



Contributing to sustainable and just energy systems? The mainstreaming of renewable energy prosumerism within and across institutional logics

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ABSTRACT

Renewable energy (RE) prosumerism comes with promises and expectations of contributing to sustainable and just energy systems. In its current process of becoming mainstream, numerous challenges and doubts have arisen whether it will live up to these. Building on insights from sustainability transitions research and institutional theory, this article unpacks the mainstreaming by considering the range of institutional arrangements and logics through which these contributions might be secured. Taking a Multi-actor Perspective, it analyses the differences, combinations, and tensions between institutional logics, associated actor roles and power relations. Firstly, it unpacks how mainstreaming occurs through mechanisms of bureaucratisation and standardisation (state logic), marketisation and commodification (market logic), as well as socialisation and communalisation (community logic). Secondly, it highlights the concomitant hybridisation of institutional logics and actor roles. Such hybrid institutional arrangements try to reconcile not only the more known trade-offs and tensions between for-profit/non-profit logics (regarding the distribution of benefits for energy activities and resources), but also between formal/informal logics (gaining recognition) and public/private logics (delineating access). This institutional concreteness moves the scholarly discussion and policy debate beyond idealistic discussions of ethical principles and abstract discussions about power: Simplistic framings of 'prosumerism vs incumbents' are dropped in favour of a critical discussion of hybrid institutional arrangements and their capacity to safeguard particular transformative ideals and normative commitments.

1. Introduction

To meet the goals of the Paris Agreement including decarbonisation, all hands are needed on deck (Geels et al., 2017; Rockström et al., 2017). In its Energy Union strategy, the EU places high hopes on citizens as self-consumers and with the adoption of the Clean Energy Package by the European Parliament, it also paves the way for their collective organisation (European Commission, 2019a; 2019b, 2015). Citizens become prosumers, that is, active participants in energy markets, for example through producing energy and/or self-consuming (Bhatti, 1993; Brange et al., 2016; Butenko, 2016; Couture et al., 2014; Kotilainen and Saari, 2018). Such renewable energy prosumerism is not new. In the early days of electrification, local communities were responsible for setting up their own energy grids, often creating local cooperatives, some of which are still active today, such as for example in

Italy and Spain (Campos et al., 2019; Capellán-Pérez et al., 2018; Yildiz et al., 2015). Prosumerism is beset with high hopes: it should not only contribute to the efficient decarbonisation of our economies, but also advance energy justice and new forms of democracy in practice by opening up participation and ownership to the many (Becker et al., 2017; Campos et al., 2019; Horstink et al., 2020; van Veelen, 2018; van Veelen and van der Horst, 2018; Yildiz et al., 2015).

Today, prosumerism is no longer a marginal phenomenon. A recent study found more than 2500 energy cooperatives in Europe, although collective prosumer projects may take up other legal forms (Wierling et al., 2018). The development of prosumerism has different dynamics across Europe. In the Netherlands, about 580 energy cooperatives account for 2% (119 MWp) of total installed solar capacity and 5,6% percent (193 MW) of installed wind capacity (Schwenke, 2020). By contrast in Spain and Portugal there is currently only a small, if growing,

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number of renewable energy cooperatives (Capellán-Pérez et al., 2018). Modelling the maximum potential of energy generation with prosumer technologies, Doračić et al. (2020), conclude that a very large part of the electricity needs of households in 2050 can be generated by themselves (89%). Their study also makes clear that in all EU Member States, notwithstanding their geography and spatial planning, the electricity generated by prosumers can increase to over 50% of the demand in 2050 (Doračić et al., 2020).

Prosumerism is thus on the way to becoming mainstream. In this process, it faces numerous challenges, pertaining to for example: a) necessary technology and physical structure of energy grids and distribution infrastructures (Miceli et al., 2013); b) governance and the participation of multiple social actors in energy markets, such as municipalities, small medium companies, civil society organisations and local communities (Hall and Roelich, 2016); c) normative aspects such as energy justice, and energy democracy pertaining to differing capacities between individuals, communities, localities, regions and nations to engage in and benefit from prosumerism (Arentsen and Bellekom, 2014; Burke and Stephens, 2017; Sovacool et al., 2019; van Veelen, 2018); and d) economic aspects, such as the possible ‘death spiral’ effect for energy markets due to decreasing payments for energy supplied through the grid (Castaneda et al., 2017). With such challenges still ahead the mainstreaming of prosumerism is no set deal.

Rather than considering the process of mainstreaming as either leading to a radical transformation of the energy system or to system reproduction (cf. Geels and Schot, 2007), we acknowledge that the mainstreaming process involves a broader multiplicity of possible energy futures (Pel et al., 2019). Parag and Sovacool (2016), for example distinguish two possible pathways: one with millions of autonomous prosumers off grid, and one in which prosumers are connected and provide services to the grid and thereby supplement and may even compete with traditional utilities. Differentiating more or less radical transformative courses that prosumerism mainstreaming may take, literature on energy democracy and energy justice, makes us aware that the development of prosumerism revolves not only around the energy policy triad of clean, secure and economically efficient energy (Milchram et al., 2018). Rather, broader transformative potentials of prosumerism regarding inclusion, distributive justice, democratic voice, and mitigation of structural power inequalities are in focus (Ahlborg, 2017; Brisbois, 2019; Sovacool and Brisbois, 2019). Importantly, political actors and governance networks in the mainstreaming process may support these ambitions to different extents; these ideals cannot be safeguarded unilaterally (Jenkins et al., 2018).

The general challenge of ‘transformative’ prosumerism mainstreaming thus means to go beyond the energy triad but also beyond abstract ethical discussions. It calls for institutional concreteness, i.e. consideration of the range of institutional arrangements and logics through which such normative strivings could be secured (Bader and Engelen, 2003). Hence, our research questions are: *Which institutional logics and actors shape the mainstreaming of prosumerism and how? Which forms of institutional hybridity emerge, and what do these imply for sustainable and just energy systems?* These questions are rooted in a sustainability transitions perspective and come from an institutionally pluralist view that shows how the mainstreaming process is shaped along the different institutional logics of market, state and community, and that discusses the emergence of institutionally hybrid arrangements. This attentiveness to hybridity will be informed by dialectical views on ‘niche’ innovations (Pel, 2016; Smith, 2007; Smith and Raven, 2012), scholarship on the institutional hybridisation of energy systems (Bauwens et al., 2019; Huybrechts and Haugh, 2018; Šahović and da Silva, 2016), contemporary ‘third phase’ institutionalism (Lowndes and Roberts, 2013), and especially the institutional logics perspective (Thornton et al., 2012; Thornton and Ocasio, 2008) and its systematisation through the Multi-Actor Perspective (Avelino and Wittmayer, 2016, 2019). The latter heuristic helps to systematically analyse the differences, combinations, and tensions between institutional logics, associated actor roles

and power relations. The mainstreaming process of prosumerism is described as an open-ended and contested process of institutional hybridisation, with as yet unclear implications for sustainable and just energy systems.

The next section discusses the state of the art in sustainability transitions and innovation research, introducing prosumerism as a niche that is mainstreamed across different institutional logics (section 2). It also introduces the Multi-Actor Perspective. After analysing the mainstreaming of prosumerism along different institutional logics (section 3), we turn towards unpacking institutional hybridisation and its implications for sustainable and just energy systems (section 4). The summative conclusion also formulates key policy implications (section 5).

2. Energy prosumerism mainstreaming: ‘niche’ breakthrough and institutional hybridity

2.1. Prosumerism as ‘niche’ innovation

Sustainability transitions research understands radical, disruptive innovations like prosumerism as evolutionary ‘niches’ and has extensively studied the challenges surrounding their becoming mainstream (Grin et al., 2010; Loorbach et al., 2017; Markard et al., 2012), often focusing on sustainable energy (Markard et al., 2012; Verbong and Loorbach, 2012). Such emergent innovations need to be cultivated, nurtured and eventually mainstreamed to realize their transformative potentials. The prosumerism ‘niche’ harbours elements that break with the status quo or ‘regime’, such as the exploitation of renewable energy sources rather than fossil fuel. It is also based on the active participation of consumers as producers, which is at odds with the centralized mode of governance characteristic of modern-day energy systems (Summerton, 1994). The institutionalisation of the latter has relied on highly specialized expertise in centralized and fossil-fuel based energy infrastructures, strong and long-term alliances between state and industry, stable structures of taxation and regulation. In the meantime, citizen-consumers have become accustomed to highly reliable provision. Within this energy ‘regime’, alternative approaches like prosumerism tend to appear unrealistic.

As transitions research underlines, it is only in exceptional cases that radical niches survive, become mainstream or even transform a prevailing regime. Often, radical innovations become gradually diluted, adapted, absorbed and ‘captured’ by incumbent actors and institutions; and often contribute to system reproduction (Geels and Schot, 2007). Addressing this puzzle, transitions scholars, on the one hand, have proposed a range of mechanisms, often translated in strategies, through which niche innovations try to escape such a scenario. Mechanisms for the diffusion of niche innovations include ‘deepening, broadening or scaling-up’ (van den Bosch, 2010), ‘replicating, scaling-up or translating’ (Seyfang and Haxeltine, 2012; Smith, 2007), ‘shielding, nurturing or empowering’ (Smith and Raven, 2012), ‘scaling out, scaling up or scaling deep’ (Moore et al., 2015), and ‘replicating, partnering, upscaling, instrumentalising or embedding’ (Gorissen et al., 2018). Each in their own ways, these mechanisms indicate how alternative ‘niches’ can gain foothold in the prevailing structures of the energy system: Through social learning and improvement, through awareness raising and cultural normalisation, and through the enlargement and diversification of innovation networks and actor arenas. What these elaborations often touch upon only marginally, are the normative implications of the mainstreaming process, and the politics involved in this.

2.2. Politics of mainstreaming

While the analysis of niche mainstreaming mechanisms highlights the struggles and strategies of pioneers in prosumerism, the unpacking of ‘regimes’ clarifies the combinations of social and technological ‘regime’ elements that they encounter (Fuenfschilling and Truffer, 2014; Jørgensen, 2012; Smith et al., 2010). It is in this interplay, that ‘niche’

innovations like prosumerism are adapted, appropriated, instrumentalized and ‘translated’ by different actors with different interests in them (Smith, 2007). This includes actors, such as (a diversity of) prosumerism initiatives, regulators, distribution system operators, transmission system operators, or suppliers, brokers and aggregators of energy, each with different normative commitments, interests, and capacities. In translating prosumerism to a more mainstream context, these governance networks are bound to be reconfigured in terms of interactions, actor roles, and linkages between decision-making arenas (Koppenjan and Klijn, 2004). Such reconfigurations lead to changing power relations and have the potential to foster energy justice through new market entrants, such as aggregators and organised prosumer collectives developing peer-to-peer trading platforms (Morstyn et al., 2018; Ruotsalainen et al., 2017). The mainstreaming literally changes the game, as hitherto passive players assume active roles (Pel et al., 2016), and as established players are changing their strategies in response to new rules (Scharpf, 1997).

In this process, innovations thus undergo alternating moments of ‘capture’ (instrumental use by ‘incumbent’ actors) and radicalisation (Pel, 2016). Mainstreaming processes involve strategic accommodation within dominant societal structures, in which dominant rules are bent step by step (Smith and Raven, 2012). Implying engagements with diverse actors and with the different institutional logics that guide those, the mainstreaming of prosumerism can thus lead into a process of further institutional hybridisation (Bauwens et al., 2019; Brandsen and Karré, 2011; Huybrechts and Haugh, 2018; Šahović and da Silva, 2016). This dialectical view on actors’ competing translations highlights how mainstreaming and institutionalisation tend to be conflict-ridden processes, rather than straightforward trajectories or integral institutional designs (Lowndes and Roberts, 2013). It is thus in and through diverse actor networks and in the institutionally hybrid setting of a regulated market (cf. Heldeberg, 2017) that prosumerism is becoming mainstream.

These translation dynamics already indicate what is stressed in recent work on ‘just’ or ‘democratic’ transitions: Beyond the pre-occupations with the breakthrough and authenticity of prosumerism as a ‘sustainable niche’, it should be considered at greater depth why and in which respects it would be desirable (Bening et al., 2015; Schlaile et al., 2017). Regarding prosumerism it has for example been questioned whether it is not limited to those in a position to participate (Brummer, 2018; Łapniewska, 2019) and whether its mainstreaming is not mainly indicating its commercial significance (Brown et al., 2020). Even if unmistakably driven by environmentalist motives, energy prosumerism is not free from considerations of profitability (Horstink et al., 2020). Rather, community energy initiatives are often torn between state, market and community logics (Taylor Aiken, 2019). While some analysts warn against the capture of prosumerism by ‘incumbent’ actors, vested interests and prevailing consumerist ideologies (e.g. Brown et al., 2020), the overall insight is that institutionally neat and normatively pure solutions are not available (Milchram et al., 2018).

In other words, what is at stake is the extent to which the mainstreaming process leads to institutional arrangements that safeguard more sustainable and just energy systems (Forman, 2017; Hall et al., 2018; Jenkins et al., 2018) through challenging and transforming existing power relations (cf. Avelino et al., 2019b). By engaging citizens and communities in local energy projects, prosumerism challenges the conception of the passive, uninterested and unknowing consumer; by engaging in politically oriented entrepreneurship, it challenges the role, purpose and orientation of incumbent energy companies and the way that decisions are taken; and through new forms of crowdfunding and co-ownership of local energy systems, it challenges the centralized organisation and control of the system. Looking at the mainstreaming of prosumerism thus includes to take a broader look at the interplay between different political actors in the mainstreaming process (Jenkins et al., 2018).

2.3. Introducing a multi-actor perspective

We thus propose to understand the mainstreaming of the prosumerism ‘niche’ (section 2.1) as a political process in which diverse actor networks translate prosumerism to the mainstream context, influenced by varied normative and pragmatic considerations (section 2.2). To increase our understanding of that process, we need insights into the broad range of concrete (hybrid) institutional arrangements and logics through which mainstreaming processes are taking shape. Our institutionally pluralist analysis will be systematized through the Multi-actor Perspective (MaP) (Avelino and Wittmayer, 2016, 2019) – a heuristic introduced to analyse (shifting) power relations in sustainability transitions. Based on the ‘Welfare Mix’ model (Evers and Laville, 2004; Pestoff, 1992) and comparable with other institutional literature (Thornton et al., 2012; Thornton and Ocasio, 2008), the MaP distinguishes between four institutional logics (state, market, community and non-profit) across the following three axes, namely 1) informal – formal, 2) for profit – non-profit and 3) public – private (see Fig. 1). The MaP also distinguishes the ‘hybrid sphere’, which includes the non-profit logic, but also intermediary organisations that cross the boundaries between profit and non-profit, private and public, formal and informal. The institutional logics that the MaP distinguishes, are played out in energy systems and act as frames of reference within which collective or individual actors operate and with which they interact (Thornton et al., 2012). Approaching institutional logics as spaces within which multiple actors operate is what turns it into a multi-actor perspective (see Fig. 1 below).

The MaP acknowledges that the mainstreaming of innovation differs between institutional logics (section 3). The outstanding feature of a state logic is that it is ‘public’, concerned with the common good and based on the root metaphor of ‘redistribution’ (cf. Thornton et al., 2012). Becoming institutionalised in a state logic means that an innovation and its benefits are to be redistributed through becoming part of the bureaucratic apparatus (cf. Weber, 1978) and being made accessible through standardisation (cf. Scott, 1998). For the mainstreaming of an innovation in a state logic, we need to see how it for example is being considered in policies, regulations and subsidy schemes. Second, the outstanding feature of the market logic is that it is ‘for-profit’ (i.e. for financial gain) with the root metaphor being that of ‘transaction’ (Thornton et al., 2012). Becoming institutionalised in a market logic means to consider the effectiveness and profitability of the innovation through assigning economic value and turning it into an object of trade (cf. Appadurai, 1986, 2005) and marketizing it (Eikenberry and Kluver, 2004). Current European societies outsource many services to the market, and also marketize social relations. Finally, the outstanding feature of the community logic is that it is informal and that it is based on shared values and ideology, thus on that which is not formalised in writing, but taken for granted. Mainstreaming in a community logic refers to processes of normalisation and integration with shared values, also referred to as socialisation or communalisation (cf. Weber, 1978) (see section 3).

Specifying the institutional logics also allows to analyse the combinations and transposition of certain elements from different institutional logics (i.e. hybridisation) that occur in the process of prosumerism becoming more mainstream. While there are many ways to discuss such hybridisation, the MaP explicitly offers three specific sets of distinctions that can guide such a discussion. This includes the distinction between for-profit and non-profit approaches towards distributing benefits; the distinction between formal and informal orientations towards gaining recognition and the distinction between public and private orientations in delineating access to energy activities (see section 4).

(Hybrid) institutional arrangements are driven by individuals or organisations who can play multiple roles across institutional logics and who can combine diverse institutional logics. To this end, the MaP offers a specification of actors at different levels of aggregation (individual, organisation, sector) and how these are constructed within each

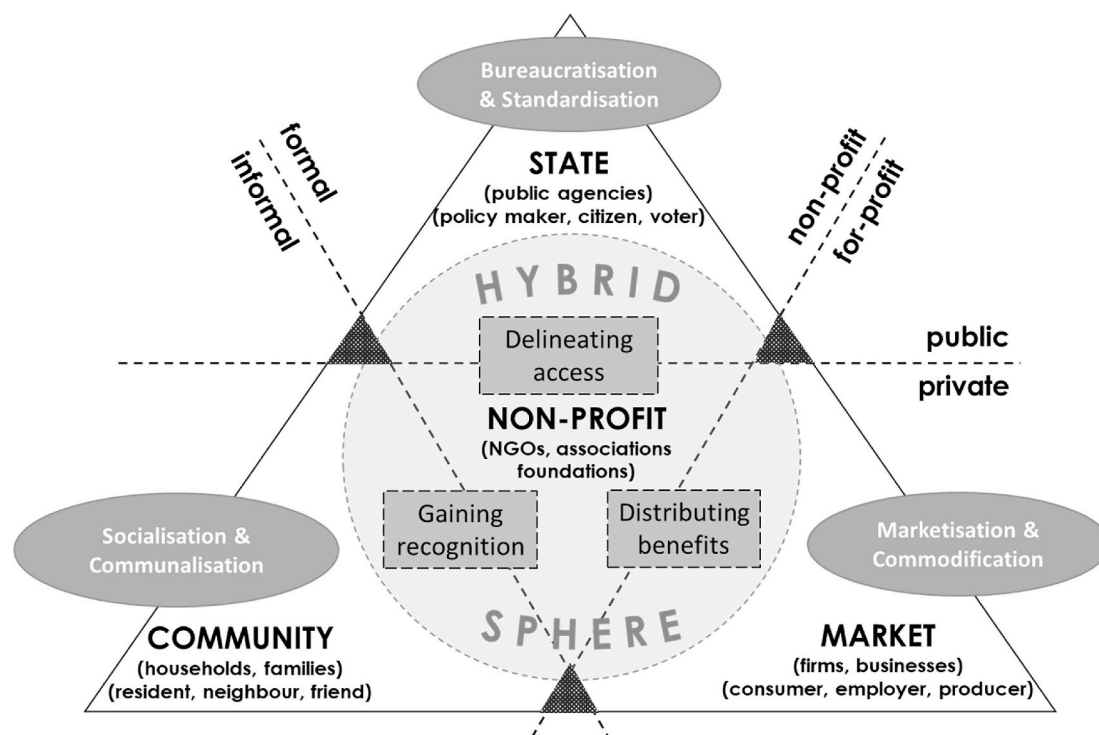


Fig. 1. Multi-actor perspective on mainstreaming processes (adapted from (Avelino and Wittmayer, 2016)).

institutional logic (ranging from ‘resident’ or ‘neighbour’ to ‘citizen’ or ‘consumer’). The MaP also offers a specification of the relations between individuals, organisations or sectors as power relations; i.e. as the exercise of different types of power. In doing so, the MaP serves to highlight that institutional hybridity might not always necessarily result in societal improvement but might also reproduce or even aggravate existing power relations. It might involve the excessive penetration of one logic into another, or the realisation of desirable relations at one level but the (re)production of undesired relations at another level (Avelino and Wittmayer, 2019).

3. Mainstreaming prosumerism in state, market and community

The mainstreaming of prosumerism is the process through which it becomes more established in current energy systems. This section analyses how such mainstreaming manifests within different logics. Each of the following sub-sections is dedicated to an elaboration of the emergence of prosumerism, its mainstreaming and the changing actor roles within each of the institutional logics (sections 3.1 to 3.3). Table 1 below provides a summary of the argumentation.

3.1. Mainstreaming prosumerism in the state logic

As expressed by the Energy Union strategy of the European Commission, states seek to ensure that energy provision to their citizens, businesses and industries is secure, sustainable, competitive and affordable (European Commission, 2015). This has found expression in centralized, large-scale structures that are strongly driven by a state logic of standardisation and redistribution and driven by values such as technologic efficiency, national welfare, and equity. The state is considered to formulate, enforce, and monitor regulatory frames ensuring energy provision but to leave infrastructure and supply to market mechanisms (Heldeweg, 2017). From a state logic, **prosumerism has emerged** since it provides the opportunity to put decentralized energy production technologies in service of the goal to secure energy

provision (also in remote areas) (Murphy and Smith, 2013) and to have a broad range of people benefit from renewable energies.

The **mainstreaming of prosumerism** in the state logic involves becoming recognised and integrated in state policies. However, prosumerism is yet to be integrated into a range of European policy areas (Petrick et al., 2019). A first step at EU-level has been the Clean Energy Package, which includes a series of policy documents and legal provisions for prosumers. Specifically, the recast of the Renewable Energy Directive (Directive (EU) 2018/2001) offers definitions of “self-consumers”; “jointly acting renewable self-consumers” and “renewable energy communities”. As a result, those actors are imbued with rights – to produce, sell, store and self-consume energy – and responsibilities which reduces risk and uncertainties for them (Campos et al., 2019). On national levels, however, there is a broad variety of forms that prosumer collectives can take. In some countries, prosumer policies are reduced to collective self-consumption laws (e.g. as in the case of the French law, i.e. the Energy Code), which do not introduce a legal identity for renewable energy communities, and which require specific legislation and provisions to be effectively implemented (Campos et al., 2019).

States do incentivise mainstreaming also through subsidy schemes, such as the remuneration of surplus electricity through a feed-in-tariff as in the German case (Renewable Energy Sources Act 2017), or the Dutch ‘Postcoderoos’ scheme, which allows residents of connected postal code areas to set up an energy community (Kooij et al., 2018; Proka et al., 2018). Regulatory challenges arise in relation to novel business models and actor roles (e.g. peer-to-peer; aggregators, social enterprises) (Herbes et al., 2017; Sandoval and Grijalva, 2015), but also regarding digitalisation and demand-side management solutions (e.g. blockchain technologies) (Goulden et al., 2014; Kounelis et al., 2017). Policy frameworks for aggregators and peer-to-peer schemes are needed. These activities are not possible in countries without collective self-consumption laws such as Croatia, or Italy (Hendricks and Mesquita, 2019). Becoming standardised is also accompanied by questions around taxation and the rule of law as well as administrative burdens. While the state provides regulatory security, it might put

Table 1
Mainstreaming prosumerism within three institutional logics: state, market and community.

State logic	Market logic	Community logic
Normative orientation Available, affordable and secure energy provision to citizens, businesses and industries	Economic efficiency, energy market competitiveness and entrepreneurial freedom	Energy as a commons
Emergence of prosumerism Opportunity to secure energy provision in remote areas and to put decentralized energy production technologies in service of the goal to secure energy provision on the long term	Opportunity for financial gain with prosumerism services and products are becoming (near) competitive and affordable	Opportunity and space for communal action and an alternative to the individualisation and alienation trends of current societies
Mechanisms for mainstreaming prosumerism Legal recognition of different forms of prosumerism collectives, access to and existence of subsidy schemes (e.g. feed-in-tariffs), collective self-consumption laws, national energy laws, ...	Creation of new business models such as energy marketplaces; increased competition between RE producers, facilitating access to finance, ...	Energy services are exchanged in informal and/or non-profit ways; promoting a culture of 'do it yourself' and 'do it together'; adapting existing cultural imaginaries and creating new framings such as 'community energy', 'energy democracy' or 'energy justice', ...
Actor roles in the mainstreaming of prosumerism (examples for roles for individuals and organisations)		
Active energy citizen ...	Producer/consumer, entrepreneur, ...	Volunteer, energy user, ...
Municipalities as energy providers, as energy community participants, as initiator of retrofit or energy efficiency programmes, ...	Energy service company, RES aggregators that are intermediaries between small prosumers and larger utilities and/or grid operators, changing expectations towards the role of grid operator, ...	Renewable energy community, virtual community, neighbourhood centres, ...

pressure on prosumer collectives, which are often run by volunteers driven by concerns about climate change and the need to adopt a greener energy model, and who thus can be discouraged by administrative burdens (Horstink et al., 2020). Becoming mainstreamed in the state logic also means that next to such bureaucratisation, prosumerism has the potential to become more accessible and its benefits redistributed across different societal strata.

Looking at the *actor roles in the state logic*, we currently see government and policy makers aiming to keep up accomplishments of the existing system, such as energy security, while accommodating steps towards decarbonisation and decentralisation. National energy policies are being developed to meet the Paris Agreement (e.g. the mandatory National Energy and Climate Plans for EU Member States, while broader transformative ambitions regarding decentralized production, energy justice and energy democracy, which are put on the agenda by prosumerism, are still in the background (Robiou du Pont et al., 2016). Here, we see national governments struggle with trade-offs between efficiency and democratisation. On the one hand, for example, Dutch governments provide subsidies for small scale prosumerism, while on the other historically favouring large-scale renewable energy projects (e.g. offshore wind parks, 'green gas' production), run by incumbent utilities and other market-oriented investors (Oteman et al., 2017). Local governments take up more active roles, through raising funds at higher governmental levels (Hoppe et al., 2014), engaging in public-civic-private partnerships (Heldeweg et al., 2015), or engaging in co-production with citizens (Hoppe et al., 2015) including the participation in or creation of new energy communities (Moss et al., 2015). The roles accorded to citizens are ambivalent: the 'passive citizen' is expected to need a government that ensures a steady and reliable energy supply; while the 'active energy citizen', either individually or collectively, engages in prosumerism, changes energy consumption routines and practices; or is actively involved in deliberating with her local government to support energy transitions. However, there are limits to the self-efficacy also of the 'active citizen'. For instance, disconnecting from the grid is seldom an option, given the technical and financial challenges of storage, as well as the regulatory aspects of it. It may even undermine energy markets and redistribution mechanisms, as utility companies would increasingly lose consumers but still be required to bear the cost of maintaining transmission and distribution infrastructures.

3.2. Mainstreaming prosumerism in the market logic

The market logic has come to bear in energy systems through its focus on economic efficiency. Market liberalisations, and thus the rolling back of state monopolies regarding energy production and infrastructure ownership, has led to the emergence of large multinational energy producers. These liberalisations have been motivated by ideas about greater efficiency and technological progress through increased competition; and have been accompanied by important social and environmental side effects that fed the mistrust in centralized systems. From a market logic, **prosumerism has emerged** because it offers more choice, freedom as well as financial gain – thus its services and products are becoming (near) competitive and affordable.

Further **mainstreaming of prosumerism** in the market logic involves a commodification of the sources of renewable energy, such as sun, wind, or biomass. An important mechanism is the development of new business models, such as energy marketplaces that act as intermediary between producers and consumers (Bellekom et al., 2016; Sandoval and Grijalva, 2015) or reinventing familiar ones, such as energy cooperatives (Capellán-Pérez et al., 2018). For the mainstreaming of prosumerism, the development of new technologies and tools for demand-side management or to support peer-to-peer schemes (Goulden et al., 2014) also play a role, including blockchain technologies for managing smart-grids (Kounelis et al., 2017) or for exchanging renewable energy. However, the development of technologies for managing collective self-consumption arrangements requires considerable expert knowledge and investments. Alternative ways to create money for investment in prosumer technologies and infrastructures, including Fintech and crowdfunding are considered vital (Hall et al., 2018; Lam and Law, 2016).

Changes in the energy market include the redefinition of **roles in the energy system** (i.e. energy producer, grid operator, utility company, energy consumers, investor) and which actors can take these on. New actors enter markets, such as organisations of the alternative finance sector, along with the emergence of new roles (Hall and Roelich, 2016). The latter includes the 'prosumer', as combining producing, consuming and possibly marketizing energy and thereby challenging the traditional distinction between producers and consumers (Ritzer, 2015). Other new roles are aggregators (i.e. intermediaries between small prosumers and larger utilities and/or grid operators), or prosumer collectives in the

form of renewable energy communities or energy cooperatives (Parag and Sovacool, 2016). With the decentralisation of energy production and consumption, energy markets may be populated by ‘energy pools’ where prosumer collectives locally produce and exchange surplus energy. This new playing field creates multiple challenges to current business models, with the grid operators as a prime example. They are tasked with ensuring grid stability and the maintenance of grid infrastructures even as their profit decreases – and are considered to do so without penalizing the final consumer (especially those that are not prosumers). Similarly, ‘traditional’ utility companies will need to reconsider their business models, their relationship with their customers and their shareholders.

3.3. Mainstreaming prosumerism in the community logic

The community logic expresses the shared, non-formalised values and ideology – in energy systems in current Western Societies propagated values include individualisation, rationalisation, and self-gain. The individual household is singled out – next to industrial or business units – as the main unit to be served by regulated market systems. This individual household is to rationally compare prices of energy suppliers to get the financially most attractive deal. From a community logic, **prosumerism has emerged** since it provides space for communal action and alternative value orientations, moving away from such rationalized systems of provision, mistrust and anonymity sparking a search for institutional arrangements more satisfactory in terms of autonomy, relatedness and competence (Pel et al., 2020).

Further mainstreaming in the community logic involves further embedding of post-materialist and post-growth values, which have increasingly taken foothold through environmental movements or translocal networks (Avelino et al., 2019a; Hajer, 1995). Collective prosumerism thus plays into a psychological need for (re)establishing collective ties and builds upon values such as trust, communal action, and further strengthens these sentiments by doing so. Long before REDII, community energy or energy communities have been loosely used terms referring to different (informal) groups actively working towards more sustainable energy systems (e.g. Seyfang and Haxeltine, 2012). Further mainstreaming in the community logic involves that energy services are exchanged in informal and/or non-profit ways within such energy communities. It includes a culture of ‘do it yourself’ and ‘do it together’, which is being built through initiatives such as those connected through the Transition Movement (Schoor et al., 2016). Moreover, new narratives and framings about how our energy system could look like are starting to gain traction (Longhurst and Chilvers, 2019). This includes issues of social inclusion, power inequalities and justice as put forth by discourses around energy democracy (van Veelen and van der Horst, 2018) and energy justice (Jenkins et al., 2018). Specific attention is paid to the role of gender, expertise, time, and income and their interlinkages between a more gender balanced energy system and energy poverty (Middlemiss et al., 2019). When resonating with the values and expectations held by people, these counter narratives can further empower citizens’ collective action towards a more democratic and socially just energy system or provide guides for action (Wittmayer et al., 2019).

While prosumerism strengthens individual households in their roles as prosumers, it also allows informal energy communities to (continue to) play a key **role in the energy system** (e.g. Hewitt et al., 2019). These make energy a more accessible topic and often aim to increase communal ties and bridge between social groups. Such informal communities frequently rely on voluntary engagement, which poses a challenge in terms of efficiency and continuity of activities. Also, voluntary engagement in such activities is often confined to a certain group of people – with technological or organisation expertise, spare time, and access to financial resources. Studies have shown that these are more likely to be male than female (Łapniewska, 2019) and often older and retired individuals (Johnson et al., 2014). Thus, while mainstreaming in the community logic entails providing space for new value

orientations and lifestyles to materialize, it comes with an increased risk that some social groups end up having better energy provision than others (Bauwens and Defourny, 2017). If energy production and distribution would rest on social ties only, those social ties can become important up to a point that those lacking social capital have difficulties accessing energy. In addition, new actor roles include ‘virtual’ communities, where individually owned production units are linked in a virtual network through which they collectively act as suppliers and self-consumers of energy (Gui and MacGill, 2018).

4. Institutional hybridity and its implications for sustainable and just energy systems

Approaching the mainstreaming of prosumerism also as a political process which contests the boundaries between institutional logics and challenges existing power relations – this section focuses on the combination of elements from different logics and how prosumerism also develops through hybrid institutional arrangements. We discuss the second part of our research question: Which forms of institutional hybridity emerge, and what do these imply for sustainable and just energy systems? To structure our analysis, we use the set of distinctions brought forth by the MaP: (1) for-profit/non-profit approaches to the distribution of benefits (2) the formal/informal approaches to gaining recognition and (3) the public/private approaches to delineating access. Each of the following sub-sections (sections 4.1 to 4.3) is dedicated to elaborate tensions that arise from combining the logics, the institutional arrangements that these combinations manifest in and the implications in terms of sustainable and just energy systems.

4.1. Distributing benefits - combining common good with profit making

In terms of distributing benefits from energy activities, hybrid institutional arrangements attempt to combine non-profit commitments to sustainable development and energy justice with (for-profit) strivings towards efficient, competitive and profitable energy sourcing and distribution. Considering the ambitions of many prosumer initiatives to contribute to just and sustainable energy systems, a tension lies in combining, within one organisation, financial gain and freedom to enterprise (market) with caring for members or communities (community) and allowing the broader public or the environment to benefit as well (public state). Stereotypical judgements from singular logics, will not do justice to the ethical entrepreneurship that guides these initiatives. They do not engage in markets to maximise financial gain such as other for-profit oriented actors. Yet to break even in terms of financial balances, they do possibly secure a modest return on investment for their members, or to reinvest in new installations.

There are **different institutional arrangements** through which possible beneficiaries and benefits can be combined. For example, they recur to legal forms that cater for some of this hybridity in countries where these are accessible – such as cooperatives, or social enterprises (Horstink et al., 2020). We see a similar combination in newly emerging crowdfunding platforms, where a clear for-profit focus, comes with investment being guided by community needs and sustainability principles (see Abundance in the UK and GoParity in Portugal (Lam and Law, 2016)). When they are growing, they can be prone to ‘mission drift’ – the shifting of their hybrid mission towards one of the distinct institutional logics. In doing so existing injustices might be reproduced. Cooperatives, for example, might focus on returning profit to their small circle of members, who are likely to be part of a privileged group (Bauwens and Defourny, 2017; Łapniewska, 2019). Initiatives also set up numerous related entities, each to engage in specific activities clearly driven by either for- or non-profit logics; e.g. a member-based cooperative that owns a for-profit company to run the energy production facilities – thereby striving to combine the democratic, inclusive character of a cooperative with the agility and flexibility of a company (e.g. Verschuur, 2010).

There are **several implications for sustainable and just energy systems** that arise from the combination of non-profit and for-profit commitments regarding distributing benefits in hybrid institutional arrangements. They serve to highlight that there are *multiple interpretations of what a 'sustainable and just energy system' can be taken to refer to*. While the 'capture' of prosumerism through for-profit motivations is often critiqued (e.g. Brown et al., 2020; Rescoop, 2017), it is good to remember that consumer choice, the freedom to exploit one's assets and freedom of enterprise are all forms of self-determination that as such could be considered contributions to 'just' energy systems – at least along liberal-libertarian accounts of sustainable development. To further mainstream in the current regulated market, prosumerism will need to rely to some extent on the potential of market-oriented actors to efficiently mobilize resources for decarbonisation. This is the rational, active, creative prosumerism that has been promoted along the liberalisation of energy markets. Second, the emergence of hybrid institutional arrangements serves to *remind of and question the dominance and perseverance of a for-profit orientated understanding of benefits and their distribution*. While establishing a cooperative might lead to changes in power relations on a small scale, where members gain influence on what kind of energy is produced and who benefits from it, recurring to a for-profit company model for running the actual energy production might also perpetuate the dominance of a for-profit market logic on the long run. Finally, the *many hybrid institutional arrangements constitute actual attempts towards balancing and reconciling a for- and non-profit logic and therefore serve to reveal the many trade-offs* that they are facing. A broader move towards green capitalism, or considerations of prosumerism as market-instrument for sustainability will come with trade-offs regarding the broader ambitions towards equal distribution of benefits; while a broader move towards equal distribution of a diversity of benefits and ethical entrepreneurship will come with curtailed financial profits.

4.2. Gaining recognition – searching for an 'institutional home'

In terms of gaining recognition for energy activities, hybrid institutional arrangements attempt to combine longing for informality and institutional independence (informal orientation) with the need for institutional shelter to secure resources (formal orientation). Considering the ambitions of many prosumer initiatives to contribute to just and sustainable energy systems, a tension arises when initiatives want to access resources (e.g. a bank loan or subsidy), draft shared rules or collaborate with third parties, but experience difficulties in finding ways and degrees of formalisation that fit their capacities and value orientation. Stereotypical judgements from singular logics, will not do justice to the independent and unconventional approaches guiding these initiatives.

This combination of informal and formal orientation manifests in various institutional arrangements. Many prosumer initiatives creatively combine and adopt distinct organisational forms that bridge different logics and legal formalities (Pel et al., 2020). On the one hand, such collectives might develop informal norms, rules and relations, which will challenge current formalisations and might give rise to again new forms. The rise of social enterprises in some countries is an example of such a new legal form allowing the combination of different normative orientations and different benefits. Whether such forms are available is a matter of the regulatory context within which initiatives are operating – a gap that the EU's Clean Energy Package, which requires EU-member states to craft or adapt legal forms for renewable energy communities, aims to address. On the other hand, initiatives also might fall back on the norms, rules and relations that come from either one of the logics and in this way perpetuate the status quo. As a result, formal entities might be established running the revenue-generating energy activities for the community and/or public good while a broader informal group stays involved in, often voluntary, foot work. In such a distribution of labour, prosumers split up activities, leaning more

towards the one or the other institutional logic and associated actor roles.

There are **several implications for sustainable and just energy systems** that arise from the combination of formal and informal orientations when gaining recognition for energy activities in hybrid institutional arrangements. Their emergence serves to *remind of and question the highly regulated and thus formalised nature of the energy system* and draws attention to developments that are further perpetuating this tendency such as support schemes for prosumer initiatives, or the transposition of the new EU directives. The hybrid institutional arrangements, especially the eventual formalisation of informal practices (e.g. as outlined regarding social enterprises) also *serve to highlight the long breath involved in realising recognition for or transformation by unconventional and thus not (yet) formally recognised activities, ideas or technologies* (cf. Pel, 2016). Finally, these hybrid institutional arrangements as attempts towards combining orientations *serve as a reminder of trade-offs*. The informality of the community logic seems to provide a low barrier entry point for people to get engaged as prosumer, along with family and neighbours and thus increases the potential of a broader energy constituency. However, once up and running, reliance on informal labour is often associated with difficulties in sustaining operations in a highly formalised and competitive (i.e. regulated market) energy system. Given a lack of capacities (e.g. in terms of personnel, skills, leadership, and finance) in most community energy initiatives, support mechanisms are considered necessary (Warbroek and Hoppe, 2017). However, it could also mean thinking about mechanisms through which the labour in the informal economy can be resourced – such as a basic income, time banking or alternative currencies (Weaver et al., 2017). While formalisation holds the prospect of access to resources and arguably increases efficiency (sustainability achievements and profitability), it comes with a certain degree of administration and bureaucracy. This could raise resentment on the side of entrepreneurially minded prosumers, or just be a step too far for many informal collectives that are not producing energy for their living but for engaging with their neighbours and doing good for the environment.

4.3. Delineating access – reconsidering the boundaries

In terms of delineating access to energy, hybrid institutional arrangements attempt to combine public commitments to openly available energy for the majority, with private commitments towards restricted access by a defined group (e.g. members of a cooperative, customers of an energy company). Considering the ambitions of many prosumer initiatives to contribute to the public good and to be open and accessible to a broad range of citizens, a tension lies in combining this openness with the fact that there is usually an individual (household) or a small group of people who actively engage and will draw a boundary of sorts around their prosumerism activities – often conceived from a private logic. Stereotypical judgements from singular logics, will not do justice to the redistributive values that guides many of these initiatives.

This combination has manifested in a variety of forms. Through the re-municipalisation of energy utilities, energy supply is brought (back) under a public logic – under the ownership of a public institution and thus ruled by a democratically chosen government (Moss et al., 2015; Wagner and Berlo, 2017). However, while these utilities are owned by local governments, the operations are often continued under a private (for-profit) logic. Thus, while such re-municipalisation means a power shift from private to public logic at sector level, individual consumers are still confronted with an access-restricting private logic. We also see arrangements that hold the promise to combine private capital with open access, such as alliances between energy cooperatives and local governments. Not only may cooperatives be co-founded by (local) governments (Warbroek and Hoppe, 2017), they also co-create policies and local actions or are involved in public service delivery via co-production arrangements (Hoppe and Miedema, 2020; Warbroek and Hoppe, 2017). Doing so increases their influence on public policy and

opens a window for the latter to be informed by a broader multitude of voices that can be mobilised by cooperatives. There are also alliances between energy cooperatives and mainstream energy companies, alliances which however often frustrate the public and political ambitions of energy cooperatives (de Bakker et al., 2020).

There are **several implications for sustainable and just energy systems** that arise from the combination of public and private commitments regarding access to energy (activities) in hybrid institutional arrangements. Also here, their emergence serves to *remind of and question the dominant private logic* exercised through market or community logics and favouring specific groups – whether those being able to pay as consumers, or those belonging to certain groups and networks. It brings to the fore arguments and examples for a greater balance between private and public orientations, where the latter currently seems to bear the promise of redistribution, transparency and accountability. A public logic could regulate a market logic but also a community logic to allow for processes and benefits of prosumerism to be open for and belonging to all. In doing so, it serves to *highlight the process of exclusion* that occurs when ‘harvesting’ energy from sun and wind. While both are commons – thus held by all people, harvesting their energy for human use currently involves a process of exclusion, and thus privatisation. In manifesting in concrete forms and activities prosumerism is becoming more exclusionary – whether this takes place through an energy company or an energy cooperative and thus providing access to certain individuals or groups and not to others. These hybrid institutional arrangements are thus witness to the many different attempts towards remitting the current exclusionary tendencies (coming from different actors from across logics using different means and resources) and the many trade-offs they are facing.

5. Conclusion and policy implications

This paper set out to analyse the ongoing process of prosumerism to become mainstream and the implications of this process for its potential to contribute to sustainable and just energy systems. Considering that the latter is only one of many possible futures and prone to multiple interpretations on the way, we regarded the mainstreaming of prosumerism as a political and conflict-ridden process that involves challenging and possibly changing power relations on the way. Using a Multi-actor Perspective for institutional concreteness (see Fig. 1), we first unpacked the dynamics of this mainstreaming process within the institutional logics of the state, market and community separately (as summarised in Table 1). We then highlighted how these logics are combined in hybrid institutional arrangements that address not only the more known trade-offs and tensions between for-profit and non-profit approaches, but also those between formal and informal as well as public and private. Doing so highlights the tensions that arise around distributing benefits, gaining recognition and delineating access to energy activities. Some of the main insights are a reminder of the dominance and perseverance of certain orientations (for profit, formal and private) and the implications thereof for sustainable and just energy systems. From discussing the distribution of benefits from energy activities, we derive that the current energy system allows everybody to benefit from secure and reliable energy supply, but only a small group from the financial benefits while the ecological costs are overlooked. From discussing gaining recognition for energy activities, we find that it is important to understand the extent to which formalisation is necessary and desirable since informality might lower the barrier for involvement and increase creativity. Finally, from discussing the delineation of access to energy activities and resources, we derive that the public logic can serve to regulate market logic but also community logic to allow for processes and benefits of prosumerism to be open for and belonging to all – rather than serving the interest of certain social groups.

In the following, we want to highlight some policy implications specifically for the process of transposing the Clean Energy Package by the European Union into national legislation at EU member state level.

The Clean Energy Package, amongst others, formalised the right of EU citizens to self-consume and to form energy communities and its transposition opens a window of opportunity to provide a framework that enables a more sustainable and just orientation of energy systems. Possibly paradoxically, a first implication is **to consider informality as a resource**. Informal practices bear promises for broader engagement, creative experimentation and unconventional approaches and ideas. A lower degree of formalisation translates into lower administrative burden for community groups, for enterprises and businesses and makes engagement with energy activities more likely and desirable. The task at hand is to consider **to which extent and for which elements formalisation is necessary** to ensure and incentivise that a broad and diverse group of publics have access to energy activities and resources (considering the public/private distinction) and do benefit from them beyond secure energy supply (considering the non-profit/for-profit distinction). This becomes more pertinent since the decentralisation of energy production means that every person will be ‘confronted’ with production sites in their ‘backyard’ including their financial, visual, auditory and otherwise implications. Bearing this burden can then be accompanied by sharing in the social, ecological and financial benefits.

Second, our analysis highlights that such a transposition needs to **take account of the dominance of specific orientations in current energy systems**. Not only have large populations been for long framed as ‘passive consumers’ served by large energy suppliers (market logic) and been shepherded as citizens with the ‘right’ to continuous energy supply by national governments (state logic). Also, current prosumer initiatives seem to favour certain groups (private community/market logic) at the expense of a broader majority (public state logic). Acknowledging the dominance of for-profit activities and private interests governed by formal regulations and the path dependency, politics and struggles that come with it, seem a necessary first step towards thinking about regulations and policies that take a different route and dare to combine elements of logics to incentivise those (skillful combinations) of activities, ideas and technologies supporting sustainable and just energy systems and to disincentive and phase out those that do not.

Thirdly, our analysis has shown that it is through a diversity of (hybrid) institutional arrangements that a diversity of sustainable and just energy systems is being pursued and practiced. There is no set future. Keeping futures open and plural allows for experimentation, societal engagement and constant (re)invention and social innovation – and thus for the potential of manifold voices being considered. The implication here is to not only enable this, but to also consider the **diversification of actors and networks when negotiating an enabling framework for prosumer activities**. Research has shown that it is through the formation of collaborations and networks that prosumer collectives strive to safeguard hybridity on a collective level (Bauwens et al., 2019; Huybrechts and Haugh, 2018). Next to the incumbent players, seats need to be provided at negotiation tables and in informal settings for those newly emerging actors and their hybrid institutional arrangements to learn from them about the design of an enabling framework for a decentralized, more sustainable and just energy system.

As demonstrated, prosumerism has its own tensions and scope for institutional hybrid arrangements. These are manifestations of attempts to reconcile and balance different normative orientations. In doing so, they face trade-offs and risks, such as those of falling short of high hopes and promises. The mainstreaming of prosumerism is not a ‘done deal’ and it certainly does not have a predefined end – it is an open-ended process, attracting many different actors who engage in different activities, follow different normative orientations, and take on different roles.

CRedit authorship contribution statement

Julia M. Wittmayer: Writing - original draft, Writing - review & editing, Conceptualization, Methodology, Investigation, Project

administration. **Flor Avelino:** Writing - original draft, Writing - review & editing, Conceptualization. **Bonno Pel:** Writing - original draft, Writing - review & editing, Conceptualization. **Inês Campos:** Writing - original draft, Writing - review & editing, Investigation, Project administration.

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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References

- Ahlborg, H., 2017. Towards a conceptualization of power in energy transitions. *Environ. Innov. Soc. Transitions* 25, 122–141. <https://doi.org/10.1016/j.eist.2017.01.004>.
- Appadurai, A., 1986. Introduction: commodities and the politics of value. In: Appadurai, A. (Ed.), *The Social Life of Things: Commodities in a Cultural Perspective*. Cambridge University Press.
- Appadurai, A., 2005. Definitions: commodity and commodification. In: Ertman, M., Williams, J.C. (Eds.), *Rethinking Commodification: Cases and Readings in Law and Culture*. New York University Press, p. 35.
- Arentsen, M., Bellekom, S., 2014. Power to the people: local energy initiatives as seedbeds of innovation? *Energy. Sustain. Soc.* 4, 2. <https://doi.org/10.1186/2192-0567-4-2>.
- Avelino, F., Wittmayer, J.M., 2016. Shifting power relations in sustainability transitions: a multi-actor perspective. *J. Environ. Pol. Plann.* 18, 628–649. <https://doi.org/10.1080/1523908X.2015.1112259>.
- Avelino, Flor, Wittmayer, J.M., 2019. The transformative potential of plural social enterprise: a multi-actor perspective. In: Eynaud, P., Laville, J., Lucas dos Santos, L., Banerjee, S., Hulgård, L., Avelino, F. (Eds.), *Theory of Social Enterprise and Pluralism: Solidarity Economy, Social Movements, and Global South*. Routledge, Oxfordshire, pp. 193–220.
- Avelino, F., Dumitru, A., Cipolla, C., Kunze, I., Wittmayer, J., 2019a. Translocal empowerment in transformative social innovation networks. *Eur. Plann. Stud.* 1–23. <https://doi.org/10.1080/09654313.2019.1578339>, 0.
- Avelino, F., Wittmayer, J.M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., Kemp, R., Jorgensen, M.S., Bauler, T., Ruijsink, S., O'Riordan, T., 2019b. Transformative social innovation and (dis)empowerment. *Technol. Forecast. Soc. Change* 145, 195–206. <https://doi.org/10.1016/J.TECHFORE.2017.05.002>.
- Bader, V., Engelen, E.R., 2003. Taking pluralism seriously Arguing for an institutional turn in. *Philos. Soc. Critic.* 29, 375–406.
- Bauwens, T., Defourny, J., 2017. Social capital and mutual versus public benefit: the case of OF renewable energy cooperatives. *Ann. Public Coop. Econ.* 88, 203–232. <https://doi.org/10.1111/apce.12166>.
- Bauwens, T., Huybrechts, B., Dufays, F., 2019. Understanding the diverse scaling strategies of social enterprises as hybrid organizations: the case of renewable energy cooperatives. *Organ. Environ.* <https://doi.org/10.1177/1086026619837126>, 1086026619837126.
- Becker, S., Kunze, C., Vancea, M., 2017. Community energy and social entrepreneurship: addressing purpose, organisation and embeddedness of renewable energy projects. *J. Clean. Prod.* 147, 25–36. <https://doi.org/10.1016/J.JCLEPRO.2017.01.048>.
- Bellekom, S., Arentsen, M., van Gorkum, K., 2016. Prosumption and the distribution and supply of electricity. *ENERGY Sustain. Soc.* 6 <https://doi.org/10.1186/s13705-016-0087-7>.
- Bening, C.R., Blum, N.U., Schmidt, T.S., 2015. The need to increase the policy relevance of the functional approach to Technological Innovation Systems (TIS). *Environ. Innov. Soc. Transitions* 16, 73–75. <https://doi.org/10.1016/j.eist.2015.07.007>.
- Bhatti, M., 1993. From consumers to prosumers: housing for a sustainable future. *Hous. Stud.* 8, 98–108. <https://doi.org/10.1080/02673039308720753>.
- Brandtsen, T., Karré, P.M., 2011. Hybrid organizations: No cause for concern? *Int. J. Publ. Adm.* 34, 827–836. <https://doi.org/10.1080/01900692.2011.605090>.
- Brange, L., Englund, J., Lauenburg, P., 2016. Prosumers in district heating networks – a Swedish case study. *Appl. Energy* 164, 492–500. <https://doi.org/10.1016/J.APENERGY.2015.12.020>.
- Brisbois, M.C., 2019. Powershifts: a framework for assessing the growing impact of decentralized ownership of energy transitions on political decision-making. *Energy Res. Soc. Sci.* <https://doi.org/10.1016/j.erss.2018.12.003>.
- Brown, D., Hall, S., Davis, M.E., 2020. What is prosumerism for? Exploring the normative dimensions of decentralised energy transitions. *Energy Res. Soc. Sci.* 66, 101475. <https://doi.org/10.1016/j.erss.2020.101475>.
- Brummer, V., 2018. Community energy – benefits and barriers: a comparative literature review of Community Energy in the UK, Germany and the USA, the benefits it provides for society and the barriers it faces. *Renew. Sustain. Energy Rev.* 94, 187–196. <https://doi.org/10.1016/j.rser.2018.06.013>.
- Burke, M.J., Stephens, J.C., 2017. Energy democracy: goals and policy instruments for sociotechnical transitions. *Energy Res. Soc. Sci.* 33, 35–48. <https://doi.org/10.1016/j.erss.2017.09.024>.
- Butenko, A., 2016. User-centered innovation and regulatory framework: energy prosumers' market access in EU regulation. *TILEC Discuss. Papp.* 1–22.
- Campos, I., Pontes Luz, G., Marín-González, E., Gährs, S., Hall, S., Holstenkamp, L., 2019. Regulatory challenges and opportunities for collective renewable energy prosumers in the EU. *Energy Policy* 111212. <https://doi.org/10.1016/J.ENPOL.2019.111212>.
- Capellán-Pérez, I., Campos-Celador, A., Terés-Zubiaga, J., 2018. Renewable Energy Cooperatives as an instrument towards the energy transition in Spain. *Energy Pol.* 123, 215–229. <https://doi.org/10.1016/J.ENPOL.2018.08.064>.
- Castaneda, M., Jimenez, M., Zapata, S., Franco, C.J., Dyrner, I., 2017. Myths and facts of the utility death spiral. *Energy Pol.* 110, 105–116. <https://doi.org/10.1016/j.enpol.2017.07.063>.
- Couture, T., Barbose, G., Jacobs, D., Parkinson, G., Chessin, E., Belden, A., Wilson, H., Barrett, H., Rickerson, W., 2014. Residential prosumers: drivers and policy options (Re-prosumers). United states. <https://doi.org/10.2172/1163237>.
- de Bakker, M., Legendijk, A., Wiering, M., 2020. Cooperatives, incumbency, or market hybridity: new alliances in the Dutch energy provision. *Energy Res. Soc. Sci.* 61, 1–11. <https://doi.org/10.1016/j.erss.2019.101345>.
- Doračić, B., Knoefel, J., Naber, N., 2020. Report on Local, National and EU Scenarios (Deliverable D5.2).
- Eikenberry, A.M., Kluber, J.D., 2004. The marketization of the nonprofit sector: civil society at risk? *Publ. Adm. Rev.* 64, 132–140. <https://doi.org/10.1111/j.1540-6210.2004.00355.x>.
- European Commission, 2015. Energy union package. Communication from the commission to the European parliament, the council. In: *The European Economic and Social Committee, the Committee of the Regions and the European Investment Bank. A Framework Strategy for a Resilient Energy Union Wi. Brussels*.
- European Commission, 2019a. Clean Energy for All Europeans. <https://doi.org/10.2833/9937>. Luxembourg.
- European Commission, 2019b. Clean energy for all Europeans package completed: good for consumers, good for growth and jobs, and good for the planet. https://ec.europa.eu/info/news/clean-energy-all-europeans-package-completed-good-consumers-goo-d-growth-and-jobs-and-good-planet-2019-may-22_en accessed 7.25.19.
- Evers, A., Laville, J.L. (Eds.), 2004. *The Third Sector in Europe*. Edward Elgar Publishing, Cheltenham.
- Forman, A., 2017. Energy justice at the end of the wire: enacting community energy and equity in Wales. *Energy Pol.* 107, 649–657. <https://doi.org/10.1016/j.enpol.2017.05.006>.
- Fuenshilling, L., Truffer, B., 2014. The structuration of socio-technical regimes—conceptual foundations from institutional theory. *Res. Pol.* 43, 772–791. <https://doi.org/10.1016/J.RESPOL.2013.10.010>.
- Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. *Res. Pol.* <https://doi.org/10.1016/j.respol.2007.01.003>.
- Geels, F.W., Sovacool, B.K., Schwanen, T., Sorrell, S., 2017. Sociotechnical transitions for deep decarbonization. *Science* (80-.), 357, 1242.
- Gorissen, L., Spira, F., Meynaerts, E., Valkering, P., Frantzeskaki, N., 2018. Moving towards systemic change? Investigating acceleration dynamics of urban sustainability transitions in the Belgian City of Genk. *J. Clean. Prod.* 173, 171–185. <https://doi.org/10.1016/j.jclepro.2016.12.052>.
- Goulden, M., Bedwell, B., Rennick-Egglestone, S., Rodden, T., Spence, A., 2014. Smart grids, smart users? The role of the user in demand side management. *Energy Res. Soc. Sci.* 2, 21–29. <https://doi.org/10.1016/J.ERSS.2014.04.008>.
- Grin, J., Rotmans, J., Schot, J., 2010. *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*. Routledge, New York.
- Gui, E.M., MacGill, I., 2018. Typology of future clean energy communities: an exploratory structure, opportunities, and challenges. *Energy Res. Soc. Sci.* 35, 94–107. <https://doi.org/10.1016/j.erss.2017.10.019>.
- Hajer, M., 1995. *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*. Oxford University Press.
- Hall, S., Roelich, K., 2016. Business model innovation in electricity supply markets: the role of complex value in the United Kingdom. *Energy Pol.* 92, 286–298. <https://doi.org/10.1016/j.enpol.2016.02.019>.
- Hall, S., Roelich, K.E., Davis, M.E., Holstenkamp, L., 2018. Finance and justice in low-carbon energy transitions. *Appl. Energy* 222, 772–780. <https://doi.org/10.1016/J.APENERGY.2018.04.007>.
- Heldeweg, M.A., 2017. Normative alignment, institutional resilience and shifts in legal governance of the energy transition. *Sustainability* 9. <https://doi.org/10.3390/su9071273>.
- Heldeweg, M., Sanders, M., Harmsen, M., 2015. Public-private or private-private energy partnerships? Toward good energy governance in regional and local green gas projects. *Energy. Sustain. Soc.* 5, 9.
- Hendricks, D., Mesquita, R., 2019. *PV Prosumer Guidelines for Eight EU Member States*. European Renewable Energies Federation.

- Herbes, C., Brummer, V., Rognli, J., Blazejewski, S., Gericke, N., 2017. Responding to policy change: new business models for renewable energy cooperatives – barriers perceived by cooperatives' members. *Energy Pol.* 109, 82–95. <https://doi.org/10.1016/j.enpol.2017.06.051>.
- Hewitt, R.J., Bradley, N., Baggio, C.A., Barlagne, C., Ceglaz, A., Cremades, R., McKeen, M., Otto, I.M., Slee, B., 2019. Social innovation in community energy in Europe: a review of the evidence. *Front. ENERGY Res.* 7 <https://doi.org/10.3389/fenrg.2019.00031>.
- Hoppe, T., Miedema, M., 2020. A governance approach to regional energy transition: meaning, conceptualization and practice. *Sustainability* 12, 1–28. <https://doi.org/10.3390/su12030915>.
- Hoppe, T., van den Berg, M.M., Coenen, F.H.J.M., 2014. Reflections on the uptake of climate change policies by local governments: facing the challenges of mitigation and adaptation. *Energy. Sustain. Soc.* 4, 8. <https://doi.org/10.1186/2192-0567-4-8>.
- Hoppe, T., Graf, A., Warbroek, B., Lammers, I., Lepping, I., 2015. Local governments supporting local energy initiatives: lessons from the best practices of Saerbeck (Germany) and Lochem (The Netherlands). *Sustainability* 7, 1900–1931.
- Horstink, L., Wittmayer, J.M., Ng, K., Luz, G.P., Marín-González, E., Gährs, S., Campos, I., Holstenkamp, L., Oxenaar, S., Brown, D., 2020. Collective renewable energy prosumers and the promises of the energy union: taking stock. *Energies* 13, 1–30. <https://doi.org/10.3390/en13020421>.
- Huybrechts, B., Haugh, H., 2018. The roles of networks in institutionalizing new hybrid organizational forms: insights from the European renewable energy cooperative network. *Organ. Stud.* 39, 1085–1108. <https://doi.org/10.1177/0170840617717097>.
- Jenkins, K., Sovacool, B.K., McCauley, D., 2018. Humanizing sociotechnical transitions through energy justice: an ethical framework for global transformative change. *Energy Pol.* <https://doi.org/10.1016/j.enpol.2018.02.036>.
- Johnson, V.C., Hall, S., Barton, J., Emanuel-Yusuf, D., Longhurst, N., O'grady, A., Robertson, E., Robinson, E., Sherry-Brennan, F., 2014. Community energy and equity: the distributional implications of a transition to a decentralised electricity system. *People, Place and Policy* 8, 149–167. <https://doi.org/10.3351/ppp.0008.0003.0002>.
- Jørgensen, U., 2012. Mapping and navigating transitions—the multi-level perspective compared with arenas of development. *Res. Pol.* 41, 996–1010. <https://doi.org/10.1016/j.respol.2012.03.001>.
- Kooij, H.-J., Lagendijk, A., Oteman, M., 2018. Who beats the Dutch tax department? Tracing 20 years of niche-regime interactions on collective solar PV production in The Netherlands. *Sustain. Times* 10. <https://doi.org/10.3390/su10082807>.
- Koppenjan, J.F.M., Klijn, E.H., 2004. *Managing Uncertainties in Networks: A Network Approach to Problem Solving and Decision Making*. Routledge, London/New York.
- Kotilainen, K., Saari, U.A., 2018. Policy influence on consumers' evolution into prosumers-empirical findings from an exploratory survey in Europe. *Sustain. Times* 10. <https://doi.org/10.3390/su10010186>.
- Kounelis, I., Giuliani, R., Geneiatakis, D., Di Gioia, R., Karopoulos, G., Steri, G., Neisse, R., Nai-Fovino, L., 2017. Blockchain in Energy Communities a Proof of Concept.
- Lam, P.T.I., Law, A.O.K., 2016. Crowdfunding for renewable and sustainable energy projects: an exploratory case study approach. *Renew. Sustain. Energy Rev.* 60, 11–20. <https://doi.org/10.1016/j.rser.2016.01.046>.
- Longhurst, N., Chilvers, J., 2019. Mapping diverse visions of energy transitions: co-producing sociotechnical imaginaries. *Sustain. Sci.* <https://doi.org/10.1007/s11625-019-00702-y>.
- Loorbach, D., Frantzeskaki, N., Avelino, F., 2017. Sustainability transitions research: transforming science and practice for societal change. *Annu. Rev. Environ. Resour.* 42, 599–626. <https://doi.org/10.1146/annurev-environ-102014-021340>.
- Lowndes, V., Roberts, M., 2013. *Why Institutions Matter: The New Institutionalism in Political Science*. Palgrave Macmillan UK, Houndmills.
- Markard, R., Raven, R., Truffer, B., 2012. Sustainability transitions: an emerging field of research and its prospects. *Res. Pol.* 41, 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>.
- Miceli, R., Favuzza, S., Genduso, F., 2013. A perspective on the future of distribution: smart grids, state of the art, benefits and research Plans. *Energy Power Eng.* 5, 36–42. <https://doi.org/10.4236/epe.2013.51005>.
- Middlemiss, L., Ambrosio-Albalá, P., Emmel, N., Gillard, R., Gilbertson, J., Hargreaves, T., Mullen, C., Ryan, T., Snell, C., Tod, A., 2019. Energy poverty and social relations: a capabilities approach. *Energy Res. Soc. Sci.* 55, 227–235. <https://doi.org/10.1016/j.erss.2019.05.002>.
- Milchram, C., Hillerbrand, R., van de Kaa, G., Doorn, N., Künneke, R., 2018. Energy justice and smart grid systems: evidence from The Netherlands and the United Kingdom. *Appl. Energy* 229, 1244–1259. <https://doi.org/10.1016/j.apenergy.2018.08.053>.
- Moore, M.-L., Riddell, D., Vocisano, D., 2015. *Scaling out, scaling up, scaling deep: strategies of non-profits in advancing systemic social innovation*. J. Corp. Citizsh.
- Morstyn, T., Farrell, N., Darby, S.J., McCulloch, M.D., 2018. Using peer-to-peer energy-trading platforms to incentivize prosumers to form federated power plants. *Nat. Energy* 3, 94. <https://doi.org/10.1038/s41560-017-0075-y>.
- Moss, T., Becker, S., Naumann, M., 2015. *Whose energy transition is it, anyway? Organisation and ownership of the Energiewende in villages, cities and regions*. *Local Environ.* 20, 1547–1563. <https://doi.org/10.1080/13549839.2014.915799>.
- Murphy, J., Smith, A., 2013. Understanding transition-periphery dynamics: renewable energy in the highlands and Islands of Scotland. *Environ. Plann.* 45, 691–709. <https://doi.org/10.1068/a45190>.
- Oteman, M., Kooij, H.J., Wiering, M.A., 2017. Pioneering renewable energy in an economic energy policy system: the history and development of Dutch grassroots initiatives. *Sustain. Times* 9. <https://doi.org/10.3390/su9040550>.
- Parag, Y., Sovacool, B.K., 2016. Electricity market design for the prosumer era. *Nat. Energy* 1, 16032.
- Pel, B., 2016. Trojan horses in transitions: a dialectical perspective on innovation 'capture'. *J. Environ. Pol. Plann.* 18, 673–691. <https://doi.org/10.1080/1523908X.2015.1090903>.
- Pel, B., Wallenborn, G., Bauler, T., 2016. Emergent transformation games: exploring social innovation agency and activation through the case of the Belgian electricity blackout threat. *Ecol. Soc.* 21 <https://doi.org/10.5751/ES-08346-210217>.
- Pel, B., Wittmayer, J.M., de Geus, T., Oxenaar, S., Avelino, F., Fraaije, M., Petrick, K., Doracić, B., Toporek, M., Brown, D., Campos, I., Gährs, S., Davis, M., Horstink, L., Hinsch, A., Marín-González, E., Ehrtmann, M., Klarwein, S., Fosse, J., Hall, S., Kampman, B., 2019. *Synthesis of Incentive Structures: Input for Participatory Integrated Assessment. PROSEU - Prosumers for the Energy Union: Mainstreaming Active Participation of Citizens in the Energy Transition (Deliverable 6.1)*.
- Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., Kunze, I., Dorland, J., Wittmayer, J., Jørgensen, M.S., 2020. Towards a theory of transformative social innovation: a relational framework and 12 propositions. *Res. Pol.* 49, 104080. <https://doi.org/10.1016/j.respol.2020.104080>.
- Pestoff, V., 1992. Third sector and Co-operative services – an alternative to privatization. *J. Consum. Pol.* 15, 21–45.
- Petrick, K., Fosse, J., Klarwein, S., 2019. *Strategies for Policy Coherence and Sustainability – Relevance of EU Policies and Frameworks for Prosumers. PROSEU - Prosumers for the Energy Union: Mainstreaming Active Participation of Citizens in the Energy Transition (Deliverable 3.2)*.
- Proka, A., Loorbach, D., Hisschemoller, M., 2018. Leading from the niche: insights from a strategic dialogue of renewable energy cooperatives in The Netherlands. *Sustainability* 10. <https://doi.org/10.3390/su10114106>.
- Rescoop, 2017. *RES202020-Report on Financial Barriers and Existing Solutions [Deliverable 4.1]. Intelligent Energy Europe Programme of the European Union*.
- Ritzer, G., 2015. Prosumer capitalism. *Socio. Q.* 56, 413–445. <https://doi.org/10.1111/tsq.12105>.
- Robiou du Pont, Y., Jeffery, M.L., Gütschow, J., Christoff, P., Meinshausen, M., 2016. National contributions for decarbonizing the world economy in line with the G7 agreement. *Environ. Res. Lett.* 11, 054005 <https://doi.org/10.1088/1748-9326/11/5/054005>.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., Schellnhuber, H.J., 2017. A roadmap for rapid decarbonization. *Science* 355 (80), 1269.
- Ruotsalainen, J., Karjalainen, J., Child, M., Heinonen, S., 2017. Culture, values, lifestyles, and power in energy futures: a critical peer-to-peer vision for renewable energy. *Energy Res. Soc. Sci.* <https://doi.org/10.1016/j.erss.2017.08.001>.
- Šahović, N., da Silva, P.P., 2016. Community renewable energy - research perspectives -. *Energy Procedia* 106, 46–58. <https://doi.org/10.1016/j.egypro.2016.12.104>.
- Sandoval, M., Grijalva, S., 2015. Future grid business model innovation: a prosumer-based cost-benefit framework for valuation of Distributed Energy Resources. In: *2015 IEEE PES Innovative Smart Grid Technologies Latin America (ISGT LATAM)*, pp. 450–455. <https://doi.org/10.1109/ISGT-LA.2015.7381197>.
- Scharpf, F.W., 1997. *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*. Hachette, UK.
- Schlaile, M.P., Urmetzer, S., Blok, V., Andersen, A.D., Timmermans, J., Mueller, M., Fagerberg, J., Pyka, A., 2017. Innovation systems for transformations towards sustainability? Taking the normative dimension seriously. *Sustain. Times* 9. <https://doi.org/10.3390/su9122253>.
- Schoor, T., Lente, H., Scholtens, B., Peine, A., 2016. Challenging obduracy: how local communities transform the energy system. *Energy Res. Soc. Sci.* 13, 94–105. <https://doi.org/10.1016/j.erss.2015.12.009>.
- Schwenke, A.M., 2020. *Lokale Energiemonitor 2019*. Utrecht.
- Scott, J.C., 1998. *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press.
- Seyfang, G., Haxeltine, A., 2012. Growing grassroots innovations: exploring the role of community-based initiatives in governing sustainable energy transitions. *Environ. Plann. C Govern. Pol.* 30, 381–400. <https://doi.org/10.1068/c10222>.
- Smith, A., 2007. Translating sustainabilities between green niches and socio-technical regimes. *Technol. Anal. Strat. Manag.* 19, 427–450. <https://doi.org/10.1080/09537320701403334>.
- Smith, A., Raven, R., 2012. What is protective space? Reconsidering niches in transitions to sustainability. *Res. Pol.* 41, 1025–1036. <https://doi.org/10.1016/j.respol.2011.12.012>.
- Smith, A., Voß, J.-P., Grin, J., 2010. Innovation studies and sustainability transitions: the allure of the multi-level perspective and its challenges. *Res. Pol.* 39, 435–448. <https://doi.org/10.1016/j.respol.2010.01.023>.
- Sovacool, B.K., Brisbois, M.C., 2019. Elite power in low-carbon transitions: a critical and interdisciplinary review. *Energy Res. Soc. Sci.* 57, 101242. <https://doi.org/10.1016/j.erss.2019.101242>.
- Sovacool, B.K., Lipson, M.M., Chard, R., 2019. Temporality, vulnerability, and energy justice in household low carbon innovations. *Energy Pol.* 128, 495–504. <https://doi.org/10.1016/j.enpol.2019.01.010>.
- Summerton, J., 1994. *Changing Large Technical Systems*. Westview Press, Boulder, Colorado, USA.
- Taylor Aiken, G., 2019. Community as tool for low carbon transitions: involvement and containment, policy and action. *Environ. Plann. C Polit. Sp.* 37, 732–749. <https://doi.org/10.1177/2399654418791579>.
- Thornton, P.H., Ocasio, W., 2008. Institutional logics. In: *Greenwood, R., Oliver, C., Suddaby, R., Sahlin-Anderson, K. (Eds.), The Sage Handbook of Organizational Institutionalism*. SAGE PUBLICATIONS LTD, pp. 99–129.

- Thornton, P.H., Ocasio, W., Lounsbury, M., 2012. *The Institutional Logics Perspective. A New Approach to Culture, Structure and Process*. Oxford University Press, Oxford.
- van den Bosch, Susanne, 2010. *Transition Experiments: Exploring Societal Changes Towards sustainability*. Doctoral dissertation. Erasmus University Rotterdam.
- van Veelen, B., 2018. Negotiating energy democracy in practice: governance processes in community energy projects. *Env. Polit.* 27, 644–665.
- van Veelen, B., van der Horst, D., 2018. What is energy democracy? Connecting social science energy research and political theory. *Energy Res. Soc. Sci.* 46, 19–28. <https://doi.org/10.1016/J.ERSS.2018.06.010>.
- Verbong, G., Loorbach, D. (Eds.), 2012. *Governing the Energy Transition: Reality, Illusion, or Necessity*. Routledge, New York.
- Verschuur, G., 2010. *Thermo Bello: energie voor de wijk - Nieuwe Nuts in de praktijk*.
- Wagner, O., Berlo, K., 2017. Remunicipalisation and foundation of municipal utilities in the German energy sector: details about newly established enterprises. *J. Sustain. Dev. Energy, Water Environ. Syst.* 5, 396–407. <https://doi.org/10.13044/j.sdwes.d5.0152>.
- Warbroek, B., Hoppe, T., 2017. Modes of governing and policy of local and regional governments supporting local low-carbon energy initiatives; exploring the cases of the Dutch regions of overijssel and fryslân. *Sustainability* 9, 75. <https://doi.org/10.3390/su9010075>.
- Weaver, P., Backhaus, J., Pel, B., Rach, S., 2017. Transformative change for inclusive society: insights from social innovations and implications for policy innovation and innovation policy (TRANSIT working paper # 9), TRANSIT: EU SSH.2013.3.2-1 Grant agreement no: 613169.
- Weber, M., 1978. *Economy and Society: an Outline of Interpretive Sociology*. University of California Press.
- Wierling, A., Schwanitz, V., Zeiß, J., Bout, C., Candelise, C., Gilcrease, W., Gregg, J., 2018. Statistical evidence on the role of energy cooperatives for the energy transition in european countries. *Sustainability* 10, 3339.
- Wittmayer, J.M., Backhaus, J., Avelino, F., Pel, B., Strasser, T., Kunze, I., Zijderwijk, L., 2019. Narratives of change: how social innovation initiatives construct societal transformation. *Futures*. <https://doi.org/10.1016/j.futures.2019.06.005>.
- Yıldız, Ö., Rommel, J., Debor, S., Holstenkamp, L., Mey, F., Müller, J.R., Radtke, J., Rognli, J., 2015. Renewable energy cooperatives as gatekeepers or facilitators? Recent developments in Germany and a multidisciplinary research agenda. *Energy Res. Soc. Sci.* 6, 59–73. <https://doi.org/10.1016/J.ERSS.2014.12.001>.
- Łapniewska, Z., 2019. Energy, equality and sustainability? European electricity cooperatives from a gender perspective. *Energy Res. Soc. Sci.* 57, 101247. <https://doi.org/10.1016/J.ERSS.2019.101247>.