the home (Bouzarovski and Petrova, 2015). The low energy performance of houses and buildings, and the use of inefficient energy appliances lead to higher energy needs and hence higher costs⁵⁹. Improving energy efficiency of low income households is crucial for the long-term solution to energy poverty⁶⁰.

Different EU-level projects are exploring strategies to develop and disseminate citizen-led renovation initiatives. The One Stop Shop Renovation Co-op (OSR-Coop) project⁶¹, funded by the EU LIFE programme, and the ECF Citizen-Led Renovation project bring together good practices from across Europe. For example, the Energy

⁵³ See: <https://cordis.europa.eu/project/id/101033940>. The project is led by Energy Cities (<https://energy-cities.eu/>), a large European city network, and will help building capacity of more than 160 people in local organisations, to allow them to either provide cheap energy to fuel poor households, or reinvesting benefits to carry out energy poverty alleviation measures

⁵⁴ In six locations across Europe: Eeklo (Belgium), Heerlen (the Netherlands), in the Campania area (Italy), in the Czech Republic, Valencia (Spain) and Skopje (North Macedonia).

⁵⁵ For more information on the project, see: <https://powerpoor.eu/>

⁵⁶ See: <https://www.powerfund.eu/>

⁵⁷ <https://www.ecrowdinvest.com/>

⁵⁸ <https://www.crowder.pro/>

⁵⁹ Analysis based on disaggregated data are needed to advance in the study and understanding of these relationships. In the Netherlands, the statistical authority maintains micro-level data on the energy performance of dwellings – energy performance certificates – and household income levels (Filippidou, Nieboer, & Visscher, 2017). Studies on the subject of building energy epidemiology have already proven valuable and could be further developed to include energy poverty and define methods to measure it. Building energy epidemiology is the emerging field that focuses on identifying, reviewing, evaluating and producing methods for studying and modelling the building stock including: data collection techniques on energy use, building features and occupant features, and building morphology; analysis of smart meter energy data, building systems, and user behaviour; and modelling energy demand among sub-national and national building stocks (IEA Annex 70 2019).

⁶⁰ There is also increasing evidence that energy efficiency leads to numerous wider benefits for the economy, environment, and society (Paci and Shnapp, 2021).

⁶¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/925991974/project/101076669/program/43252405/details>

Communities Tipperary Cooperative, active in County Tipperary in Ireland, is a community-led, home insulation upgrade and retrofitting organisation. It leverages community-led renovations as a way to increase local development and local benefits. UK-based energy cooperative, Carbon Co-op provides a People Powered Retrofit service, guiding homeowners through the entire renovation process to reduce home carbon emissions.

In France, Les 7 Vents, aspires to help home-owners living in poor housing conditions refurbish their homes with the 3SR ('Shared and Supported Self-Renovation') mechanism. This mechanism actively involves the participation of the home-owner and a group of volunteers in the renovation activities. They get assistance from a professional. This mechanism reduces the costs of refurbishments, and stimulates knowledge sharing and community building.

However, beyond such exemplary cases, energy communities mostly have renewable energy production and distribution at the core of their model and activities. In this regard, tax schemes, tariffs and investment costs will drive energy communities' development. Indeed, a recent JRC report points out that as long as investment and operational costs are competitive against electricity prices, energy communities will have incentives to form and invest in the energy assets that are suitable for the local socioeconomic and geographical context (Jimenez, et al. 2023).

Today, only in limited number of cases take actions that specifically address energy efficiency in buildings. For example, a recent COMETS project's survey across over 200 collective action initiatives, including but not limited to energy communities, in six European countries shows how of the initiatives that declare to undergo some energy efficiency activity (about 52 % of the sample) the majority focus on providing "advise on energy consumption", whereas a much smaller number seems to address energy efficiency in buildings (Lupi, Candelise, and Sciallo, 2021). Thus, energy communities in order to address the needs of vulnerable households and promote participation should increase energy efficiency activities (insulation, efficient heating and cooling systems, and energy-efficient appliances provision) in their inventory.

4. Conclusions and future research

Energy communities have the potential to play an innovative role in alleviating energy poverty and strengthening a just and inclusive energy transition. By collectively generating, managing, and sharing energy resources, energy communities can provide their members with access to reliable and affordable energy, a common space to acquire knowledge about the energy transition and opportunities to collaborate on issues of climate and energy justice. Nevertheless, while there is wide recognition of this potential, it seems that the number of energy communities actively addressing the issue of energy poverty remains rather limited.

The role of governments, NGOs, and the private sector in supporting the development and scaling of energy communities cannot be overstated. Large institutions such as the EU play a crucial role in promoting and funding energy community initiatives and opening up the possibility for energy communities to tap into their potential to mitigate energy vulnerability among citizens and communities across the EU. It is important that national authorities fully transpose REC and CEC provisions from the Clean Energy Package and create clear definitions for energy poverty and vulnerability that encompasses multidimensionality of the issues. At all policy levels, from European to local, dedicated policies should eliminate the barriers preventing vulnerable and low-income households from participating in energy communities and for energy communities to become more inclusive of vulnerable and low-income households. To accelerate the energy transition, significant structural changes in the political economy of the energy system are necessary to allow for more democratic citizen ownership, decision-making and engagement. Recent evolutions in the European policy framework increasingly recognise the multidimensional role energy communities and citizens can play in the energy transition. It is crucial that these ambitions are protected, strengthened and properly translated to national and local contexts.

In parallel, future research and policy work should focus on specific domains that will manage to help us understand and unlock the potential of energy communities and their underlying policy framework on energy poverty reduction. These include:

- Efforts to elaborate and create clear and homogenous definitions / categories and data to help frame the debate. One example is KPIs on the amount of energy an energy community donates to vulnerable households, and the ratio of low-income consumers in an energy community in relation to the total number of members.
- Dedicated scientific research on social aspects of energy communities with specific focus on their impact on the most vulnerable groups and on tackling energy poverty. The evidence is still limited. Examples of best practice as well as decoding the barriers energy communities encounter when trying to perform a social role (technical, social administrative etc.) can help policymakers.
- Assessment of the impact of EU legislation on promoting energy communities' social role as key actors in a just transition. Empowering energy communities to step up to their social role by addressing vulnerable households depends on understanding the many restrictions faced by energy communities on one side and those of vulnerable groups on the other. Based on a thorough understanding of energy communities' member structure, future research should analyse the effect of different engagement strategies on different social groups.
- Similarly, more understanding is needed on how varying the configurations and implementation models of energy communities (aside from the legal format) could lead to different results in terms of their capacity to address energy poverty. This would provide the evidence base to identify best practice and optimal policy tools.
- Understanding vulnerable groups' perspectives on participating in energy communities to ensure energy justice for all (Hanke et al, 2021). As the point of view of citizens, and in particular vulnerable social groups, differ, understanding their perspective and level of information with regard to the energy transition and common resources management is key in ensuring energy justice.
- Analysis of the role of alternative and participatory finance instruments (such as different models of crowdfunding) as well as other finance mechanisms (e.g. revolving funds) in easing the capital access barrier of entry for the energy-poor and in improving and facilitating their engagement and participation in energy communities.

- Experimental and longitudinal research into the social impacts of energy communities is almost completely absent in the current research landscape (Bielig et al., 2022). There is also a need to look beyond English-language academic literature.

In summary, energy communities have the potential to play a significant role in alleviating energy poverty. Through a combination of policy, funding, and technical support from large institutions such as the EU, energy communities can be empowered to become a key vehicle for the alleviation of energy poverty.

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List of abbreviations and definitions

AHI	Affordable Housing Initiative
CAI	Collective Action Initiative
CEC	Citizen Energy Communities
EED	Energy Efficiency Directive
EPAH	Energy Poverty Advisory Hub
EPBD	Energy Performance of Buildings Directive
EPOV	EU Energy Poverty Observatory
KPI	Key Performance Indicator
MS	Member State
NECP	National energy and climate plan
REC	Renewable Energy Communities
RED II	Recast Renewable Energy Directive 2018/2001/EU

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