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People in transitions: Energy citizenship, prosumerism and social movements in Europe

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ABSTRACT

Active energy citizens are leading energy transitions, co-producing new cultures, practices and structures of production and consumption. This article aims to understand if prosumerism – the collective participation of prosumers in energy projects with social, economic and environmental benefits to society – can be referred to as a social movement. The article draws on a review of Social Movements Theory and applies thematic analysis to characterize 46 prosumer initiatives in Europe. The collective identities, socio-political opponents, knowledge-making activities, collective learning, and collective action aspects of these prosumers are described. The results show that prosumer initiatives converge towards a transformative social movement. This movement upholds decentralized renewable energy production and consumption, and presents itself as a socially inclusive, transparent and participatory energy model, replicable across the globe, in what can be described as a collective action towards a decentralized democratic energy model. The discussion highlights relationships between prosumerism and framings such as energy justice (including energy poverty and gender issues), energy democracy, climate change action and anti-nuclear movements, to reach a conclusion considering the relevance of calling prosumerism a social movement, while opening up some avenues for future research.

1. Introduction

The idea that citizens will have a key role in the energy transition is outlined by the concept of energy citizenship [1,2], which is "a view of the public that emphasizes awareness of responsibility for climate change, equity and justice (…) and, the potential for (collective) energy actions", ([1], p. 72). Energy citizenship offers a background to approach different ways in which citizens are becoming actively involved in the energy transition, and engaging politically, either as consumers and users [3,4], by participating in protest and support movements [5,6] and, most relevant to this paper, as prosumers [7].

Renewable energy prosumers [8] are active energy citizens who may be involved in producing and self-consuming renewable energy and/or may be willing to participate in energy markets, providing services such as aggregation or energy efficiency support, across different energy sectors (electricity, transport, heating and cooling). Although being a prosumer does not require participation in collective projects, this paper focusses on prosumers organised in collectives, acknowledging the wide spectrum of activities in which they may be involved, such as participating in renewable energy cooperatives [9], setting up local collective self-consumption schemes [10], acting as market aggregators and selling surplus energy from various energy communities [11], adopting diverse organizational and decision-making structures, and providing citizen-led responses to local energy needs [12]. These activities make up a form of energy citizenship – i.e. prosumerism – which is the focus of this study, and implies the collective participation of prosumers in cooperative or communal energy projects with social, economic and environmental benefits to society [12,13]. Decentralised renewable energy systems, provide the opportunity for the emergence of prosumerism, which we explore as a social movement towards a more democratic energy system [14].

How groups of people are engaging politically in the energy transition is still only marginally addressed in sustainability transitions [15,16] and with some exceptions [14,17–19], Social Movement Theory has often been neglected in social sciences' approaches to climate change. Though there are some proposals for combining Social Movements Theory and Sustainability Transition studies [20], a broader understanding of the relevance of social movements is critical considering the expected impact of prosumerism in future energy systems [21]. Social Movements Theory also bring to the foreground other emerging research areas, such as energy democracy [13,22,23] and energy justice [24,25], concerned with 'humanizing' the transition by addressing its socio-political aspects [26].

Sustainability Transitions research understands transitions as

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regime shifts, or non-linear processes that result from the interaction between different system levels [15,27]: i.e. niches (or socio-technical innovations), socio-technical regimes (i.e. the dominant rules, cultures, institutions and practices in which innovations emerge) and the landscape (the structural conditions or exogenous structures that support social systems) [28]. The socio-technological aspects of innovations and regimes are embedded, since technologies are always mediated by social practices, cultures and institutions [29]. Nevertheless, despite the integration of political processes in Sustainability Transitions research, there is still little focus on the role of social movements in pushing for transition trajectories [17]. Social movements appear as relevant for regime changes, since they have a role to play in the political and cultural processes leading to the destabilisation of existent socio-technical regimes [30]. In the context of the energy transition, a range of recent studies have highlighted the different forms of governance where energy democracy emerges through the various relationships established by those involved in prosumer projects [31,32]. Hess [17] builds on Social Movements Theory to approach energy democracy as a frame for "energy-transition policy coalitions", understanding energy democracy movements are offering resistance to incumbent industry actors [17]. Some studies have focussed on the interweaving of energy democracy and energy justice within socio-technical innovations, shading light on the interdependencies between new forms of democracy and prosumerism [31,32], looking into how energy justice promotes local agency and community-owned energy projects [24], how local low-carbon community projects can help advance with energy justice in practice [33], and the political motivations of different forms of enterprise developing decentralised renewable energy projects in Europe [34]. Energy democracy thus emerges in this literature as an "ideal political goal, in which citizens are the recipients, stakeholders (as consumers/producers) and accountholders of the entire energy sector policy" ([13], p. 35). This paper builds on this literature to explore not only energy justice and energy democracy in the context of prosumerism and the energy transition, but the full scope of social movements framings (e.g. climate action, anti-nuclear, low-carbon and solidarity-based economy) that are triggering collective prosumer projects as key drivers in a transition for a more just as well as sustainable transition.

Hence, this paper analyses collective prosumer initiatives to answer the question: Can prosumerism be referred to as an autonomous social movement? This is relevant to understand if prosumerism is an expression of a community-led movement enacting a more democratic, socially just, sustainable and sober energy model.

The article continues as follows: Section 2 presents background concepts on Social Movements Theory and community energy literature; Section 3 explains the methodological approach, drawing on an inductive thematic analysis of the collective identities, values, motivations, goals and visions of a sample of 46 collective prosumer initiatives in Europe; Section 4 provides the results, which are discussed in Section 5; finally, the conclusion offers some avenues for future research.

2. Background: Social movements theory and prosumerism

Social movements literature is vast and different ideas exist about what constitutes a social movement [18,35,36]. Classical perspectives of social movements understand these are political by nature and therefore a form of political protest [37]. New Social Movement Theory largely developed by Castells, Touraine, Habermas and Melucci in the 1980s [38,39] observes social movements as a form of collective social action, wherein conflict between opposing actors is enacted. These conflicts emerge around power and control over the exploration of resources, as well as cultural and political contestation across established social relationships, environmental change and new technologies (e.g. nuclear energy) [38].

Agreeing to Jamison's [18] definition, social movements are: "(…) processes of political protest that mobilize human, material, and cultural resources in networks linking individual actors and organizations together in pursuit of a common cause. They provide spaces in the broader culture for new forms of knowledge-making and socio-cultural learning as a central part of their activity" (p. 813). This description is adopted here as an analytical definition to investigate whether prosumerism can be referred to as a social movement and a seed for a more democratic and just energy model [32,40]. If prosumerism is a social movement, it is relevant to characterise the collective identities of prosumers, their opponents, networks, and the knowledge-making and collective learning activities, sustaining their collective action.

The concept of "frames" [41] is equally central to Social Movements Theory and describes the process by which an agent seeks to alter the discourse in such a way that it implicitly advances their political objectives [35]. Thus, frames are "a mechanism through which actors engage in collective action" ([42], p. 194). By generalising a problem (e.g. energy poverty), framing allows the perception, and labelling of events within a wider scope [42]. Climate activism, for instance, has been an important framing for new social movement [43].

Recent research points to prosumerism has a collective social action, with energy justice as its framing [41], built from the bottom-up via local community action and new intermediaries working towards increased accessibility and affordability of energy [24,33]. Social movements mobilize human, material and cultural resources [36,44,45], and share a collective identity (i.e. a set of values mobilizing action among those who share and identify with such values) [18]. As such, social movements include forms of energy citizenship such as "Carbon Rationing Action Groups", working towards reducing their personal carbon emissions [43] as well as community energy [19]. A review of how people are driven to participate in community energy projects in Scotland found that "symbolic" resources, such as shared ideals, values and shared goals play a bigger role than structural (political and institutional) contexts [19]. Conversely, another study of citizen-driven energy projects in the UK, Spain and Germany concluded that political motivations in terms of ownership of energy resources, but also reduced consumption and a more sustainable land-use, are relevant for the emergence and development of community energy projects [34].

Networking is an important characteristic in Social Movements Theory, allowing individuals and organisations who share a set of ideas and beliefs to organise themselves and pursue collective goals [46,47]. Although networks have fundamentally changed over the past decades, from place-based communities to virtual networks, they still materialize through collective action, to which Melucci [48] referred to as a form of solidarity based on a shared identity. In the Netherlands, a study [39] used Social Movements Theory to examine the clustering of local prosumer initiatives, presented as "temporary actors that reveal a fundamental dilemma in our society: the normative organisation of the production and appropriation of energy resources" ([39], p. 99). By understanding how prosumer collectives are interconnected through networks [39] the study investigated how they challenged the energy system, yet did not go in depth into how prosumer collectives form (or not) an autonomous social movement. Other studies of community energy in the UK concluded that learning, both internally, or within the community, and externally, with other groups, communities, or networks, played a critical role for the emergence and effectiveness of prosumer collectives [49,50].

Knowledge-making and socio-cultural learning have been found to be key characteristics of social movements [35,51]. According to Jamison [18], when promoting their own dominant worldviews, social movements participants engage in multiple forms of knowledge-making, including producing new technologies, new governance experiences or new business models. These new knowledges are thus assimilated in collective learning processes, both through the development of scientific and technological knowledge, but also by integrating new socio-cultural practices [52,53]. By co-producing different knowledges, social actors in social movements develop different forms

Table A1
Country, data sources used and basic characteristics of 46 energy citizenship collective initiatives in Europe.

Country	Data source type	Type	Year (foundation/starting of activities)	Geographical scope of activities	RES used (Solar includes thermal and photovoltaic)	Other services provided
Belgium 1	Website and blog	Cooperative	2008	National	Wind, hydro, biomass, solar, geothermal	Energy Efficiency, Energy Literacy
Belgium 2	Website	Cooperative	2012	Local	Wind	Energy Efficiency; Energy Saving Applications; Energy Advice
Belgium 3	Website and blog	Social enterprise	2009	Regional	Wind, photovoltaic	Electric Cars; Energy Literacy; Energy Efficiency
Belgium 4	Website	Cooperative	2012	Regional	Wind	Energy Literacy, Citizens Engagement
Belgium 5	Website	Cooperative	1991	National	Wind, photovoltaic	Co-founder of a network for knowledge sharing and cooperation between cooperatives
Belgium 6	Website and blog	Cooperative	2001	Local	Wind	Energy efficiency
France 1	Website	Cooperative	2017	Local/Regional	Photovoltaic	Installation of PV panels locally (municipal facilities); Awareness raising
France 2	Website	Cooperative	2018	Local/Regional	Photovoltaic and hydro	Development of RES in the territory (rural initiative)
France 3	Website	Energy Community	2012	Regional	Wind	Citizen involvement in ownership of energy and local development
France 4	Website and blog	Cooperative	2015 (association)/2017 (cooperative)	Local/Regional	Photovoltaic	Awareness raising, education and training activities
France 5	Website and blog	Cooperative	2013	Regional	Biomass	Energy efficiency, awareness-raising activities
France 6	Website	Cooperative	2016	Local	Photovoltaic	Awareness raising
Germany 1	Website, blog, and documents provided	Energy Community	2009	Local	Biogas, Solar	Energy Efficiency, Energy Literacy
Germany 2	Website	Social Enterprise	2011	Local/Regional	Solar	Energy Efficiency, Reduce Consumption
Germany 3	Website	Cooperative	2013	Local	Biogas (wood chips/district heating)	Circular Economy
Germany 4	Website	Cooperative	2014	Local	Biogas (district heating)	Awareness raising
Germany 5	Website and blog	Cooperative	1999	Regional	Photovoltaic; wind	Support art projects through synergies with RES production
Germany 6	Website	Energy Community	2007	Local	Biogas	Regional development (agriculture; job creation)
Italy 1	Website	Cooperative	1911/1970	Regional	Hydro	Protection of cultural and environmental heritage, economic growth of the territory
Italy 2	Website and blog	Cooperative	2015	Local/Regional/National	Solar	Innovation, energy sharing, alternative mobility, energy efficiency
Italy 3	Website and blog	Private non-for-profit organisation	2015	Regional/National	Solar	Electric mobility, education (toolkits), energy literacy and reduce consumption
Italy 4	Website	Company	1994	Regional	Biomass (district heating)	Connection with the environmental and local resources (Natural Park)
Italy 5	Website	Cooperative	1927	Regional	Hydro	N/A
Italy 6	Website	Partnership between organisations	1924/2015	Regional	Hydro, biomass, photovoltaic	Opinion-making on energy policy, and lobbying activities
Netherlands 1	Website and activity reports	Cooperative	2009	Local	District Heating Using Water	Energy Efficiency; Energy Saving Applications
Netherlands 2	Website	Private non-for-profit organisation	2014	Local	Wind and Solar	N/A
Netherlands 3	Website	Cooperative	2013	Local	Photovoltaic	N/A
Netherlands 4	Website and blog	Private non-for-profit organisation	2015	Regional	Photovoltaic	Energy Audit; Energy Efficiency and Savings
Netherlands 5	Website	Partnership between organisations	2014	National	Wind, solar, biomass	Energy Efficiency and Savings Applications
Netherlands 6	Website	Cooperative	2015	Local	Wind, solar, biomass	Energy Savings, Energy Efficiency
Portugal 1	Website and activity reports	Cooperative	2014	National	Photovoltaic	Energy Efficiency
Portugal 2	Website and documents provided	Energy community	2009	Local	Solar; solar oven, biogas	Circular Economy; Technology Lab
Portugal 3	Documents provided by initiative members	Energy Community	2019	Local	Photovoltaic; solar boats	Research and innovation in renewable technologies

(*continued on next page*)

Table A1 (*continued*)

Country	Data source type	Type	Year (foundation/starting of activities)	Geographical scope of activities	RES used (Solar includes thermal and photovoltaic)	Other services provided
Spain 1	Website and blog	Cooperative	2012	Local/Regional/National	Solar, wind, biogas, biomass	Energy efficiency, collaboration with other cooperatives (e.g. food), social activism and support of solidarity economy
Spain 2	Website and blog	Cooperative	2010	Local/Regional/National	Solar, wind, biogas, biomass.	Energy efficiency, energy literacy, collaboration with other cooperatives (e.g. ethical banking), and support of solidarity economy
Spain 3	Website	Public institution	2009	Local	Solar and biomass	Energy literacy, culture of sustainability, and protection of cultural heritage
Spain 4	Website	Public-private partnership	2015	Regional (Island)	Wind-Pumped Hydro Power Station	Innovation, education, energy saving
Spain 5	Website	Public institution	2008	Local	Solar, wind, and biomass	Higher education, awareness raising, energy efficiency
Spain 6	Website and blog	Company	2016	Local/National	Photovoltaic	Representation of renewable energy local producers, promotion of 'km0' energy
UK 1	Website and blog	Energy community	2012	Local	Photovoltaic	Energy Efficiency
UK 2	Website	Private non-for-profit organisation	2016	Local	Solar	Energy Efficiency
UK 3	Website	Private non-for-profit organisation	2003	Regional	Wind, Biomass, Hydro-Electric	Energy Efficiency (roof and cavity wall insulation); Preserve Heritage
UK 4 (Scotland)	Website and activity reports	Private non-for-profit organisation	2011	Local	Hydro; Photovoltaic	Preserve Heritage
UK 5 (Wales)	Website	Social Enterprise	2010	Local	Wind, Solar, Hydro	Energy Audit, Energy Efficiency
UK 6 (Northern Ireland)	Website	Cooperative	2014	Local/Regional	Wind	Energy Efficiency; Energy Literacy
UK 7	Website	Cooperative	2012	Local	Photovoltaic; Biomass	N/A

of expertise, life experiences, and worldviews through which they co-construct their knowledge. Grassroots innovations studies, for instance, present rich examples of how social movements can provide sites for knowledge creation [54]. Grassroots innovation develop solutions to respond to local needs and are sites for knowledge creation as they "experiment with social innovations as well as using greener technologies"([55], p.585). Examples of grassroots innovations include local currencies [56], food production [57], and low-carbon communities [49]. This study will bring additional insights into the kinds of new knowledge and socio-cultural practices emerging through prosumerism.

Lastly, opponents are a recurrent theme in Social Movements Theory. Della Porta and Diani's [47] stress the "oppositional relationship between actors who seek control of the same stake" (p. 20), or the existence of opponents as a core characteristic of mainstream Social Movements Theory. Yet, research has provided little insights into this aspect of social movements in the context of prosumerism. Grassroots innovation studies stress the innovation aspect of some types of communities [56], yet a more politically centred analysis is still lacking, and it is not clear how different actors in different sociocultural and political contexts are committed to social transformation [58], nor who their opponents are.

How collective identities, participation in networks and knowledge-making comes together in a collective action is still not clear in prosumerism and social movement research. This paper will thus analyse in further depth the different elements of social movements in the context of prosumerism.

3. Materials and methods

3.1. Sampling strategy and data collection

This study relies on qualitative data from an in-depth analysis of websites, blog posts, and relevant documents (e.g. manifestos; descriptions of activities developed, interviews and stories of the initiatives) (excluding any audio-visual materials) published online between October 2013 and October 2019 by 46 renewable energy prosumer initiatives (after 46 initiatives, we found the data collected allowed a robust analysis). With a few exceptions, all initiatives had participated in a survey study in which both authors were involved [59]. Additional initiatives were identified using databases of cooperatives and communities, including: RESCOOP.EU [23]; the Transitions Town Network (a network of local communities) [60]; the Global Ecovillages Network [61]; and the COOperatives Europe web Portal [62]. Other sources were used, including open access databases of European research projects, such as the ENERGISE project database [63].

To ensure a high diversity of prosumer initiatives, the following criteria guided their selection:

a) Geographical representation – i.e. countries with different energy models; energy dependency rates; and different degree of development of prosumer initiatives and regulatory frameworks [64], namely Belgium, France, Germany, Italy, Portugal, Spain, the Netherlands and the United Kingdom. These countries were chosen because they were likely to provide different, yet comparable, examples [64,65]. Six initiatives were selected per country, except for the UK in which seven initiatives were sampled (including examples from England, Scotland, Wales, and Northern Ireland) and Portugal where only three initiatives were found.
b) Variety of organisational forms, drawing on Horstink and colleagues' characterization [59], and adding "energy community" as an additional typology, since the organisation form of some initiatives fitted well with the definition of renewable energy community, as included in the recent European Renewables Energy Directive (i.e. REDII) ([64], p. 138). Thus, the typology of organisational forms is the following: Cooperative; Energy Community; Private non-for-profit organisation; Social Enterprise; Partnership between organisations; Public Institution; and Company. The two companies included are aggregators, meaning they aggregate the surplus production of other smaller collectives or individual prosumers and sell it in energy markets. Although most initiatives (42) are led by civil society organisations, the two public institutions and the two companies in our sample are led by respectively the state and market sectors.
c) Year of foundation, to include historical (1910–1990s) as well as more recent initiatives (2000–2018).
d) Territorial scope covering both rural and urban cases, as well as communities acting at the local (i.e. municipality, district), regional and national levels.
e) Renewable energy sources (RES) used (i.e. solar, wind, biomass, water, or biogas) for energy production, self-consumption and/or commercialization, and energy services offered (i.e. electricity, heating/cooling, or mobility).

Data collection was done by the two authors, resulting in a final text dataset with roughly 200 pages of qualitative data, found to be the most relevant among the total raw data analysed. Appendix Table A1 shows the country, data sources used and a characterization of the batch of initiatives studied.

3.2. Data analysis

We conducted a close examination of the textual data through thematic analysis, which is a flexible method to analysing qualitative data for systematically identifying and offering insight into patterns (themes) within a data set [66]. We executed an inductive approach to data coding and analysis, in which the codes and themes identified are strongly linked to the data themselves (i.e. driven by what is in the data), rather than shaped by pre-defined coding frames [66,67]. Such data analysis was based on the six-phases of thematic analysis described by Braun & Clarke [66,68], adding a step in which we created 'categories' as an intermediate level of conceptualization between our initial codes and the themes. Throughout the process of coding (represented in the flowchart, Fig. 1), we followed an interactive process by sharing

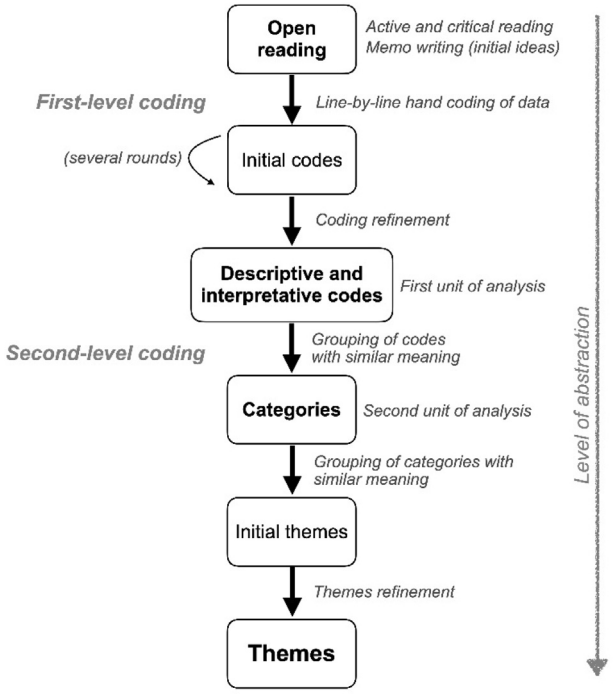

Fig. 1. Flowchart representing the coding process.

Table A2
Examples of codes, categories and themes that emerged from the data.

Data extract	Codes	Categories	Themes
"To integrate a gender and feminist perspective (…) The plan will be based on the following principles: (1) consistency with the values of the [name of the initiative] project; (2) encourages the participation of all people; (3) promoting a change of values to overcome gender stereotypes; (4) boosting women empowerment; (5) mainstreaming gender perspective; (6) promoting an environment free of sexist violence; (7) incorporation of an eco-feminism look"	Mainstreaming Gender perspective. Eco-feminism perspective. Open to all. Break gender stereotypes. Women empowerment. Environments free of sexist violence.	Eco-feminism view of the energy system. Women empowerment.	Ecofeminist perspective and gender justice
"Several motivations drive us: adopt a responsible attitude to global warming, develop autonomy and energy independence of the territory, create local value via the energy produced and the activity generated, contribute to the challenges of our municipalities on the sustainable development"	Responsibility towards climate change. (Territorial) autonomy/energy independence. Local value creation. Contribution to sustainable development.	Respond to climate change. Energy independency. Energy as a creator of economic and social value for local communities. Role of communities in sustainability.	Citizens involved in the energy transition hold a central role in responding to climate change. Regaining energy control. Communities as a key element for sustainability.
"In practice, the most cost-effective way of reducing our reliance on energy is to reduce our demand. We can do that by changing our habits, and by taking up technologies, such as low energy lighting, smart meters, or electric cars"	Reduced energy consumption, thanks to the application of the principles of sobriety and efficiency. Optimization of renewable energy and energy savings applications.	From surplus and inefficiency to (renewable) energy sobriety.	Energy sobriety, low consumption, and reduction practices, and changing habits.
"is firmly committed to raising awareness to support the exit of nuclear energy and information on the risks associated with the operation of nuclear power plants, and will support education and information programs to enable the earliest possible the exit of nuclear energy (…) the cost of fossil and fissile energy is clearly undervalued"	Cost of nuclear waste management and dangers of nuclear energy call for the need to decommission nuclear power plants. Moving away from nuclear and fossil industries.	Detract from nuclear energy technologies. Leave fossil fuels. Refuse nuclear.	Change of energy sources, abandoning fossil fuels as well as nuclear energy.
"Speculation reigns supreme, with its share of tyrannies and injustices. Ethical values, simplicity, sustainability are flouted and fragile concepts; the worrying questions of climate change, ecological immigration through resource depletion, financial crises, globalization of markets, bad governance and bank failures constitute the perverse amalgam that makes action complicated"	Banning all kinds of speculative practices Reclaiming the exploration of local energy resources by citizens. Communities have a right to benefit directly from their natural resources. Fair price of energy. Social and solidarity economy, Distributed benefits across society	Opposing the energy oligopoly. Energy ethics Opposing a power configuration, led by large utilities which do not always protect the interests of local populations. Cooperation and solidarity. A more inclusive energy system. Use of ethical banking	Opposing to (centralized) policy that benefits large utility companies and valuing decentralized energy policies protecting the interests of local populations. Taking control: Exploration of local resources in the hands of local communities. Ethical, transparent, socially responsible, and non-for-profit economy;

and discussing interpretations and exploring any different understanding concerning the data.

This method led us to gain insight into the shared identities, values, motivations, goals, and visions of the 46 prosumer initiatives, with the acknowledgement that this construction is framed in place, time, culture, and context. After completing the final coding and generation of themes, we revisited Social Movement Theory and isolated the themes, categories and codes describing the values, motivations, goals and visions of these collectives in relation to the key characteristics of Jamison's [18] definition of social movements – i.e. collective identities, opponents, participation in networks, knowledge-making and collective learning activities, and collective action. This approach allowed a portrayal of the initiatives using their own words and their own self-descriptions to determine if prosumerism can be referred to as a social movement. Appendix Table A2 shows some examples of the initial text data, codes, categories, and themes created during data analysis.

4. Results

In what follows, we describe the results and relevant codes are cited in each section (using quotation marks). Additionally, Figs. 2–5 provide examples of relevant codes, categories and themes related to each topic.

4.1. Collective identities

All initiatives produce, self-consume or supply energy from renewable sources (i.e. solar photovoltaic, solar thermal, wind, biogas, and biomass), therefore this is a basic aspect of their identities. In Belgium, wind energy is the most prevalent. In Italy, hydro gains a larger importance, and has been at the origin of old and historical cooperatives (i.e. founded in the early twentieth century). Other countries' initiatives draw on a mix of renewables, where hydro plays a minor role and solar, wind and biomass are the most frequent.

In the collective identities of the initiatives, different aspects – i.e. environmental, technological, social, and political - are highlighted in different ways.

From an environmental perspective these initiatives describe themselves as "responsible energy saving projects", aiming for a more efficient, "sober" use and access to energy. Nevertheless, except for companies and public institutions, the environmental dimension of energy generation is less heightened in the initiatives' identities than the human centric, political, and social justice aspects.

In the case of cooperatives, social enterprises, energy communities, and private non-for-profit organisations, identities are deep-rooted in human-centric values and goals. These types rely for the most part in volunteer work, and codes such as "resilient", "enthusiasts" and "committed" frequently appear. The cooperative model is the most dominant among our sample, and the adoption of an ethical code and

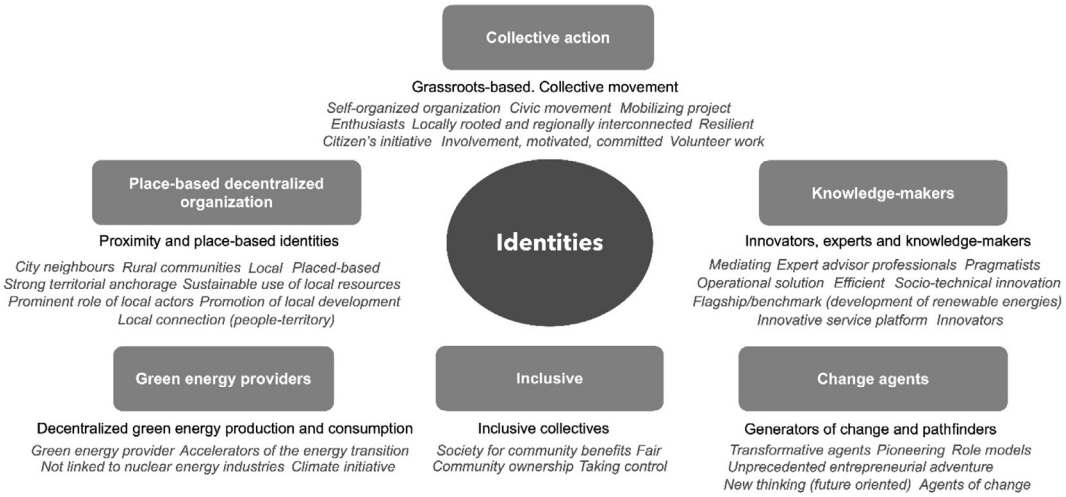

Fig. 2. Identities: examples of related themes (grey rectangles), categories (in black) and codes (in grey) resulting from the analysis of identities. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

principles (e.g. "participation in decision-making", "one member, one vote", "solidarity", "co-ownership" and "transparency") is part of all cooperatives' identities.

Cooperatives present themselves as "political energy providers", delivering green energy to their members and refusing ties to both fossil fuels and nuclear energy industries. "Decentralized politics", "re-municipalization" and "energy sovereignty" are important for prosumer projects struggling with local, regional, or national authorities, which have disincentivized the production and self-consumption from renewable energy sources in the last decades. Some cooperatives and private non-for-profit organisations from Spain, Portugal, Belgium, and the Netherlands identify themselves with these struggles as part of their political fight for decentralization.

Some identities are deeply rooted in social justice, this is specially the case of cooperatives, renewable energy communities and private non-for-profit organisations, where social inclusion and social justice are key values. It is also prevalent among the identities of the initiatives from Belgium, Italy, Portugal, Spain, and the UK. In these countries, initiatives portray themselves as "inclusive collectives", creating new jobs, as well as fighting energy poverty. For instance, a local cooperative in Italy founded in 1913 has a "strong social value", achieved through "free supplies of electricity and economic subsidies for charities and associations". One cooperative in Portugal only produces solar energy in the rooftops of charities, providing a direct benefit and local "social value". Two initiatives in the UK, two in Portugal, two in Spain and one in Belgium, are "non-profit projects" fighting energy poverty. Two English initiatives work to ensure local communities have lower energy bills, by raising money for collective renewable energy installations, with the goal of reducing fuel poverty and increasing the energy efficiency of buildings. Any profits made are used to provide funding for new community owned energy generation projects. Another example comes from a Portuguese energy community, which is experimenting with new solar technology solutions that may be used in poor settlements, such as refugee settlements. In Belgium, one cooperative has a savings program to ensure that those who cannot pay their energy bills will still benefit from their energy services.

Spanish initiatives are the most adamant in defending energy as a common good. Larger and older cooperatives in Spain, Germany and Belgium contend energy is a good that should serve society rather than being the basis for any form of exploitation. They emerge as "change agents" that recognize energy distribution needs to be "fair, both socially and environmentally". This is well reflected in the names of some of the initiatives, of which the Spanish Som Energia ("We are energy") is a good example, and their mottos, such as "Power to the people" (used by another Spanish cooperative).

Another particularity of Spanish initiatives is their focus on gender equality. Two cooperatives highlight this as core to their "egalitarian organisation", encouraging women to participate through the

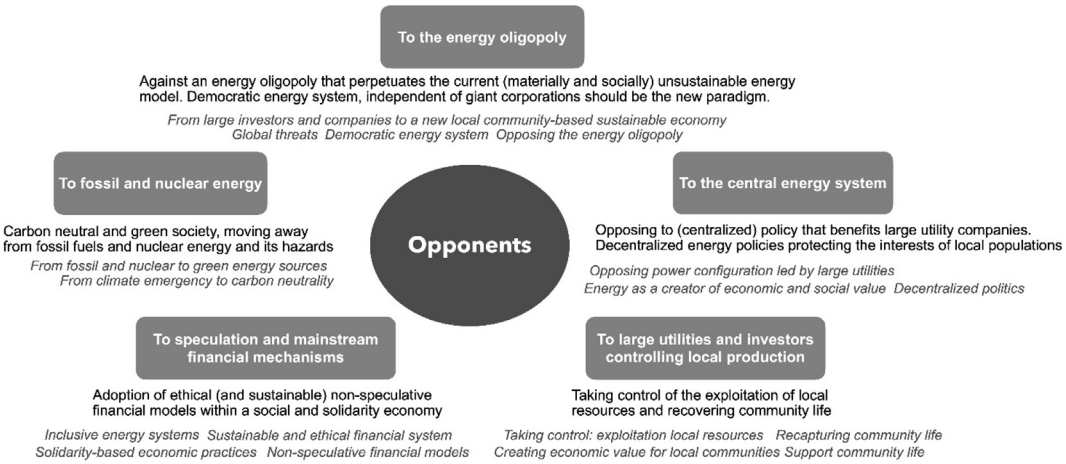

Fig. 3. Opponents: examples of related themes (grey rectangles), categories (in black) and codes (in grey) resulting from the analysis of identities, values, goals, and visions. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

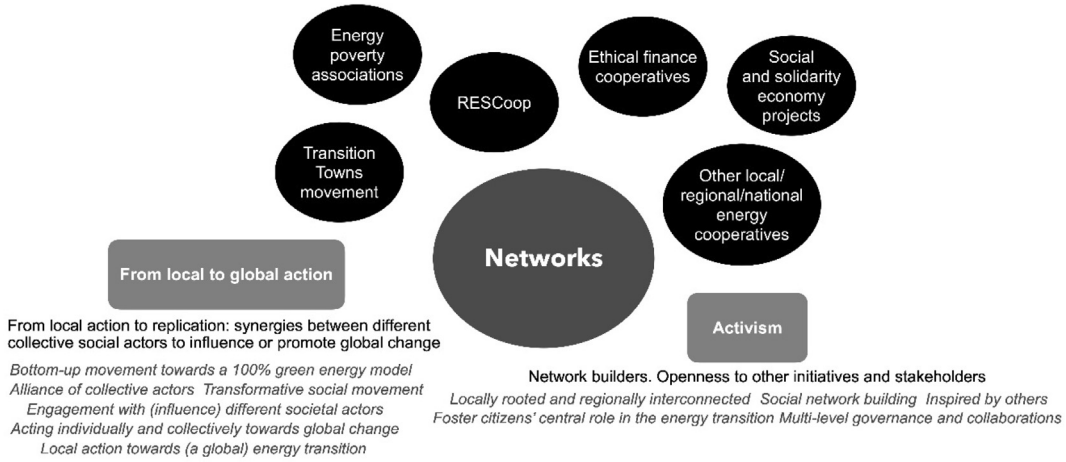

Fig. 4. Networks: examples of related themes (grey rectangles), categories (in black) and codes (in grey) resulting from the analysis of identities, values, goals, and visions. Black circles represent examples of organisations that are involved in the initiatives' networks. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

"incorporation of an eco-feminism look", "boosting women empowerment", and gender justice. Such perspective is mostly absent in others, except for an energy community and a private non-for-profit organisation in the UK, where gender balance appears in the context of tackling energy poverty. One of such UK initiatives is also led by women, although most initiatives studied are managed by men.

Territorial scope and action are key factors in characterising identities. Place-based projects include city neighbourhoods, regional or national networks, such as large cooperatives in Germany, Italy, Spain, or Belgium, as well as rural, local, and regional communities, in Germany, France, Portugal, Italy and England. Across both rural and urban contexts, cooperatives and energy communities explicitly present themselves as social innovations, "specialists in the energy transition", who are "creating social value", and providing "social benefits". Rural initiatives and small-scale neighbourhood initiatives tend to have a "strong territorial anchorage". These initiatives value proximity, "local production and use of energy", aiming to preserve "environmental and cultural heritage" and work towards local economic growth and development. In urban areas, identities tend to be more technology centric. Here, initiatives aim to contribute to "technologically advanced smart solar cities and communities" and self-identify with the idea of being key players in the energy transition, since cities are expected to have "a major role in the fight against climate change". They refer to themselves as "pragmatists", offering "operational solutions". Some urban initiatives portray themselves as "passionate about technology" and "technology experts and innovators", who have a leading role as "pioneers", "innovators" or "frontrunners", and are "role models" for others. Other descriptions of the identities of urban initiatives include terms related to the future – e.g. "climate municipality of the future" or "a climate community of the future" (see also Fig. 2).

4.2. Opponents

All types of initiatives clearly oppose the current energy regime, based on a centralized model. This model is characterized by being powered by fossil-fuel and nuclear energy sources, produced in power

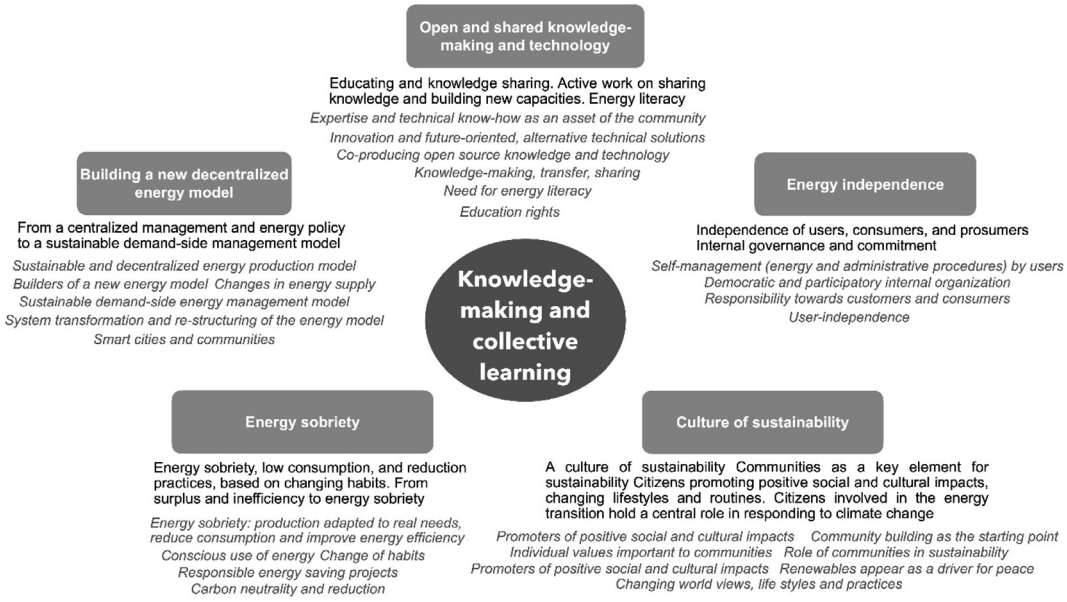

Fig. 5. Knowledge-making and collective learning: examples of related themes (grey rectangles), categories (in black) and codes (in grey) resulting from the analysis of identities, values, goals, and visions. Black circles represent examples of organisations that are involved in the initiatives' networks. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

stations, and distributed across high-voltage networks, until it reaches medium and low voltage stations, where it is locally distributed to consumers. In the case of public institutions and companies, the reference to political opponents is less explicit. All other initiatives oppose that energy is owned and managed by governments and large corporations with no involvement of citizens in the exploitation and management of the energy system. Although all initiatives defend a "move away from fossil industries", some also stress the need to move away from nuclear energy, calling attention to the problem of nuclear waste and its dangers. In this respect, initiatives differ between countries, which is likely related to the different national energy trajectories. In Belgium, France, the UK, and Spain, where a significant number of active nuclear power plants exist, there is a clear opposition to nuclear energy. The age of the initiative also plays a factor. For instance, in Germany, one initiative which started in 1999 is still "committed to the goal of a consistent energy transition without coal and nuclear power", even though Germany has been phasing out its nuclear production. Older and better-established energy cooperatives in Spain, France, Belgium, and Germany, tend to have a stronger discourse against the use of nuclear as much as fossil energy.

Belgium, Dutch, French, Italian, Portuguese and Spanish initiatives oppose the exploitation of local energy resources, such as solar, wind, biomass or water resources, by large investors and are against the dominance of "energy oligarchies" and "the power that oligopoly companies have". The opposition to large investors is particularly relevant in the case of wind energy in Belgium, French and Dutch initiatives. Large investors are equally opponents for cooperatives and energy communities, who purpose that "local people, not large impersonal companies", should be leading the transition and benefiting from the wealth generated using local renewable energy sources. These initiatives stand against "the energy transition being left solely at the hands of governments" and the "dictates of energy giants", which, according to them, are not able to resolve the problem of energy poverty nor respond to the needs of local communities.

There is an overall perspective that by acting locally and addressing local problems and needs (e.g. dependency on external energy sources, fossil fuel dependency, energy poverty, etc.), the initiatives also oppose mainstream economic practices. But for cooperatives, social enterprises, and energy communities this is key, and it is important to avoid traditional financial systems as much as possible, "banning all kinds of speculative practices". The cry out against speculation is particularly strong in Spain, France, and Belgium, where initiatives are "acting against anonymous shareholder capitalism". This is also translated in the economic and financial models adopted by cooperatives in all countries, drawing on "crowdfunding" and "community shares", placing citizen's needs and well-being at the centre, and opting for an "ethical finance" model, where "it's not the profit that counts", "ensuring a fair and transparent pricing policy".

Across all types of initiatives, the opponents found – i.e. nuclear and fossil fuel energy providers, big utility companies and the traditional banking system –, are important in enabling different types of action, promoting financial inclusion and co-ownership of local production (e.g. "be your boss in your own city"). For all initiatives, involving new participants relies heavily in presenting themselves as a sustainable alternative for a decarbonised energy system, but also as an alternative to the exploitation of dominant regime actors (see also Fig. 3).

4.3. Networks

The initiatives acknowledge interdependencies established across community-based projects leading to a worldwide exchange and networking between "energy autonomous regions". There are some differences between different types of organisational forms and the age of initiatives. Networks are predominant in the case of cooperatives, since networking is intrinsic to the cooperatives' principle of "solidarity between cooperatives", and the need for establishing collaborations that "create synergies, new ideas, and gain greater knowledge of the role that cooperatives can play in the energy transition". Cooperatives and partnerships between organisations emerge as "builders of social networks"; who are "inspired by others", by mediating and building a "network of actors in the energy transition", and "developing solutions that can be replicated across the globe". Interestingly, one of the cooperatives (in Spain) presents itself as being part of a "transformative social movement".

Cooperatives, public institutions and private–public partnerships support "multi-level governance and collaborations", and are open to "other initiatives and stakeholders" through an active citizen engagement – e.g. "we are building a social network in which we work for the same goal, (…) using innovative methods to promote citizen participation". Yet, these organisational types are themselves networks who collectively invest and manage energy projects.

Cooperatives, partnership between organisations, social enterprises, and public institutions relate to other neighbouring communities and initiatives at local, regional, national, and supranational levels. One Italian initiative highlights the importance that international networks have in the energy sector "to ensure that no-one loses sight of the bigger picture". The idea that these initiatives are "locally rooted and regionally interconnected" is also prevalent.

Energy communities, and younger initiatives refer less to networks outside their local scope of action, but there are exceptions. A well-established energy community in Germany, for instance, puts considerable effort in promoting international collaboration, organising energy literacy and environmental education events and receiving visitors from across the world. Therefore, aside from the type of organisational form, the age of the initiatives seems to play a role in their propensity to integrate national and international networks.

Community networks, such as the *Transitions Towns* [69] (two initiatives studied in Belgium and two in the UK are part of this community movement), and cooperative networks such as *Rescoop.EU* (11 cooperatives in the sample are part of this network) are influencing their member initiatives, who integrate these networks' values and goals such as participation, solidarity and transparency.

As an "alliance of collective actors", cooperatives and energy communities have described themselves as a "bottom-up movement towards 100% green energy model" (see also Fig. 4).

4.4. Knowledge-making and learning

All types of initiatives aim to raise awareness of the energy transition and knowledge sharing is an important goal. Knowledge exchange is at the core of prosumer activities, it is about learning from others as much as providing knowledge to others. This aspect is particularly relevant in cooperatives, older energy communities and private non-for-profit organisations, and partnerships between organisations. Collaborations happen even at a supranational level, as initiatives work to help each other by openly distributing technology. They write about "prototyping and experimenting with new solutions". They aim to increase energy optimization and energy efficiency, to implement local "climate protection projects" and achieve a "carbon neutral energy model" that can be "replicable across the world and help reverse climate change". Transparency is valued as more than openly sharing information, it is also a way to show the world how the initiative works, what practices have been adopted, and how they contribute to a more democratic and autonomous energy system.

There are differences between urban and rural initiatives, when it comes to the type of knowledge shared. The idea of "smart cities and smart consumers" is recurrent in local urban initiatives, and more so in Germany and the Netherlands. Urban cooperatives, private non-for-profit organisations, companies, and public institutions strive to contribute to solutions for sustainable cities. Through changes in the energy supply, these prosumers aim for a "systems' transformation" and a "re-structuring of the energy model", experimenting with tools for self-

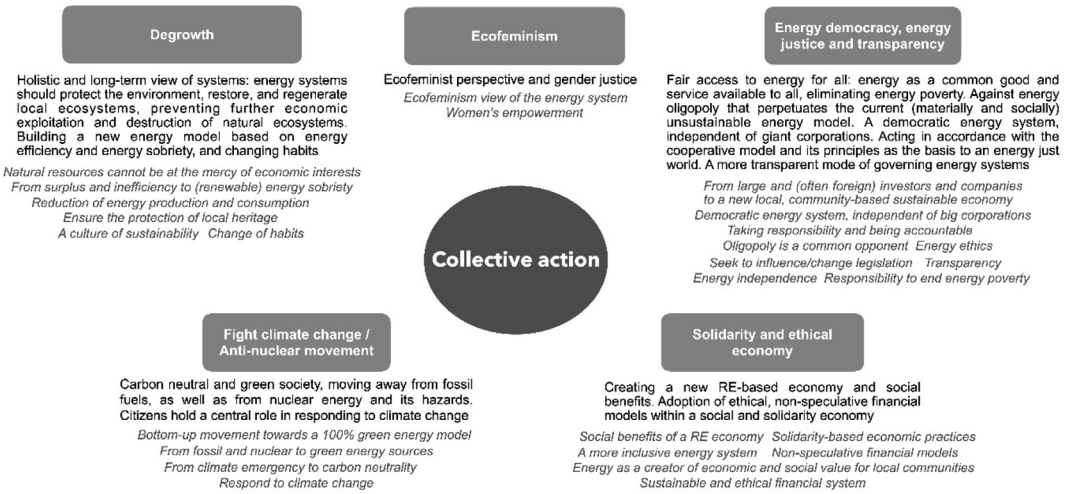

Fig. 6. Collective action: examples of related themes (grey rectangles), categories (in black) and codes (in grey) resulting from the analysis of identities, values, goals, and visions. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

management by users and "user independence". Expertise and technical know-how are considered an asset.

Although energy literacy is a crosscutting theme for all initiatives, in rural and older initiatives, literacy, awareness raising, and education gain a greater relevance. Cooperatives, energy communities and private non-for-profit organisations in rural areas value "energy literacy" and "education rights" as central to the transition. They are actively working on building new capacities, "removing barriers to renewable energy production by pooling skills and resources". Children are a key target audience and these initiatives develop activities in schools to "teach children that an energetic and sustainable future is possible".

Learning is also related to environmental responsibility, "putting sustainability before profit", "protecting ecosystems biodiversity", "working with nature", "protecting quality of life" by restoring green areas, "leaving space for nature" and ensuring inter-generational sustainability.

Regarding sustainable consumption, the concepts of energy "sobriety" and "reduction of energy needs" are widespread across the initiatives, but more so in local initiatives (both urban and rural), where initiatives aim to "educate children and their parents" through "reduced consumption". Initiatives refer to making a reasonable and "conscious use of energy" by changing habits and routines with the goal of achieving "carbon neutrality". One initiative from France captures this idea with the motto: "the best energy is the energy we do not consume". Energy communities also value renewables as "safer", in contrast to fossil fuels which have been at the centre of wars and conflicts. Thus, learning takes place in different ways, from new consumption practices and routines, to gaining new knowledge about the energy transition (see also Fig. 5).

4.5. Collective action

Together, the initiatives' identities, converge towards a collective action that involves a variety of actors with the aim of changing the centralized energy regime towards a decentralized democratic one. These communities are acting towards energy independence from fossil fuels, but also from powerful utility companies, seeking "energy autonomy" by using locally available energy sources, empowering people through "participatory", "transparent" and "collaborative decision-making" processes, across different levels of governance, and striving to address the "needs of present and future generations". Climate action is crucial for all initiatives, from cooperatives to companies, yet it is stronger in British, Dutch, Spanish and French initiatives that call out for "social and climate justice" and to "fight against climate disruption".

All collectives place trust on the ability of people to work together, becoming part of the solution to a problem created by overconsumption and "selfish individualism". Cooperatives, energy communities, private non-for-profit organisations and social enterprises support economic development in a socially inclusive way, which we coded as a solidarity and ethical economy framing. These initiatives strive to provide social and economic benefits to local communities, such as reductions in the energy bill, new jobs, including "jobs for people with disabilities"; enabling the distribution of energy costs; "preventing energy poverty"; helping more vulnerable communities, "including those living in refugees settlements"; and, in the case of rural initiatives, helping "reduce the threat of land abandonment". Community living is understood as a key steppingstone, based on collaboration, "solidarity and social cohesion".

The idea of collective action "to sum up forces to promote a change" is mentioned by most initiatives, referring to the collaboration with others, such as other cooperatives at local and national levels, reinforcing the previously mentioned networking aspect. Collective action is related also to a novel way of understanding investments, for instance, "(through collective action) we overcome the difficulties of putting modules in our homes, we help to promote renewable projects, and self-produce our green electricity".

Overall, the energy transition is perceived as a transition to a more just, better informed, and more resilient society. Collective action is an expression of the sense of solidarity that exists between initiatives. Different interpretative frames of social movements such as energy democracy and energy justice, can be identified in relation to these initiatives' collective action (see also Fig. 6).

5. Discussion: Can prosumerism be referred to as a social movement?

Renewable energy prosumerism, and specifically in the legal forms of cooperatives, energy communities, social enterprises, partnerships between organisations, and private non-for-profit organisations, can be characterized as a social movement towards a decentralized democratic energy model with clearly identifiable opponents (i.e. fossil and nuclear energy industries, big utility companies and the traditional banking system). Similarly to other social movements, these prosumers have collective identities and are often involved in networks (acting locally, yet aiming for a global outreach), and seek to achieve goals that benefit a collective, motivated by altruistic aspirations [45]. Even the two companies in our sample have a discourse supporting decentralized energy production as a more social, economic, and environmentally

sustainable option.

Prosumer initiatives equally adopt interpretative frames such as energy justice [41], energy democracy [32], climate change action movements [18]; anti-nuclear movements [70,71]; solidarity economy [72] and to a much lesser degree feminist movements [73].

In line with Jamison's [18] definition of social movements, prosumerism creates a space for knowledge making and socio-cultural learning. Knowledge-sharing practices are related to the initiatives' call for inclusiveness and solidarity. Moreover, new set of practices [74] that have been coded as "energy sobriety", aiming to reduce energy consumption are encouraged. New practices include also adopting new economic and financial models, for example, a solidarity economy [75] grounded in values such as cooperation, pluralism, collective well-being and sustainable relationships with ecosystems. These values and new social practices are shared by the initiatives studied (except the two companies and the public institutions in our sample). Specifically, co-operatives – the most common legal form adopted by these collectives [59] –, have been referred as proponents of the principles of a solidarity-based economy [72].

Recent scholarship calls for the need to recognize energy injustice within energy supply chains, including distributional impacts that span across other systems (e.g. food production and transport) [25,41]. Similarly, for initiatives across all countries, and especially in rural cases, it is imperative to protect local natural resources – not only energy, but also food and water. This holistic perspective is part of their framing of what a fair and just energy system should be. Prosumer collectives frame the energy transition as a broader process than a purely technological change, requiring a transparent, inclusive, distributional, and participatory approach that is seeding through their heterogenous activities. Such heterogeneity has also been found in the activities of other low-carbon community movements, such as the Transition Towns movement [69], of which four initiatives in our sample are part. Older initiatives (e.g. in the Netherlands, Germany, Italy, Portugal and one in England), highlight the value that local production of renewables has across other systems, especially as profits from energy projects are invested in creating new jobs, supporting local food production and in the protection of local cultural and historical heritage. Haf and Parkhill's study of the cultural value of renewable energy developments in Scottish and Welsh speaking communities [76], echoes these findings, particularly related to the importance of protecting local cultural heritage, and what we have coded as a "culture of sustainability". Thus, the intersection between community-led projects and its impacts across other systems has implications for a wider integration of energy justice and sustainability transitions [24,77,78].

For active energy citizens, changing energy resources implies also changing dominant power relationships [79] and ensuring that both the positive and negative impacts of the transition are distributed across all actors in the supply chain. Power is equally a crucial aspect for Social Movement Theory, as movements have been found to collectively construct and communicate power [80]. For these collectives, the power to benefit from, and manage local energy resources, should be in the hands of local communities [23]. The strong territorial identity of the initiatives studied and the importance of the sites of production and/or consumption, is therefore a crucial aspect characterizing the relevance of prosumerism as social activism around energy justice [41]. Thus, prosumers gain political power through greater control over resources and a more equitable allocation of energy [13]. This is expressly relevant in Portuguese, Spanish, Italian, French and Belgium initiatives, which link energy justice with the co-ownership of energy generation by local communities. All initiatives have a pragmatic approach, getting actively involved and aiming for a radical change that is fundamentally based on involving local communities, much like the analysis of the Transition Towns movement [69], and all are to some degree contributing to a transformative change of the energy system.

A humanized transition [26] requires also an inclusive decision-making process, as is practiced by cooperatives, social enterprises, non-for-profit organisations, and energy communities who defend a participatory, "one member-one vote", democratic decision-making structure, characteristic of the procedural aspects of energy justice [81]. Thus, by opposing the dominant centralized energy regime, these initiatives challenge dominant practices, structures, and power relations in various ways. They adopt new decision-making practices; they oppose and challenge the centralized fossil and/or nuclear-based energy system, by building a "new decentralized energy model", and they rebel against established power relations based on the dominance of "energy oligopolies", by promoting co-ownership and adopting new financing mechanisms such as crowdfunding. In this context, prosumers are more than an "emerging political agent in a changing environment" ([13], p. 32), they are acting as a social movement that is enacting a more democratic energy system. This social movement implies the participation of responsible and aware prosumers, supporting inclusive and transparent decision-making processes, and aiming for the common good. Such characteristics are core to energy democracy [22] and the proliferation of prosumer collectives who promote knowledge-sharing practices, is crucial to achieve such "ideal political goal" [13].

Energy poverty, which is a relevant concern for energy justice [82], is an emergent theme for these collectives. It refers to the lack of accessibility and affordability of energy to citizens and households, due to high energy prices, low household incomes, energy inefficiency, and particular energy needs of households [83–85]. To some degree all initiatives support the need for accessible energy prices, although a specific mention to services that tackle energy poverty has been found only in Belgium, British, Spanish, and Portuguese initiatives. Although there is still insufficient literature on the impact of prosumerism in reducing energy poverty [86], eliminating energy poverty and reducing socioeconomic disparities in access to energy [87] is an important goal of the prosumer movement. Spanish cooperatives strongly oppose the traditional finance system, arguing that energy poverty is evidence of the commodification of energy. Their views on the structural causes for energy poverty are also interrelated to overcoming patriarchal societies. While feminism, and specifically ecofeminism, emerges in the codes and themes of initiatives from Spain, gender equality was not a shared value across the initiatives and in many countries gender issues were not even mentioned. In the British cases, the interrelation between gender and energy poverty is more discrete and relies on the stories of some (women) community members who benefited from the initiatives. Correlations between energy poverty and gender have equally been found in studies contending that women have often been underrepresented in diverse energy-related areas [88]. Recent research has likewise shown that women, and particularly older women, are at a higher risk of energy poverty than men [89]. Such links between energy poverty and gender reinforce the need to integrate gender equality as a sub-set of energy justice, or what has been coded in this study as "gender justice". Other aspects of energy justice are equally present, including the importance of information (e.g. energy literacy) and intergenerational equity [81]. Thus, despite not being a classical political protest and mobilization social movement, prosumerism is a movement towards a new decentralized and democratic renewable energy system.

This movement interacts strongly with climate change and environmental action movements [90]. Drawing on cases from Denmark and Germany, another study concluded that although ecological citizenship guided community projects, their focus was mainly on providing local benefits rather than political and global discourses against climate change[14]. Our findings however contradict these conclusions, since many initiatives, and more so in the case of energy cooperatives, are active political actors and indeed concerned with polar bears. Aside from calling for the phasing out of fossil fuels (all initiatives do so), prosumerims calls for the end of nuclear energy in those countries where it is still present. While fossil fuels are slowly disrupting the ecological balance of planetary systems, nuclear has a rapid and mass destruction potential. Both exacerbate the conviction that rather than having large foreign company "oligarchies" service local communities,

renewables open the door to a new energy paradigm, where energy is safer and fairer.

However, further attention to the impacts of prosumerism is needed. As other studies have shown, the ideals of democracy and inclusion may be compromised by the practical needs of finding consensus in decision-making and developing projects in everyday life, leading inevitably to a lower participation of some community elements. Despite the best of intensions, an internal democratic governance model can be challenging and even undermined as communities are advancing and managing collective energy projects [32,91]. Lastly, as argued by Lennon [92], the current energy transition should result in a reconfiguration of what energy is, from a commodity excluding some people and reifying prevalent hierarchies (i.e. racism), to an essential and vital good. Lennon's work provides crucial insights into a different way of approaching the intersection between social movements and the energy transition.

6. Conclusion

Prosumers acting collectively can influence the trajectories of the energy transition and act as change agents towards a more decentralized, democratic, inclusive, fair, and sustainable energy model. Taken together, these findings illustrate that active energy citizens are co-creating a new socially valuable energy model, aiming to radically change the energy market, striving for a more ethical economic and financial system, that brings forth a new production and consumption culture, centred on responding to people's needs, while ensuring economic and environmental sustainability. This holistic perspective calls for new production and consumption practices, structures, and power relations, which should be part of a sustainable and just energy transition conceptualisation.

This study has some limitations since it relies only on a limited source of texts published online by the initiatives. Further research is needed to understand how their aspiration for a more democratic and just energy system is reflected in real-life projects and in the changes produced by the communities involved. While textual analysis uncovers the intensions of these communities, other types of research methods are needed to discover how action matches word, and whether these projects are indeed contributing to a new socially valuable energy model.

Future research should also investigate the lobbying potential and political action of prosumer networks. Given the holistic and heterogenous nature of these initiatives' activities, identities, values and goals, it is relevant to expand on the conceptualisation of energy justice in relation to other socio-technical systems (i.e. food production, transport, water resources, etc.). Additionally, the potential of energy citizenship and the role of prosumers in helping reduce energy poverty is still under-researched. Energy justice studies should focus equally on what we called "gender justice" and its interactions with energy poverty.

Concerning other types of prosumers, such as aggregators, which have a for-profit and economic benefit goal, further research should investigate their normative values and visions for the energy system of the future. Finally, sustainability transitions research should strive towards better understand the role of social movements in transitions, their interdependencies with socio-technical innovations and the ways social movements exert pressure on socio-technical regimes and landscapes.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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