Democratising the energy transition: A case study into the transformative power of Energy Communities in the United Kingdom.

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Abstract: Energy Democracy (ED), is an emerging concept that describes a divergence away from traditional, centralised energy systems, that promotes the ownership and participation of energy systems be brought closer to the individual. With democratic ideals at their core, community energy initiatives aim to empower communities by enabling local ownership of energy projects. This research investigated the role that community energy organisations have in the UK. Firstly, by looking at the associated benefits that will be stimulated by democratising energy systems through the governance structures of the community organisations. On top of this, the Multi-level Perspective derived from transition theory is a crucial element in this research to understand how the emerging social innovations of community energy can become a key actor in the UK's energy transition. Findings from a mixed-qualitative approach show how community energy in the UK can provide for a more decentralised form of how communities interact with energy systems. Additionally, the community sector presents itself as resilient with the ability to further develop itself as a mainstream actor. However, this is impeded by the lack of support and ambition from the national government, where more emphasis has been placed on larger-scale actors to undertake renewable energy targets. In order for the community energy sector to grow, the national government must take a more supportive stance.

Keywords: **Community Energy, Energy Democracy, Transition Theory, Multi-level Perspective, Energy Transition, UK, Social-innovation, Niche Development.**

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1. Introduction - a Democratic Energy Transition?

The current energy transition away from fossil fuels to a renewable based system has presented multiple challenges and opportunities with how technological developments will shape our energy systems in the near future. However, this research will delve into the emerging societal developments and opportunities that the energy transition could provide. Namely, the concept of energy democracy and understanding of how our energy practices can become more democratic through the development of local energy initiatives. This chapter will firstly report on the current theoretical framing of the energy democracy concept and then move on to how community energy initiatives can develop as a niche-innovation.

The concept of energy democracy emerged in the 2010s linked to the increased politicisation of energy governance alongside the expansion of renewable energy sources, transitioning from a niche concept used by activists to a key element in energy policymaking (Szulecki, 2020). The relevance of a democratic energy process has also emerged due to the negative socio-ecological impacts of fossil-based economies (Sorman, 2020). Factors such as unequal ecological exchange, environmental conflicts and large profits of multinational energy companies that have exploited the vulnerabilities of communities globally (Healy, 2019). With the aim to move toward a decarbonised system where renewable energy will be at the forefront of energy production. There is an opportunity to implement this normative, societal goal of a more democratised energy system. Renewable energy is localised, and as a result, a less centralised response is required but one that is addressed by decentral actors. Szulecki (2020) explains exogenous factors (amongst other factors mentioned later) are key in driving the demand for energy democracy, primarily the threat of climate change. Stimulating a greater public desire to have control of the production, transmission and consumption of energy.

It is important to note that before energy democracy the widespread concept; that is now encouraged at national and even EU policy levels, was originally formed at the niche or grass-roots level as a social movement away from the negative externalities of traditional fossil fuel based systems, which produced harmful CO_2 emissions in the atmosphere. Moving to local projects based around small scale energy production from renewable sources. The emergence of prosumers and grassroots movements have led the way for a much larger transition. The integration of technological change; in renewable energy, with the emergence of new energy governance structures (Burke, 2018). The rise in the Energy Democracy (ED) phenomenon has also brought increased academic attention with growing literature on the subject, with most publications coming after 2017 this is a very novel topic of research. As a result, there is evidence that the framing of ED is diverse (Brummer, 2018). However, Szulecki, (2020) narrows the fragmented definitions of ED into three 'ideal-typical understandings', Categorising energy democracy as a process of change, an outcome of the energy transition itself and a normative goal to aspire to in the near future. This variance in perspectives is intriguing as it will have a different attitude as to how democratic processes should be implemented within energy systems. It being a normative goal implies that ED is an outcome that should be controlled, whereas ED being framed as an outcome or process implies that it will occur naturally and will not require controlling. It also represents how the concept of energy democracy has emerged through various disciplines and

cultures. Especially distinguishing between the pre-existing grassroots energy movements and the ongoing normative goal to shape the energy transition, these are varied in nature. In Western Europe, discussions surrounding democracy and climate justice can be linked to social movements and left-wing radical circles (Szulecki, 2018). In Germany, this was a frame for political change, where energy governance was handled at a more decentralised level by local government. In Poland, it provided the groundwork for giving 'power to the people' in line with its 1989 solidarity and dissident attitudes. The USA-based trade unions for energy framed ED as a way to emphasise ownership and environmental action (Szulecki, 2018). So the national contexts can also provide varied approaches to how ED is framed and implemented. This variance also should be connected to the multidisciplinary approach of ED. Starting as a niche, grassroots movement, this topic has sprawled into economic, political and social research. Each with varied lenses as to what ED can bring to the energy transition.

Energy democracy is evidently embedded with ideals from democracy theory itself. Meaning that the process should follow fundamental ideals. Participation, equality, political tolerance, accountability and transparency, just to name a few prominent ideals. Of course, these are broader guiding rules that have to navigate complex political and social contexts, consisting of certain power structures and imbalances. However, what is crucial is to understand how these ideals are translated into energy democracy, which will also have to navigate the same complexities of the political and social contexts. Why is there an emerging demand to democratise energy? To understand this, Szulecki (2018) suggests understanding the societal context ED exists within. That is an appetite to democratise the energy sector that is traditionally centralised, depoliticised and detached from public participation. There is a clear divide between the entitled energy companies that are detached from local needs, in comparison to the emerging ED movement that strives for community participation and ownership for its citizens. Firstly, political participation and inclusive decision-making are considered the base or essential elements of a democratic energy system (Gautney, 2009). Deliberation democracy is noted as being better at solving environmental problems and hence is influential on energy democracy (Dryzek, 2000). Deliberation highlights a method of participation where citizens can have active involvement as subjects and political agents (Blee, 2012). Dryzek (2000), highlights three outcomes of this process that should be prevalent in emerging energy systems. These are *legitimacy*, *problem-solving rationality* and *making better citizens*.

In practice, however, there are emerging arguments that energy democracy may not be truly democratic. ED movements may be framed as local governance that has a moral voice doing the 'right' thing (Little, 2002). There is criticism as it describes a reality of homogenous communities where locally developed norms can effectively regulate resources (Featherstone, 2012). There is an undesirable assumption here that community efforts and decentralised systems within energy allow for a true democratic system for communities. Agrawal (1999), describes these as 'mythic communities', criticising the unrealistic assumption about the nature of communities to produce favourable outcomes. Seemingly ignoring the complexities within communities and the national context with regards to producing, owning and consuming renewable energy. Even within decentralised systems, communities will face their own power struggles and individual ambitions. So to assume that these processes are truly democratic is often criticised by academics. The main critics of community-based

energy systems framing themselves as democratic come from two distinct roots: difference and inequality within communities (van Veelen, 2018). Investigating the true democratic nature of community energy systems is further discussed in the next chapter.

Energy communities are centred around a business model that allows citizens to mutually participate and/or own renewable energy or energy efficiency projects (REScoop.eu, 2020). energy cooperatives (main form of CE) follow the 7 principles outlined by the International Cooperative Alliance (ICA). These being *(1)* voluntary and open membership, (2) democratic member control, (3) economic participation through direct ownership, (4) autonomy and independence, (5) education, training and information, (6) cooperation and (7) concern for the community (ICA.eu). Hence showing the link between community energy and democratic ideals. As the energy transition unfolds it will present a movement from traditional non-renewable energy sources to renewable energy sources. RES presents characteristics of low power density and intermittence, on top of this renewable energy production will be more visually polluting such as onshore wind farms and solar parks. However, it does provide for a more locally suited energy source. Thus allowing for the development of more localised energy institutions (Barca, 2011), coinciding with the emergence of community energy programmes such as ECs. The duality of more localised, renewable energy production and the growth of community energy results in the communities having a better connection to capital and means of production surrounding energy. In turn, resulting in a more decentralised means of stimulating the energy transition.

RECs are one of the main emerging community-based initiatives/organisations, established on a business model of community ownership concerning the production, transmission and distribution of renewable energy. They may differ in size, structure and energy type, however, they all are based on building an ownership structure that prioritises the community and energy democracy. As of 2020, there are approximately 1,500 renewable energy cooperatives throughout Europe (REScoop.eu). However, this distribution is not even, as most are situated in North-West Europe where the share of renewables within the energy mix is much higher. Namely Denmark, the Netherlands, Belgium, Germany, Austria, Northern Italy, Sweden, the UK and France. And this is less apparent in fossil-fuel-reliant countries based in central and Eastern Europe (Kunze, 2014). Their development in Western Europe can also be connected to the onset of the shock by oil and nuclear crises, ecologist movements and most importantly the impact the socio-political-cultural context has on policy transformations (Cappellan-Perez, 2018). From analysing the contemporary literature on ECs it is clear that two countries represent the largest growth and support for community-based energy, those being Germany and Denmark (Cappellan-Perez, 2018. Ozgul, 2020. Holstenkamp, 2016). Both have shown that the emergence of community energy has been backed by effective central policy support. For instance, a new government in Denmark supported decentral technology solutions, decentral ownership and sufficient state aid. Meaning that local-level actors could have political value and leverage (Eikeland, 2016). In Germany ECs have emerged as a consequence of a rise in renewable sources alongside feed-in tariffs for decentralised based RE projects, additionally, the legal certainty of ECs within cooperative law and the liberalisation of the German energy market (Menges, 2003. Ozgul, 2020).

It is then clear that at least in Western Europe that there is a place for communities within the transition towards renewable energy-based systems to overcome the challenges faced by climate change. This is shown through their emergence and rise in the past 20 years. They also present localised benefits that cannot be associated with centralised approaches. As mentioned before they coincide with the localised nature of renewable energy and so, seem like a suitable structure of local ownership of renewable sources. In addition to this, Brummer (2018) displays a variety of benefits associated with ECs and hence showing the reason for their recent popularity in Western Europe. These benefits will be discussed in brief. Firstly the associated economic benefits. Generating income for the community is evident, this is done through direct revenues, tax revenues and stimulating the local economy. Secondly, there is better education and acceptance of both the technologies involved and the overall usage of renewable energies. ECs can also lead to better levels of participation and community building which coincides with the ideals of energy democracy. The aforementioned benefits can in turn lead to more sustainable actions in the community, people who are involved in ECs are generally more likely to repeat environmental commitments in their everyday actions, generating a more sustainable behaviour throughout communities. On top of this, EC will play a role in generating local energy, of course, striving to meet renewable electricity targets (Brummer,2018). Hence it is clear that cooperatives are suggested to have a positive impact on the socio-economical landscape but also have an interesting position within the energy transition as they can also promote the generation of renewable energy,

The exact role of ECs in the energy transition is a question that this research would like to address. ECs are local initiatives aimed at generating renewable energy whilst simultaneously supporting and centring their actions around the community and are categorised within transition theory as a 'social niche' (Van der Brugge, 2005). To understand the role of ECs, transition theory and the Multilevel perspective (MLP) will be utilised to further understand the transitioning effect local niche energy initiatives can have within the whole energy system. Essentially asking how participative models of ownership and community action can transcend into larger scale, regime level energy systems and practices. Using a comparative case study within the United Kingdom, this research will investigate what role UK based renewable energy communities can play in the country's energy transition. Arriving at the research question: '*what role can renewable energy communities play in shaping a democratised energy transition in the United Kingdom?.'* Building on this question, three sub-questions are provided to address certain aspects of the overarching research question. Firstly this research aims to clarify the democratic reality of ECs. Asking the question: *'To what extent do renewable energy communities practise democratic processes within their organisations?'* Furthermore, this research aims to understand ECs position within transition theory through two sub-questions: *'To what extent can renewable energy communities; as a social niche, have a transformative impact on the present energy regime?'* And, *'To what extent will regime actors support or resist social innovations from the niche level, renewable energy communities?* The next chapter will give theoretical insight into the topics of energy democracy, community energy and transition theory. Following this, the results and conclusions from the quantitative research will be addressed. Presenting the potential role community energy can play in the United Kingdom.

2. Theoretical Framework

This chapter will give insight into the current theoretical backgrounds of the main concepts within this research. Primarily by defining community energy and showing its localised role within the energy sector contextually and theoretically. Beyond this, more critical theories will be presented about energy democracy and how it may be framed in different ways from various perspectives in the field. And in order to comprehend the role community energy can play within the socio-technical society, this research will investigate how this phenomenon is embedded within transition theory.

2.1) Community Energy

One emerging phenomenon linked to the increased desire for a more democratic and just energy system is the rise of energy communities and renewable energy cooperatives. Especially in Western Europe and North America. Energy communities can vary in size and purpose. Whether they are involved in production, transmission storage or energy efficiency projects or differing between technologies such as wind and solar generation. However, their key fundamentals are similar. The core concept behind energy communities and communities is the principles of ownership and participation. In turn, a justifiable level of ownership and participation coincides with the fundamental ideals behind democratic processes and the concept of energy democracy. Community energy is based on a bottom-up approach that allows communities to be involved with local energy projects. Energy cooperatives are a type of energy community, however in this case are defined by a legal, cooperative business model, either surrounding energy in general or renewable energy focused (REScoop). Renewable energy communities (REC) have the overarching goal of ensuring that an energy transition can take place whilst fostering the ideals and practices surrounding energy democracy. These practices include open membership, democratic control, economic participation, autonomy, education/information, cooperation between communities and concern for community (REScoop). These practices bring about multiple economic, social and environmental benefits to the community and possibly further towards larger scales.

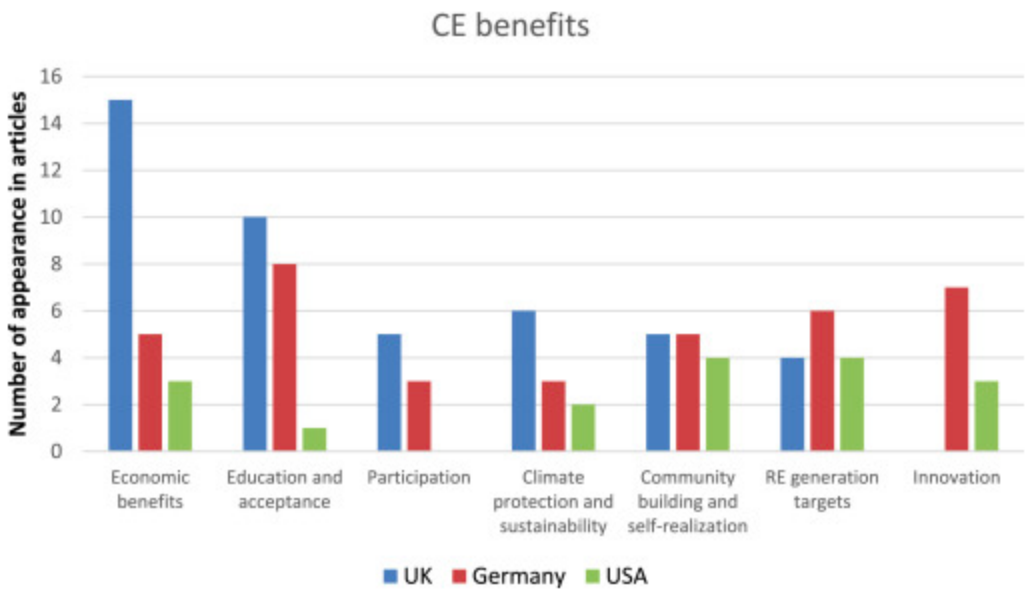

Figure 1: Graph representing the benefits of CE cited within current literature. (Brummer, 2018)

A comparative literature review of multiple energy community literatures throughout the UK, Germany and the USA provides insight into the benefits and barriers realised by energy communities (Brummer, 2018). Energy communities provide multiple benefits with varying degrees across the aforementioned countries, as shown in figure 1. For instance, Economic benefits can be generated in multiple ways such as financial benefits through profits of community ownership, higher employment and benefit to addressing fuel poverty. On the societal side, Energy communities can promote acceptance of renewable technologies and participation brings about behaviour change as well as financial/political inclusiveness. Community building is also promoted. Environmentally climate protection can be aided by creating higher levels of climate awareness and RE generation targets can be met by ECs being positive transformation agents, stimulating the promotion, finance and uptake of renewable technologies (Brummer, 2018). To be clear, the levels of each 'benefit' in figure 1 do not reflect the relevance but the frequency they are highlighted in scholarly articles. However, it does highlight the multitude of benefits that ECs can bring and do so across national contexts.

It is advantageous to understand the concept of what a community is to understand the fundamentals of ECs. As the concept of community is at the core of how ECs operate and could be argued each cooperative is a community in its own right. Communities can be placed either within their Geographical context or beyond it, and this is the central difference between Walker's (2011) concept of 'community as a place' and 'community as a network'. Both emphasising the importance of a social relationship and unified interests. However, if a community is located within a certain geographical space is to be disputed. To add, it is important to explain that these two categories of a community can coexist and emerge at different times. Vitally, energy communities can also contain these principles. Either is associated with a place: local citizens owning a local solar park for instance. Or associated with a network: investing in offshore wind, shared ownership programme. However, the fundamental objectives remain the same. Ownership by the members of the community. A system where net surplus

is evenly distributed (Mumford, 2010) and the governance structure is based on democratic values (Hansmann, 2000). One key concept that overlaps within topics of energy democracy, energy communities and the energy transition is the concept of participation.

Participation can achieve the task of facilitating societal acceptance of renewable energy technologies (Bauwens, 2018). Renewable technologies such as onshore wind farms and solar parks have been met with resistance (Huijts, 2012). Especially larger scale sights where the community is less connected (Walker, 2007). Community energy and with that participation in the energy system allows for communities to take the lead with regard to planning, own the assets and capture the economic and social benefits of ownership. And can be implemented in various ways such as a community fund or shared ownership with a private investor. Participation has been highlighted by some policymakers in the UK as a 'remedy' to the backlash and opposition to large scale onshore wind farms (Walker, 2007). This is because participation can create positive attitudes and behaviours towards renewable energy technologies. Acceptance can be brought about in multiple ways. Namely the perceived risks/benefits, the emotions and values connected to the situation, the trust in the ownership and the distributed costs/benefits (Truelove, 2012. Gross, 2007. Visschers, 2014). Being a part of an EC and hence participating can stimulate these factors and in turn, can create pride and connection towards renewable energy projects.

2.2) Democratising Energy & Energising Democracy

If communities can become more involved in energy governance this provides a window for more justified outcomes for the communities, giving them more control, participation in decisions, holding decision-makers accountable and solving issues in a democratic manner. Henceforth, there is an opportunity to reshape the ongoing energy transitions in a more democratic and equitable way that evolves the consumer into an active participant in the energy landscape(s). In theory, these outcomes are generally positive, however, not everyone within a community wishes to be involved and this nuance will be addressed later. In order to achieve this democratic shift new practices, institutions, forms of governance and actors will have to be established. Democracy in general is idealistic in nature following key steps such as participation, equality, political tolerance, accountability and transparency just to name a few. However, in the context of the energy transition, the ideals of democracy can be utilised as a tool to reshape how we implement energy projects. Szulecki (2017) proposes that the fundamentals of energy democracy are centred around communities having a desire to become more involved in the energy systems. After comparing a wide range of discourses on how energy democracy can be defined and its multiple proposed goals, Szulecki (2017) came to this conclusion on the key characteristics of energy democracy:

> "Characterised by wide participation of informed, aware, and responsible political subjects, in an inclusive and transparent decision-making process relating to energy choices, with the public good as its goal. To create and safeguard civic empowerment and autonomy, high levels of ownership of energy generation and transmission infrastructure through private, cooperative or communal/public means are necessary" (Szulecki, 2017, pg: 24).

In order to establish a more democratic energy system, three core processes are suggested, these are decision-making, accountability and dispute resolution (van Veelen, 2018). Decision making is centred around the idea that there is the most amount of people involved in an energy project as possible, contributing to a greater ED through community involvement. Accountability should be put in place to ensure that the ones making decisions are doing so in the best interest of the collective by placing frequent checks on the internal workings of a community initiative. Finally, dispute resolution accepts the idea that varied values and opinions are at play within communities and to reach an outcome these disputes must be settled in a democratic manner. Hopefully framing disagreements not as a disadvantage but as a strength in building stronger relationships within the community. These participative ideals are reflected in Szulecki's (2017) discussion on the 'prosumer'. Where participation can evolve not only the governance structure but also the individual's attitudes. Citizens are not only being altered in their attitudes but given new roles within the energy landscape, where they can stimulate localised transitions within their own communities. However, in their findings, Van Veelen (2018) displays that the ideals of decision making, accountability and dispute resolution are restricted in practice. Doing research on community energy projects in Scotland, they found that these ideals can be in contradiction with everyday practices. Whilst communities value ideas of participation in practice these can be hindered by the inner politics and ambitions of the community. Where democratic rules can be set, negotiated or subverted (van Veelen, 2018).

The energy democracy movement coincides with the potential that renewable energy sources yield and hence these phenomena should enable one another, creating a renewable energy transition with democratic ideals at its core. Stephens (2019) argues that renewable energies have the potential to stimulate a social transformation. Highlighting three fundamental opportunities that renewable systems could provide. Firstly renewable energy technologies are suitable for local projects, especially solar projects. This would mean that local actors would have more ownership and control over energy sources. There is also an opportunity that renewables can promote the pro-summer, where individuals can produce their own energy at the household level. Where they are less reliant on purchasing energy from a centralised electricity provider. Secondly, Stephens (2019) argues that due to the perpetual nature of renewable sources this essentially provides for a 'free' energy source. Once the initial technological costs are covered, maintenance costs are covered and intermittency of sources is better managed, communities will have access to a 'free' energy source based on its renewable nature, unlike fossil fuels. This could be criticised as there will always be costs associated with electricity production and consumption so it will never truly be free. However, the main point being presented here is to show how renewables could transform traditional economic structures surrounding energy production and consumption due to the variety in ownership and production structures of renewables. Finally, moving away from fossil fuels to renewables means that communities do not need to compete for scarce resources that are highly uncertain. With a healthy mix of renewable sources in an area, communities can be supplied by a certain and long-term source, providing that the infrastructure stay operational, the wind will continue to blow. Creating an energy system that becomes more decentralised and provides a window for more inclusive ownership structures that fossil fuels did not present (Stephens, 2019). Hence the increased usage of renewable sources possibly could coincide with an opportunity to

create a more democratised energy system where ownership and participation can be stimulated within communities

2.3) Transition Theory

Renewable energy communities invest in cleaner energy sources in order to meet the consumption needs of the community and in turn contribute to the increase in renewable energy and technology usage. It is argued throughout a body of literature that renewable energy cooperatives and energy communities as a whole have a transitioning impact on the energy domain. So RECs not only contain internal/organisational benefits for their community but also may have an impact on the larger regime levels also. In this argumentation, RECs are defined as a niche. RECs as a niche have the potential for social and technological innovations to appear (Capellan-Perez, 2018). Essentially the practices associated with energy communities such as participation and a high level of community value can emerge as innovations and in turn have an impact on the existing sub regimes that exist within society. Then reshaping the actions and ideals of the regimes is what aids in transitioning the whole societal system towards a more just and sustainable system. The role of the niche is considered important in transitions, and hence will be addressed in more depth later. Firstly, it is vital to this research to understand the whole picture which is based on the multi-level perspective (MLP)(Van der Brugge, 2005). MLP is connected to transition theory as it displays how three socio-technical levels interact in order to stimulate transitions.

MLP describes a relation between three interconnected levels, the regime, the landscape and the niche. All three levels exist within society at various different spatial scales, for instance at a regional level, nationally or possibly sub-nationally such as the EU. However, the focus here will be on the national/macro level. The three levels interact with one another which may lead to transitions, here the co-evolution of the three levels is essential. The regime is the dominant system which is incremental to change and reinforces current systems. For radical change to be induced the regime level must interact with fundamental changes from a shifting landscape and novel innovations from the niche. The niche plays a significant role as it produces innovations. These innovations, whether social or technical, then move into the unprotected space of the sub-regimes where change can take place (Dóci et al, 2015)). The interactions between these levels can be viewed below in figure2.

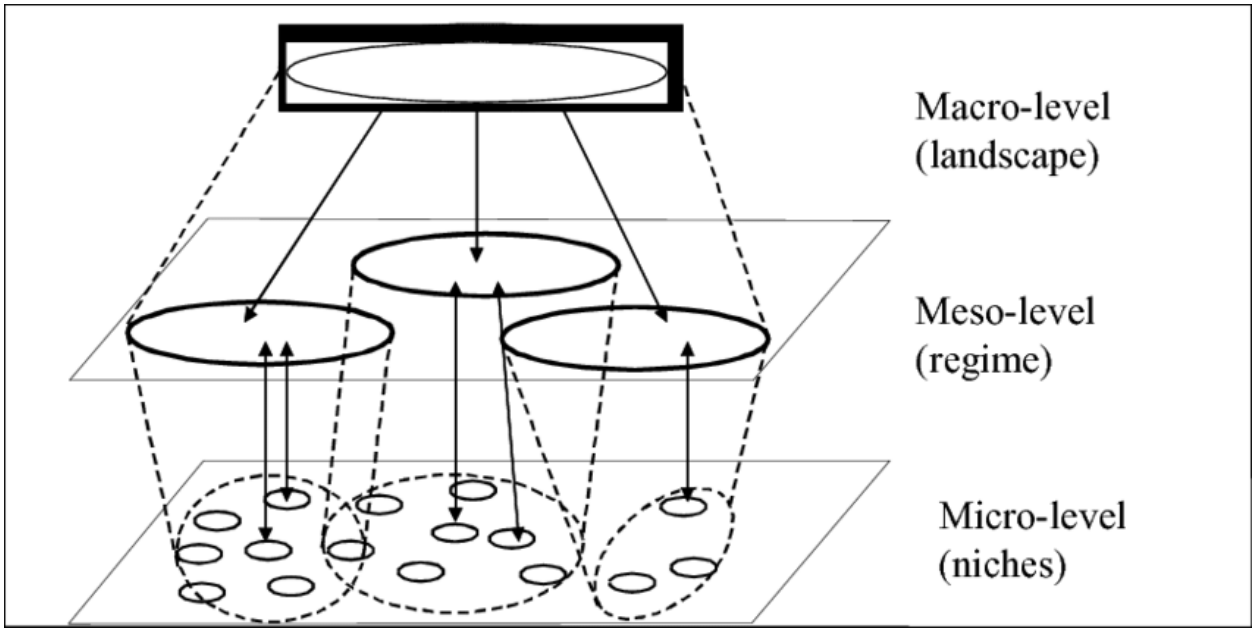

Figure 2: The Multi-level perspective. (Van der Brugge, 2005)

The regime and the landscape

The landscape level highlights an external force which has an influence on the regime level that is out of the control of the regime level actors these can be societal and political developments such as climate change. Two outcomes can occur here. Either the landscape reinforces the actions of the regime, in this case, change does not occur and the regime level continues in its trajectory. Or, the landscape presents an alternative perspective and hence will force the regime to stimulate intentional, radical change (Geels, 2002). The speed at which this transition occurs can be varied (Geels, 2005). Either these can be slow-onset changes due to a shift in culture, demographics, politics or climate change. Or, these transitions come about quickly due to external shocks, such as wars, economic crises etc. It could be argued for this research that the overarching ideals of a more democratic energy system as well as the existential shocks of climate change are the landscape elements that may have a transitioning impact on the regime. However, this research focuses on the power of the niche and the socio-technical innovations it can produce. The regime is also crucial to understand, as it is the dominant structure in realising transitions. The regime is characterised by its stability as it is (somewhat) resistant to radical change and is also strengthened by the multiple sub-regimes that make up the complex whole. However, if the regime is resistant to change, how can transitions occur? Here another 'theory' comes on stage, the complex adaptive system (CAS). The regime is expected to behave as a CAS, which has itself two levels, one robust and the other flexible. Due to the robust level on which dynamics and flexibility can flourish, the system stays alive, therefore remains, while maintaining a capacity to change (De Roo, 2018). It is where rules are determined such as regulations and institutional arrangements, prevalent practices occur and dominant actors are located. This includes areas such as the market regime, policy regime, science regime as well as the socio-technical regime (Geels, 2002). It is therefore intriguing to understand how both the landscape and niche levels can have a transformative effect on the incumbent regime. ECs as mentioned previously are positioned within the niche level and hence are

highlighted as being socio-technical innovations that can have an impact on the current 'energy regimes'.

The niche

RECs can be defined as a niche level actor. But how does the niche level operate within the MLP? Niches operate on the lowest level within this system, where innovations are fostered, taking place on a small scale. Due to social and technical innovations being novel and emerging they may not have the ability to operate in a market setting and hence must be produced in a so called protected setting. For energy communities, this protected setting means that in the sector's early stage of development sufficient financial support must be given in order for them to survive in the market. It is often assumed that niche actors develop technologies in order for them to be used at the regime level at a later date and become dominant technologies (Geels, 2011). However, a main criticism of this idea is that theories place too much emphasis on technological emergences and hence neglect socio-cultural innovations. This means that more importance is placed on technological products that can enter the regime as opposed to socio-cultural practices such as energy communities (Geels, 2005; Seyfang, 2010). So more emphasis should be placed on the social developments that can occur in parallel to technological innovations. Additionally, it is criticised to assume that the niche's ambition is to enter the regime. Dóci et al, (2015), distinguishes between 'internally' and 'externally' oriented niches. Externally, refers to those that wish to invest in growing their innovations and try to break into the regime level. Whereas some niche level actors may not have this ambition and are more willing to address small scale, local issues. These are internally focused. Internally oriented niches only emerge to address micro-level demands. Hence it is essential to distinguish between those niches that are external and internal. Dóci et al, (2015), further argues that external niches are established around strong technological innovations at the core. Whereas social innovations only use technology as a tool to achieve the desired social practices of the niche actors. Dóci et al, (2015) presents social niches as internally oriented, however, this can be disagreed upon as energy communities are likely to be external, due to the strong societal debate on energy and sustainability, and major societal concerns. However internal niches can still have a changing influence on the regime.

From this, it is important to categorise the orientation of ECs. Although renewable technology is an element of ECs, the core aim of these communities is to establish a more decentralised, community-based ownership of energy systems. Following current literature ECs can be possibly categorised as internally oriented, social niches (Cappellan-Perez, 2018. Dóci et al, 2015). However, the internal orientation of a niche does not solely mean it will not interact with the regime level. Internal niches can connect to the regime through necessary networks, that are required for niche innovations to operate. Movement from the niche to the regime may be inadvertent and not the aim of the innovation, however, it can still promote practices and values for the regime to learn from and adopt (Dóci et al, 2015). Essentially, there is reason to believe that local community energy projects can interconnect with the regime and so will aid in the overall energy transition of a country. The thesis will try to uncover how this interaction can be realised. The next section will delve further into the literature surrounding the interaction between the niche and the regime within the context of community energy.

Interactions between the niche and the regime. Co-dependency or conflict?

It is still up for debate about the transformative potential of ECs, and the extent to which niche innovations can scale up and have an impact on the regime and later stimulate a different pathway for the energy transition. A good indication of this growth would be the establishment of an abundance of energy communities throughout. Also, this potential can possibly be determined by the transformative strength of the niche but also the regime level's willingness and desire to be influenced by intentional, niche level developments. So, this section will investigate the impact communities can have, how they are being hindered by the regime and how to better manage this transition stage.

Niches, both technological and social, focus on innovation that aims to benefit civil society, and unlike the incumbent regime, social niches are centred around practices and actors that are working in the interest of emerging societal goals. It is argued that multiple niches can have similar goals and ambitions and from this emerges a 'proto-regime' (Geels, 2006). Made up of a structure similar to the regime however the difference is characterised by the shared goal for social (or technical) innovation. Which can now operate beyond the niche level and network with regime actors. In turn, giving the niche (CE) the opportunity to break through to the regime. This is further backed by Dóci et al, (2015) who classifies this as a 'global niche', where shared knowledge and practices bring together similar niches. Thus forming a stable institutionalised collective that has the ability to operate alongside regime actors. A good example of this would be the various support organisations in place that support the development of community energy. Which previously is difficult for small scale niche actors that may not have that protected space. In summary, a global niche, made up of like-minded regime actors, is being presented as a fundamental way in which social niches and innovations can break through to influence the current regime (Dóci et al, 2015).

Additionally, in theory, the transformative power of a social niche is created through the support of powerful regime actors. The ascending of niche innovations into regime practices must be embraced by both the niche and the sub regimes and so the ability to form a strong link between these two levels is also required. This builds on MLP theory as highlighted previously, it requires change on all three levels of the socio-technical system. Firstly niche actors must reach out to supportive sub regimes. One example given is the need for niches to connect to purchasing agreements with the electricity grid. Conversely, regime actors may also seek out niche level innovations, in order to follow prevailing trends, which means these niches are plenty, in which patterns, paths and trends become visible, which no longer can be ignored (Dóci et al, 2015). This is done by regime actors reshaping their practices to welcome growing innovations. In contemplation, this may seem counterintuitive. Firstly social innovations are internally oriented meaning they do not aim to enter the regime and so would not seek out regime actors. And incumbent regime actors are resistant to rapid change and the welcoming of radical innovations goes against this. However, this does not address the fact that the interconnectedness between the two levels remains. It seems there is an interdependence between the two levels. The regime supports the niche and the niche alters the practices of the regime. As summarised by Dóci et al, (2015, pg 89), "...the niche is partly building on the existing regime, but at the

same time it alters it and shifts it in a new direction." Showing not only the interdependency but also the ability of niches to transform the regime.

Moving away from the abstract notions of regimes and niches, where do these findings correspond to energy communities as a niche actor? Energy communities are local initiatives that create social innovation (participatory goals) whilst utilising new technological trends (renewable energy technology) and so are classified as a social niche. The favourable interaction between the social niche level and the regime is further emphasised by Hasanov (2018), who investigates the relation of local energy initiatives with local governance and their institutional actors. Support organisations from the regime have the ability to provide strategic advice, become institutional brokers between private-public partnerships and on top of this contribute services such as suppliers and technicians (Hasanov, 2018). Building on the 'two-way nature' as presented by Dóci et al, (2015), this research shows how institutional actors had to reshape their protocols to encourage interaction with local energy initiatives. So the desire for the interaction between the two levels is not solely initiated by the niche.

Elaborating on the internal nature of local energy communities, this research displays how local energy groups' actions rarely expanded beyond their geographical limitations. However, their socio-institutional practices "transcended the boundaries of the local area and inspired institutional actors and other local communities to experiment with similar practices in different localities." (Hasanov, 2018, pg 90) Showing the extent that even internally oriented social niches can influence the regime. So in order to utilise this positive relationship between the niche and the regime, there must be an investment into practices that promote the innovative outcomes of local energy initiatives. This must be managed in a way where niches are supported by the regime to overcome lock-in situations from the regime and where the regime can facilitate change due to the increasing pressure from the niche and the landscape. In this case, the regime's energy system to become localised and initiate practices that are both democratic and participatory. This is done through establishing the use of local initiatives.

In contradiction, other studies present a different interaction between niche innovations and the sub regimes. Research based on Korean renewable energy cooperatives showed that even though the Korean government outlined an ambitious energy transition, it failed to address the objectives of local and regional levels. In turn, inhibiting localised projects such as RECs. The lack of recognition from the regime level in the case presents a situation where the emerging niche actors had to "break a scaled regime" (Park, 2021, pg 8). Showing a direct conflict between the innovations presented by the niche and the incumbent regime that is not open to change. This is in contradiction with the findings of Hasanov (2018) where the regime is prone to social, innovative change from the niche. This then presents how various national contexts can shape the transitioning impact of the niche. As there will be a variance in the extent that the regime is open and willing to build connections with the niche level RECs. The narrative that the regime is resistant to innovative change is also pertinent across other national contexts. Research into the transitioning power of RECs in Spain highlights the current economic and political situation as the main barrier to the development of energy communities (Cappellan-Perez, 2018). And so this is an example of how certain sub regimes can hinder niche development. Where current regulations have made it difficult for RECs to enter and operate in the

market. On top of this, the uptake of renewable energies, in general, has been slowed down by poor regulations and so will consequently hinder the development of RECs. Without the ability to function in the energy market and only be highly dependent on voluntary workers, a long term vision to develop community-based energy ownership seems unlikely. RECs do face a multitude of barriers, mostly stemming from certain sub regimes such as lack of political/institutional support, unsupportive legal frameworks, inhibiting planning requirements, grid connection costs and lack of funding (Brummer, 2018). Figure 3, highlights the various barriers highlighted in academic articles across the national contexts of the UK, Germany and the USA. Mainly the 'organisational', 'lack of institutional support' and 'lack of research' categories display regime level barriers for community energy.

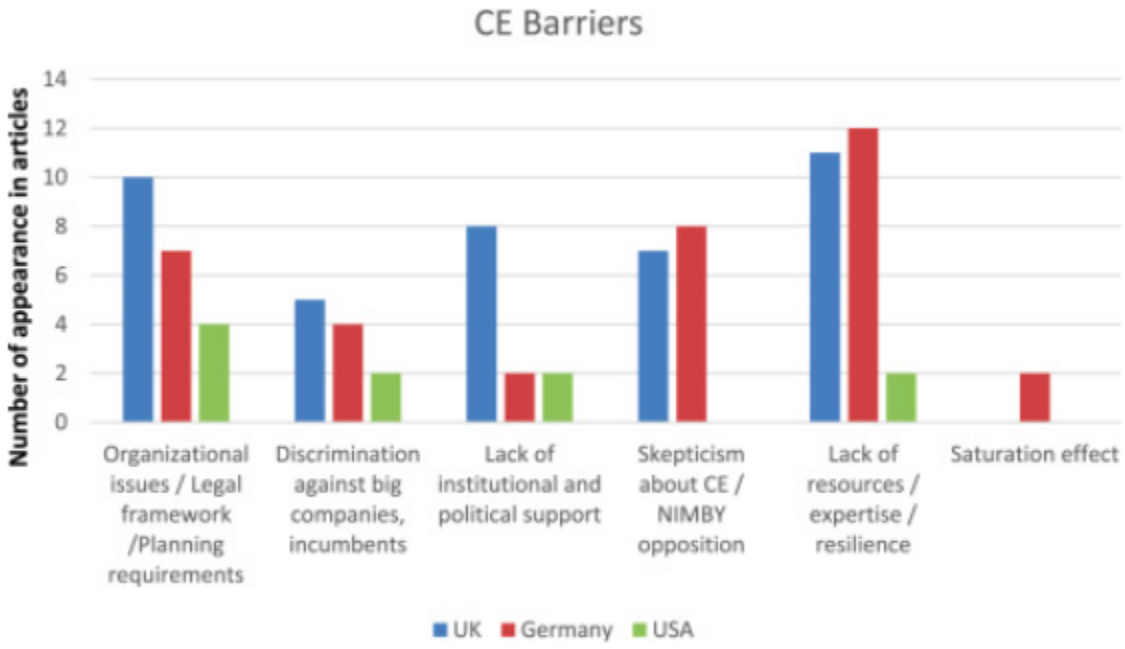

Figure 3: Graph representing the barriers to CE cited within current literature. (Brummer, 2018)

What is interesting in the conclusions of Capellan-Perez (2018) 'Renewable Energy Communities as an instrument towards the energy transition in Spain', and rarely voiced throughout other bodies of literature, is the influence of the landscape level. Here RECs have been able to utilise pressure from the landscape in order to establish their niche actions. Certain pressures such as carbon neutral goals, climate change, and economic crisis for instance have all shifted public perception of how to govern our energy systems. In order for transitions to take place in the energy system where the ownership is localised, democratic and decentralised there is both a requirement for sub regime actors to have the willingness and ability to open up to innovations, for instance through financial schemes or progressive policymaking. And for niches to transcend into the regime level, where practices of participation and community orientation are adopted by regime actors. This has to be facilitated by overcoming certain pre-existing barriers placed at the regime level.

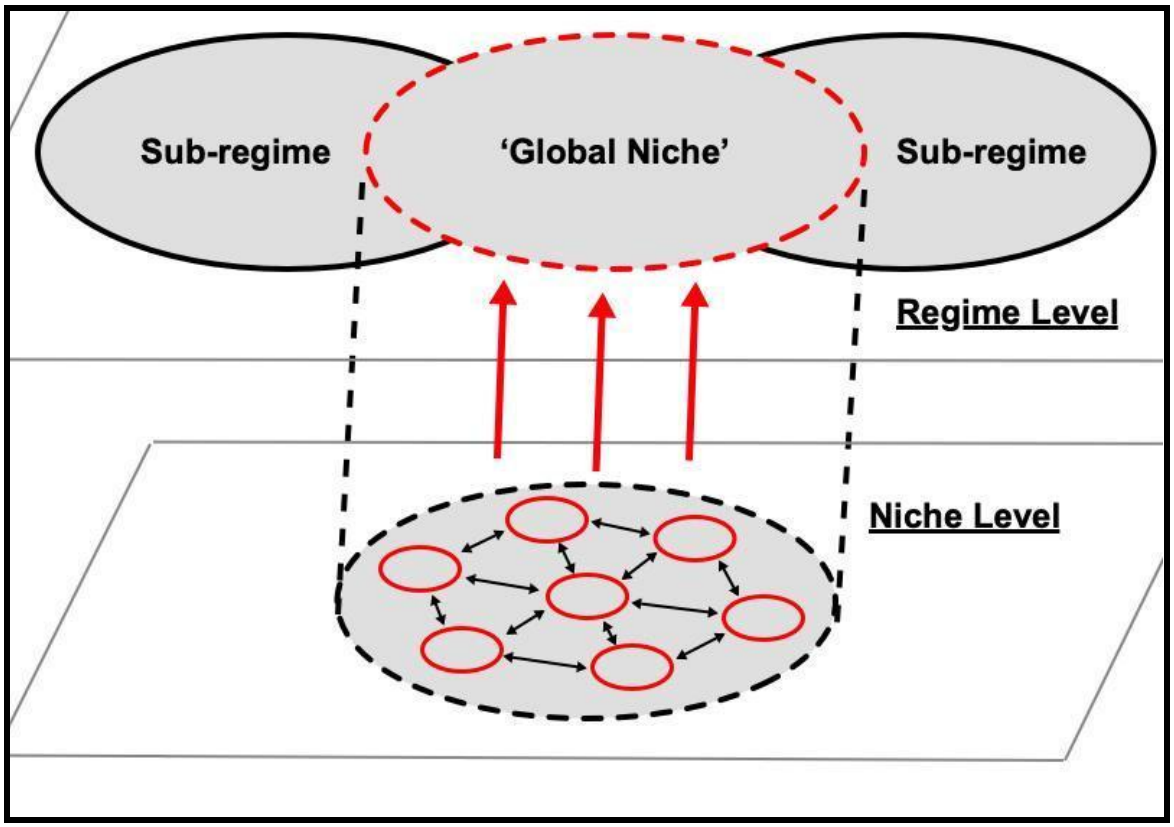

Figure 4: Theoretical model. (Walker Clarke, 2022) (Based on the original MLP concept, (Van der Brugge, 2005))

The model above presents the theories aforementioned surrounding the interaction between the Niche and regime level actors. Building off the model: 'Multi-level concept' (Van der Brugge, 2005), this model presents the ability of niche innovations to ascend into the regime level due to the creation of a 'global niche'. To delve into this model deeper, each aspect of the model will be described and linked within the literature. Firstly, on the niche level, a situation occurs where multiple niche actors, in this case, renewable energy communities, exist. Furthermore, due to the shared practices and ambitions of several renewable energy communities, they are able to interact with one another Dóci et al, (2015). The shared practices mentioned refer to community based initiatives that aim to promote participative forms of energy governance at the community level (Brummer, 2018). Here, interconnectedness of the niche actors will lead to shared learning processes. In turn a shared ambition and common goal will lead to the emergence of a 'global niche' as suggested by Dóci et al, (2015), or 'proto-regime' as suggested by Geels (2006). Which essentially are the same concept, and for clarity 'global niche' will be used. Next, the global niche is able to enter the regime where it can interact with existing sub-regimes that can aid the processes of the RECs, such as financial or institutional actors. Hence the global niche will have the ability to change sub-regime practices and so will have a transformative effect on the way energy participation is governed. The ability of the niche innovations to enter the regime is due to its transformative potential (Dóci et al, 2015). Both the learning processes and support from the regime, in theory, will mean that niche innovations have the potential to enter the regime and become widespread/mainstream in the UK.

2.4) Community Energy and the United Kingdom

North West Europe has shown a healthy growth in local energy initiatives (Cappellan-Perez, 2018. Ozgul, 2020. Holstenkamp, 2016). Comparing the likes of Germany and Denmark, the UK is lagging behind in the uptake of community based energy projects. This is explained by the national approach to community energy. The UK government has taken a more market-led approach to community energy and hence less support mechanisms are in place (Brummer, 2018). To add, the 'regulatory environment' (regime) surrounding CE in the UK has not adapted to support its development, with the UK's energy system still being invariably centralised (Saintier, 2017). Hence, this research will be based in the UK as this deficiency in national (regime) support is intriguing. What impact may that have on the future development of CE? So the scope for the research cases had to follow this criteria: (1) UK based, (2) involved in the operation or support of community energy projects and (3) a focus on renewable energy (4) have cases that cover the UK's various sub-nations for a better overview of the sector throughout the nation.

3. Methodology

3.1) Data Collection

In order to understand the role community energy plays in the UK's energy transition, this research used a qualitative approach including documentation research and in depth, semi-structured interviews. To further this understanding two core elements derived from the theoretical framework have been extracted and are at the core of this research process. Firstly investigating the democratisation of energy within energy communities by looking into their respective governance practices and experiences. Secondly, to look into how Community Energy can have a transformative impact on the UK's energy system and transition, by looking further into the actions and relationships between the niche and regime actors. This has all been derived from the theoretical model presented earlier in the paper. In order to measure the democratic value of the governance practices three core governance actions were investigated that are directly linked to democratic involvement. These being 'decision making', 'accountability' and dispute 'resolution'. These are highlighted by Van Veelen (2018) as core democratic governance practices that energy communities must incorporate. The research looked into the extent members were involved in decision making processes, how often and how impactful that process was. This is also the case for accountability and dispute resolution actions.

In order to measure the transformative potential of energy communities, two core socio-technical processes were investigated to show this. These proxies were taken from previous research (Dóci et al, 2015), which also investigated the transformative potential of CE in the Netherlands. And so the research benefits greatly from this pre-existing, proven framework. Firstly measuring the occurrence of a 'stabilised learning process'. Seeking to better understand how energy communities with comparable goals and ambitions can come together, learn and in turn develop in conjunction within a CE network. Secondly, the transformative potential can be better understood through the extent that regime level actors support CE. Or possibly the lack of support. Further looking into which connections exist between the regime and CE, the strength of these links and how these links are formed, whilst also taking into account the lack of links that may exist from the regime.

Table 1: Proxies for assessing both the democratic governance and transformative potential of CE.

Proxy	Component	Indicator	Data used
Democratic Practices	Democratic Governance in CE	• Decision making • Accountability • Dispute resolution (van Veelen, 2018)	Interview data: (With various CE actors including community directors and support organisation directors)
Learning Processes	Transformative Potential	• Common knowledge and goals • Platforms for networking • Generic rules and lessons (Dóci et al, 2015)	Documentation analysis: (Including annual reports, sector reports, expert blogs and 'global niche' documentation) Interview data: (With various CE actors including community directors and support organisation directors)
Regime support (or lack of)	Transformative Potential	• Links with regime actors • Barriers presented by the regime • Strength and breadth of links (Dóci et al, 2015)	Documentation analysis: (Including annual reports, sector reports, expert blogs and 'global niche' documentation) Interview data: (With various CE actors including community directors and support organisation directors)

Qualitative research methods were used for this paper. This is because the research needed to gain a more holistic view of the context that is the energy community sector in the United Kingdom. This way of researching lead to the collection of data that is derived from the perception of the actors that are directly involved in the sector. Hence giving an insight into the arrangements and rules (whether implicit or explicit) (Punch, 2014). Primarily documentation research was used in order to gain a better understanding of the current CE sector in the UK. When undertaking social research, documentation

has been highlighted as an undervalued form of data (Tight, 2019). However, documentation can give a profound insight into social research. Utilising documentation, provides for ample sources of information that can give a diverse insight into how a certain sector or field operates (Tight, 2019). Hence, in order to understand the CE sector it was deemed necessary to delve into contemporary documentation surrounding CE throughout the United Kingdom. The documentation needed to highlight the transformative potential and democratic governance of energy communities. In reflection, documentation provided sufficient insight into the transformative potential, however was insufficient with regard to democratic practices, so this was later addressed through the interview process. Documents were sourced from multiple places. Firstly, individual energy communities. Ensuring that documents were sourced from a diverse set of communities, varying in size and energy type. In order to get a broad overview of the sector. On top of this documents were sourced from various support organisations. Although these organisations had various roles in the sector they all had similar ambitions to support CE development. Governmental documents were also sourced, however provided limited insight into the sector, especially from the national government level. Documentation included annual reports, board meeting notes, 'state of the sector' reports and expert blogs. Documentation was selected on the basis that it provided insight into either the learning processes between communities and showed the interaction between CE and the regime.

Although the documentation research provided a rich insight into the sector, it was apparent that the 'democratic practices' proxy was insufficiently addressed in this process. To address this, semi-structured in depth interviews were held with various actors in the CE sector. The semi structured nature of the interviews was important for the research. It allowed for a degree of structure where questions were predetermined and covered the core proxies of the research. Whilst at the same time ensuring a flexibility to the interviews. Questions could be moulded to the respective interviewee depending on their role. And during the interview, the process was not restricted by the questions and allowed both the interviewer and interviewee to diverge away from the structure. Hence allowing for novel insights to be discussed that may not be incorporated into the questions. Questions were sent to interviewees before the interview itself, allowing them to prepare for the interview. Five in depth interviews took place (Table 2). Two with directors of community energy cooperatives, two with 'umbrella organisations' (these exist to support the CE sector throughout the UK). And finally, an in depth interview took place with a Scottish Government funded organisation that also offered support to communities. Hence, a good variety of stakeholders were interviewed in order to acquire their perspectives on the sector. The interviews provided insight into the three proxies aforementioned and crucially was a better source of information to understand the democratic extent of energy communities.

Table 2: List of interview respondents

Interviewee No.	Role	Organisation	Type	Objective(s)
1	Director	Bradford Community Energy	Energy Cooperative	BCE is a co-operative energy company, which aims to promote renewable energy in community buildings, reduce fuel poverty, raise awareness of energy efficiency and work towards zero carbon emissions.
2	Director	Glasgow Community Energy	Energy Cooperative/ Benefit Community	Their aim is to connect and empower local people through community-ownership and democratic involvement within the renewable energy co-operative, as well as by inspiring and sustaining community activism through their Community Benefit Fund.
3	Innovation Development Officer	Community Energy Scotland	Independent Support 'umbrella' Organisation	Community Energy Scotland provides independent and ongoing practical and technical support for community project development. Making it possible for member organisations to link up and network, both with each other and with policy makers.
4	Director	Community Energy Wales	Independent Support 'umbrella' Organisation	Community Energy Wales is a not for profit membership organisation that has been set up to provide assistance and a voice to community groups working on energy projects in Wales. Helping to create the conditions in Wales that allow community energy projects to flourish, and communities to prosper.
5	Development Officer	Local Energy Scotland	Government CE Funding Administrators	Mange CARES - the Scottish Government's Community and Renewable Energy Scheme. Supporting communities across Scotland to engage with, participate in and benefit from the energy transition to net zero emissions.

3.2) Cases

This research aimed to gain insights from multiple sources by selecting interviewees and documentation from various actors within the community energy sector. It was highly beneficial to source information not only from the communities themselves but to learn how support organisations perceived the current sector. This was also mirrored in the documentation research where multiple sources of documents were required to get an extensive overview of the community energy narratives. It is also beneficial to link the research cases within the theoretical framework. This is done through selecting cases from the 'niche', 'global niche' and the 'regime'. Below is a brief overview of the stakeholders investigated, both through interviews and respective documentation, in order to display the various perspectives that the research taps into.

Firstly in order to understand how social, niche innovations operate within the energy sector it was valid to research the energy communities themselves. How they practise democratic processes, how they learn with one another and their transformative potential with regards to how they interact with the regime level actors. Firstly, documentation was sourced from the community's websites. However depending on the size of the organisation, useful information was rare as many communities are not in the process of producing reports. Some blogs and reports were sourced from larger community organisations. Multiple energy communities were contacted to have an interview, however there was limited interest and response from directors, who (during the research) are currently going through a busy time of the year in the community energy sector. Two in-depth interviews were conducted with Bradford Community Energy and Glasgow Community Energy to gain a better understanding of their experiences with developing communities projects in the UK. Recently formed in 2020, Bradford Community Energy aims to bring communities together in order to provide for renewable sources of heat and electricity to Bradford based communities. Glasgow Community Energy was another respondent to the interview process. A community owned cooperative, the organisation is responsible for installing two solar projects onto two local schools and looking to expand to more sights. These cases gave in depth insight into the workings of renewable energy cooperatives, showing how niche innovations interact with regime actors within England and Scotland.

Emerging innovations such as energy communities can struggle in their initial stages to operate in such a competitive energy market. This has led to the emergence of several support organisations or 'umbrella organisations' as coined by the industry. Support organisations can vary in nature, from government funded schemes, charity funded organisations and one's operating as a cooperative formed by the individual community energy cooperatives (e.g Energy4All). These organisations represent the vulnerability of energy communities that find it difficult to start up and operate on their own. These organisations support in various ways. Namely, financial, technical and advisory support. It was crucial to include support organisations within this research as it gave expansive insight into how communities can strengthen their position in the regime, firstly through learning processes and networking, secondly through the ability of these organisations to connect communities to sub-regime actors. Hence, this research aimed to comprehend the role and relationship these 'umbrella organisations' have in the community energy sector. Interviews were conducted with Community

Energy Scotland and Community Energy Wales and unfortunately was unable to attain an interview with Community Energy England. Ample documentation was sourced through 'umbrella organisations' websites. This was a wealthy source of information as these organisations produce many reports and policy documents surrounding the progress and challenges of CE in the UK. For instance the 'state of the sector' report was a sufficient source of information. Spanning from 2017 to 2021, these reports provided insight into the CE sector.

On top of this, it was required to understand the role governmental bodies played in the development of the sector. This is based on the theoretical framework that displays the role the regime can have on the emergence of social innovations such as CE. As the various levels of government are a key regime actor it was favourable to investigate their role more. There are limited government initiatives in place that support the uptake of community energy. However, Local Energy Scotland (LES) was highlighted as an important actor in the UK's community energy sector. LES manages the Scottish Government's Community and Renewables Energy Scheme (CARES). This was an interesting case as to how governmental bodies can support the progress of CE rather than inhibit its progress. So an interview was done in order to learn more about this scheme and how it affects the CE sector. These various cases provide for an extensive overview of community energy processes that are directly linked to the theoretical framework aforementioned. The amalgamation of the documentation and interview findings has provided this research with some core findings and conclusions that will be discussed in the next section.

3.3) Data Analysis

The analysis method used for both the documentation research and interviews was thematic analysis. This method is very suited to the qualitative nature of the research. Not aiming to generate numbers or statistics, thematic analysis focuses on the key themes and trends within the data. Information was extracted from the documentation, this was done by extracting key text and figures that addressed the core proxies as aforementioned (Table 1). Information was transcribed and stored in a separate document, where information was divided and categorised by its theme. In order to apply a thematic analysis to this information a code was created surrounding the main themes that wanted to be addressed in the research, following the 'indictors' (shown in Table 1). These themes are directly linked to both the proxies and the theoretical model. These themes were: democratic practices, barriers to democratic practices, learning processes within the niche, learning processes between the niche and regime, barriers from the regime, support from the regime and support from the 'global niche'. It is important to note that the same themes were applied to the interview data also. Documentation information was coded in accordance with these themes giving a sufficient overview of the general trends of the thematic data. On top of this interview recordings were directly transcribed using a transcribing software (otter.ai). The coding approach was equivalent to that of the documentation analysis, using a thematic approach. The core themes were given a respective colour within a key in order for the transcripts to be highlighted and coded with clarity. With both sources of information thematically coded, the most valued themes were selected in accordance with the research questions as well as emerging trends not foreseen during the initial stages of the research, such as the disparity between the UK's subnational Governments. Ensuring that the data will set a strong basis for

argumentation, linking real life experiences back to the theoretical framework and thus formulating substantial conclusions on the role community energy plays in the UK's energy transition.

4. Findings

The data collection processes resulted in the emergence of numerous themes directly related to the theoretical framework aforementioned. Firstly delving into the organisational practices of individual communities, where certain governance practices were investigated in order to comprehend the extent that democratic practices are integrated into energy community processes. Hence giving the research a better understanding of how this emerging sector (community energy) could influence a more democratic form of energy system within the UK. To some extent community initiatives do practise democratic processes and certainly bring wider benefits within the community itself. However, the extent that the processes are truly democratic are discussed further in detail below. Beyond this, other emerging themes surrounded the concept of transition theory. Aiming to better understand how the social-innovations of community based initiatives could become a mainstream actor within the regime. Firstly by looking into the transformative capability of the CE sector and then investigating how certain regime actors are supportive or not of community energy. CE is classified as a resilient sector as it is ambitious to establish itself within the UK's energy transition. However, this does not come without various barriers presented by a somewhat unsupportive regime. These findings have been divided into five sections in order to display the emerging themes of this research. These sections reflect on the theoretical model by displaying the value community energy brings to the community through its democratic practices and further displays how community energy can become mainstream in the UK through the lens of transition theory.

4.1) Democratic Practises

In order to understand the role community energy initiatives can play within the energy transition it is deemed necessary to understand their intrinsic benefits that are dispersed throughout the community itself. With community energy projects having energy democracy practises at the core of their governance structures and purpose, it was interesting to investigate how this played out in reality. Energy democracy is a divergence away from the traditional, centralised forms of energy processes. To systems that have an emphasis on individuals and communities being able to participate in energy systems and own renewable energy infrastructures. But how could these ideals be replicated in current energy systems? The rise in energy communities has represented an emerging pathway for communities to become integrated within local energy systems. Communities now have the opportunity to own energy infrastructure and participate in energy projects in order to stimulate local energy transitions which in turn can greatly contribute to the overall transition itself. It is evident from the various in-depth interviews that these two communities want to establish democratic energy systems among their members.

"I guess where the democracy comes in is that it's more the ethos and the direction of the cooperative" -Respondent 1, Bradford Community Energy.

It was apparent throughout the interviews that these renewable energy cooperatives are formed on the basic ideals of energy democracy. Ensuring that communities are at the heart of cooperatives goals. This means that community members must have the ability to be involved in decision making processes, be able to hold decision makers accountable and be able to resolve disputes when they emerge within the community (van Veelen, 2018). And this was the case. Firstly, these two energy cooperatives generally follow the same governance framework. In that, the decision making processes are enacted by the directors and board members that are democratically elected by the community members. Thus, showing that members can have input on who is operating the organisation. Furthermore, annual meetings are generally held giving the opportunity for community members to be involved in decision making processes. This representation is not considered to be tokenism. For example, one interviewee told me about the general meeting being a good opportunity for members to discuss the location of a new solar pv project in the local area. The general meetings were presented as an opportunity for members to be involved not only in the decision making processes but also the ability to hold directors accountable for their decisions and an opportunity to overcome disputes amongst the members.

It is also vital to point out that these governance practices are also bound by law. The 'Co-operative and Community Benefit Societies Act 2014' is the basis of the legal rules that cooperatives and other energy communities have to follow. Importantly, in order to be community based these organisations must enable **"the local and wider community to share in the ownership of, and contribute to, renewable and low carbon energy generation and energy efficiency initiatives." (**Co-operative and Community Benefit Societies Act, 2014**).** This is done by ensuring communities must hold elections and hold general meetings for their members. The membership base is mainly composed of individuals who buy into a share of the cooperation, however, these can also be private companies. This is further emphasised in the Scottish Government's 'Good Practice Principles for Onshore Renewable Energy Developments', which establishes key governance practices for energy communities that are inherently democratic. These communities are mainly in the form of cooperatives where members join through buying a share in the community organisation. At the core the community is sufficiently involved in the decision making processes. Showing how practices within communities should be robust, fair and transparent. It is clear that the "ethos and direction" as well as the legality of energy communities are oriented to community inclusion, however reflecting on the findings of Van Veelen (2018) as well as through the interviews. The internal practices can be limited as to how democratic they can be. Van Veelen (2018), elaborated on the ways communities can subvert and negotiate democratic practices due to the internal and varied ambitions of individuals or groups within a community. However this research touches upon another aspect of the shortcomings of democratic inclusion within communities. The respondent from Bradford Community Energy when asked to reflect on the extent that members are able to be involved in decision making processes, highlighted certain operational barriers for all members to establish themselves in the decision making processes. Namely, the financial and technical knowledge required to be directly involved in the projects.

"And a lot of that stuff is up front initial nuts and bolts. The mechanics of it all, either works, or it doesn't do that there's not a great deal of democratic involvement." -(Respondent 1, Bradford Community Energy.)

Showing that although these organisations aim to involve the community it is difficult in certain aspects where a level of expertise is required. Throughout the interviews it was clear that members were more informed than directly involved with the projects. This also shows one of the core restrictions to community projects, especially the smaller scale ones. They are made up of a high percentage of volunteers, so not only do they not have the expertise for renewable energy projects but also have limited time and capacity to be constantly involved.

"Members can be involved as little or as often they are able. We are keen for members to help us identify new projects and get involved as volunteers. We also offer advice and signposting to useful climate related resources." - (Respondent 2, Glasgow Community Energy.)

Members seem to be not fully integrated within ongoing decision making processes, however are certainly willing to be informed within the community projects themselves. Of course it is unrealistic to assume that community members could be involved in every aspect of the energy projects. And these organisations are still far more democratic than the traditional centralised energy systems. Within energy communities in the UK, there is an opportunity for community members to be involved in local energy systems. Essentially, these organisations practice forms of indirect and representative democracy, where elected representatives can govern in the interest of community members. The extent to whether this form of governance is purely tokenism rather is uncertain. However, with the CE organisations researcherd here, it seemed that democratic practices are encouraged but in practice are limited to annual moments. Such as elections and general meetings, being involved in projects beyond this is infrequent.

4.2) Community Value

Whilst investigating the democratic governance of energy communities it also comes apparent the wider benefits that community initiatives can stimulate. Energy communities can stimulate benefits within the community and beyond. The direct benefit of renewable energy communities is their ability to aid in the development of the energy transition, whether that is through renewable electricity generation, energy efficiency or storage solutions. For instance, local generation in Scotland has been acknowledged as an important contributor to net zero goals. Even setting local generation targets through community based energy projects. "The Scottish Government's target of generating 500 MW of energy from community and locally owned energy schemes by 2020 was surpassed five years early; a significant and fantastic achievement for the sector." (LES, 2022) Hence, showing the productive capacity of local projects in Scotland and possibly in the UK. Further contributing to broader environmental benefits through the reduction of greenhouse gases. Developing on the findings of Brummer (2018), community energy can generate significant economic benefits to communities in the

UK. Partially through job creation and saving energy costs for members, energy communities can also stimulate funds for the wider needs of the community.

"In 2019, community energy organisations had a total community benefit fund value of £2.5m across 96 separate organisations. Community benefit fund spending in 2019 totalled £720,000, with funding provided to community organisations such as energy advice services, sports clubs and environmental conservation charities." - (Robinson. State of the Sector report, 2020, pg 25)

This presents how community initiatives are not only capable of achieving renewable energy goals but are also providing benefits to the wider community beyond the field of energy. The other core benefits of energy communities are social in nature. Characterised as a social innovation (Van der Brugge, 2005), energy communities are proficient in building social value within their localities. Firstly they are core to stimulating community based energy action through locally based projects. On top of this behavioural change has been cited as a main impact of community energy. Through educational service, awareness creation and the increased participation/ownership of energy systems, communities and individuals are more likely to practice sustainable actions within their everyday lives (State of the Sector, 2020). On top of creating community funds, energy communities are also ambitious to address societal challenges such as reducing fuel poverty in poorer neighbourhoods for instance.

Although the sector is highly ambitious at navigating many soicio-politicl challenges within their communities, this does not come with challenges. The sector is still very limited in its size and so at the moment can only achieve small scale benefits across communities. One core challenge faced by the sector is the lack of capacity. CE organisations are struggling to realise their projects due to lack of financial and organisational capacity. On top of this, the sector is composed of a high percentage of voluntary workers who have limited time to work on projects. Thus showing how at the moment the benefits provided by community projects are still limited by the sector being in its infancy stage. To address this, the sector must develop into a mainstream sector where it can undergo its projects with larger economies of scale. The next section will reflect on the sectors ability to become a mainstream, regime-level organisation, by better undertsnaing the capability of the niche and its interaction with the existing regime.

4.3) Entering the Regime and the 'Global Niche'

In order to stimulate a decentralised transition in the UK's energy sector through the use of community energy initiatives, this research emphasises the transitioning or transformative effect the community energy sector can have. Embedded within the multi level perspective this research wanted to better comprehend how community initiatives, framed as a niche innovation, can penetrate the regime. What this means in practice is that community energy projects can continue to develop in the UK and to be recognised as a key actor in the future of the UK's energy transition. One element highlighted within the theoretical framework was the ability for like-minded niche organisations with a collective goal to

form a 'global niche' (Dóci et al, 2015) or 'proto-regime' (Geels, 2006). Thus forming a stable institutionalised collective that has the ability to operate alongside regime actors. Thus, shifting away from individual niche innovations trying to operate in isolation under volatile circumstances, to a collective network that can strengthen their position within the regime. In reality it is difficult for community energy projects to operate without external support. With limited capacity within communities and high financial and technical capability required to start up such initiatives, it is crucial that the community energy structure forms collective structures in order to address such vulnerability in the merging sector.

The research delved into how the 'global niche' may operate in the United kingdom. And so, in turn, learning of the ability of the community energy sector's capability to strengthen their position within the UK's energy system. Firstly it is important to note that global niches do exist in the UK. Namely the various support organisations that exist throughout the country. Sometimes referred to as 'umbrella organisations'. These organisations exist in various forms across various geographical borders. For instance one of the biggest networks of support organisations are the three subnational ones. Community Energy England, Community Energy Wales and Community Energy Scotland. These are non-profit organisations in place for the purpose of supporting and stimulating community energy. On top of this you have Energy4All, another important support organisation within the sector. They are a cooperative made up of smaller energy cooperatives. Also with the ambition to strengthen community energy initiatives position through aiding the project development for communities. These organisations represent the ability of this emerging sector to stimulate transition through the formation of a global niche and upholding community projects within the energy sector.

"The main barrier is time and capacity of energy cooperatives who are largely composed of volunteers. With that in mind, we receive considerable advice and financial support from Local Energy Scotland, Energy4All and Community Energy Scotland" - (Respondent 2, Glasgow Community Energy)

This quote does represent how umbrella organisations can support energy communities as they face certain organisational restraints such as lack of capacity. And that is why support organisations are so crucial. From the research, the main internal barriers faced by energy communities are due to the lack of financial capacity, technical expertise and that there is a high volunteer base within these communities who have less time and capability to address project challenges. Umbrella organisations directly address this through providing technical, financial and advisory support as well as sending representatives to directly work with communities on project developments. This is a great instance of the global niche theory as described by Geels (2006) and Dóci et al, (2015). Of how collective organisations can play a vital role in supporting niche innovations such as energy communities.

Connected to the idea of the formation of the global niche, is the occurrence of learning processes and connections between important actors in the industry. This is mainly the interaction and learning between energy communities. However, the interaction energy communities can form with other niche and sub-regime actors. The occurrence of networking and learning between communities can

stimulate growth in the sector as lessons of best practice can be understood within communities. On top of this energy communities are eager to connect to sub-regime actors in order to facilitate the development of the sector. For instance, this can be energy communities stimulating cooperation with local governments to gain local political support. Or, communities agreeing purchasing power agreements with district network operators to have better access and lower costs to the electricity grid. A prime example of communities willing to learn from one another was found through the interview with Bradford Community Energy, who essentially pointed out that the basis of their organisation structure was inspired and sourced through interacting with the community projects in Manchester, Bradford and Brighton. Showing how start up community energy organisations can learn from current community actors. Through the research it is clear that actors within the sector find it vital to bring community energy organisations together. Respondent 3 from Community Energy Scotland highlighted how the bringing together of communities is crucial in overcoming one of the key challenges of local energy. And that is the lack of expertise within the sector. Through the use of workshops and networking events, communities can come together to learn from one another. Here knowledge on the sector, personal experiences can be shared and hopefully in turn information can be disseminated throughout energy communities.

"So the programme that we came up with, was designed to basically bring community groups together, we would invite board members, we would invite staff as well from these organisations. And we run a series of workshops over a six month period that was designed to basically let them know what's happening in the sector, what the opportunities were, what the barriers are." - (Respondent 3, Community Energy Scotland).

Hence, highlighting the opportunities for communities to come together to update their knowledge on an ever evolving sector. This quote was from Community Energy Scotland, showing how this organisation was ambitious to stimulate learning processes between communities. This also seemed to be the case for the other umbrella organisations researched within this paper. And it is true the learning processes are being stimulated by these umbrella organisations. All interviewees highlighted the various networking events, workshops and partnerships between communities that allowed for the dissemination of knowledge. Another form of learning between communities is through the use of shared documentation and reports. The 'State of the Sector' report for instance is a valued product of umbrella organisations. Since 2017, Community Energy England, Scotland and Wales come together to produce the state of the sector report. Through a mix of questionnaires sent to energy communities and desk research, the state of the sector report brings together knowledge within the industry to display the current circumstances the sector faces. Not only were the reports helpful for this research process but it was clear that it allows for all the energy communities across the UK to firstly provide their own knowledge and experiences but also to learn from each other. This falls in line with the points made by Dóci et al, (2015), who says that if niche actors have the space to form common goals and knowledge they can in turn create generic rules and lessons to overcome the barriers faced by the regime. Hence it is important that communities are engaged in learning processes between one another and that this is further stimulated via support organisations.

The existence of the support organisations and thus the formation of a global niche is vital in strengthening these social innovations within the context of the UK's energy transition. On top of providing support and stimulating learning processes, this research has found that these support organisations are very effective at connecting energy communities to sub-regime actors. Theoretically, if niche developments can have stronger links with regime level actors, they can in turn establish themselves within the regime (Geels, 2006). There was some evidence in the interviews that the energy communities themselves were effective at forging connections with some sub-regime actors. For instance, Bradford Community Energy was able to form connections with multiple organisations. Firstly creating connections with the local council, partnering with an accountancy company to run their books and collaborating with Bradford Trident a community organisation beyond the field of energy. With Bradford Trident, they now have sights to place solar panels on community buildings such as schools and other recreational facilities. Beyond these partnerships, energy communities may have difficulty in forming relations with various other sub-regime actors. And this is where the umbrella organisations are so vital.

"...an opportunity for partnership between public, private and community organisations offers great potential for mutual benefit. There are many good examples of this to date, particularly in relation to rooftop solar, including NHS hospitals, local authority buildings, schools, warehouses and retail outlets." - (State of the Sector, 2018, pg 38)

This quote shows how umbrella organisations value and wish to stimulate the connection between community organisations with public and private actors to generate 'mutual benefits'. In this case the partnerships allow for community projects to source available sights to implement their solar projects. This is a important element for establishing energy projects in a community, especially in urban areas where space is limited and rooftop solar PV is the main source for community based, renewable energy. These partnerships can come in various other forms. For instance, support organisations are effective at connecting energy communities to various funding streams. On top of this partnerships have been stimulated with commercial organisations, energy network operators, local authorities and the wider public sector. Examples include joint grant funding with the local authority for fuel poverty alleviation in Brighton, and the Cyd Ynni in Wales, a consortium of community energy organisations that work to help communities develop low carbon projects (State of the Sector, 2018). These partnerships are beneficial for the development of the CE sector as it allows for greater legitimisation of community based initiatives whilst also being able to have access to better connections with established actors within the energy industry. That hopefully in turn can support that development of the CE industry by providing for better financial incentives, larger economies of scale and institutional support form both private and public actors. One regime actor that is involved in the development of local initiatives is the government, throughout its various levels from local councils to national government. Community Energy England is more focused on connecting the CE sector to governmental actors. They provide multiple sources of policy advice and campaigning tools to be the 'voice of the community energy sector'. Their camapaning tools include 'harnessing MPs' and showing how community energy projects can play a role in the climate goals through a 'climate emergency plan'. Community Energy England

further facilitates the development of the CE sector by promoting the opportunities they can provide for the country.

"We work to make politicians, national and local government officials, network operators & regulators, aware of community energy benefits, needs, opportunities and policy obstacles to ensure that community energy organisations can create and implement innovative new projects and play an active and important role in the transition to a fair, zero-carbon energy system." - (communityenergyengland.org)

This is a great example of how niche to regime connections can be stimulated via support organisations such as Community Energy England. So how do these findings provide evidence for the transformative nature of the community energy sector? Crucially it proves that the sector has the ability to enter the regime. It does this through cross community partnerships where learning processes can take place and by connecting energy communities to various sub-regime actors. In turn, stimulating the development of the CE sector, where community energy projects can become an established and mainstream player in the energy transition. However, the considerable degree of dependence on support organisations from energy communities does emphasise a significant hindrance to the development of the sector. That being the lack of support and limited ambition from the national government in the pursuit of growing the community energy sector. Thus showing why there is such a large reliance and importance placed on other sources of support such as the umbrella organisations.

4.4) Barriers from the Regime

Within transition theory it is clear that for social innovations to become mainstream within the socio-technical landscape there must be a sufficient connection between the niche and regime levels. This essentially means that not only should emerging niche developments have the potential to enter the regime but also that sub-regime actors should be open and willing to accept these innovations into the regime. There is a crucial codependence between these two levels in order to stimulate transitional changes in the energy sector for instance. The previous findings highlighted the capability of CE to become mainstream and enter the regime level. However, there still needs to be evidence that the regime can be accepting of such innovations. Through the use of documentation research and in depth interviews, this research aimed to understand the extent that certain regime level actors support or impede CE developments. If regime actors, such as the national government are willing to support the development of the CE sector then in turn this will allow for more favourable conditions for energy communities to thrive and become a key player in the UK's energy transition. Looking into the UK governments 'Net-zero strategy' (UK Government, 2021) and multiple other energy transition related policy documents. It is evident that energy communities are recognised as an element to empower local energy ambitions. Highlighting that funding streams are in place and that knowledge sharing between Community Energy England and the government will be continued. Showing that the 'regime' is at least open to the benefits provided by community energy.

However, the experiences presented by the interviewees and throughout multiple reports suggest otherwise. The first thing that is apparent is the perceived lack of support from the national government that is felt from the community energy sector. Suggesting that although the net-zero strategy finally mentioned community energy, there was no concrete plan or measures in place to aid the sector. One stark finding from an interview with Community Energy Scotland highlighted why there seems to be limited ambition from the national government.

"And perhaps there's historically some truth to that the amount of money that you have to put upfront to support community energy is higher than it would be if you then just get the private sector to do it." - (Respondent 3, Community energy Scotland)

Showing that the UK government is much more keen to place the nation's energy targets in the hands of larger scale private investors. And this has been the case, the UK seems to be leading the way in renewable energy transitions, however not at the local level. Currently being the leading nation with regards to offshore wind for instance, proves the ambitions of the government to utilise large renewable projects to achieve net zero goals (Strachan, 2015). However, this is at the expense of more local initiatives such as community energy projects. Throughout this research process it is evident that the CE is being neglected, even though the sector has proven its strengths in both achieving climate goals and strengthening communities. This lack of support is clearly reflected by the decline in support mechanisms provided by the government. Characterised as a 'post-subsidy sector' (State of the Sector report, 2020), the CE sector has seen a fall in funding and support mechanisms originally provided by the government. The various reports have shown multiple occasions where subsidy schemes for renewable community projects have been removed. Found to be the most vital, the feed-in tariff (FiT). Throughout the interviews and documentation reports, the removal of the FiT has been highlighted as one of the largest setbacks to community energy in the UK.

"The greatest challenges faced in 2018 centred around the reduction of support mechanisms, including the Feed-in Tariff . Changing support and the related uncertainty was seen by many respondents as symptomatic of a lack of clear national and local governance and support. These recent changes will continue to be a barrier to new community energy generation projects through 2019 without suitable alternative supporting mechanisms." - (Sate of the Sector, 2019)

This report echoes the many voices of energy communities across the UK. Since 2017 the FiT had slowly been reduced and eventually removed. The FiT is a funding mechanism where payments would be given back to the producer for the excess electricity one generates. Essentially, promoting the use of solar panels for instance, as there is a financial incentive to produce renewable energy. A lot of energy communities utilised this FiT scheme in order to justify the funding for their projects. As costs of renewable technologies and projects decrease in the market the FiT may also be reduced to parallel this. However, many feel that the removal was far too sudden, especially for small scale generation projects. The community energy sector was hit badly by the removal of this scheme. Electricity generation projects are no longer financially viable especially for the small scale community organisations that have less financial capacity. Thus showing how the government does not have the

ambition to support community energy. And more importantly, connecting to the theoretical framework, how lack of regime support can curtail the development of social innovations. As a result, the lack of financial viability for electricity generation projects has caused energy communities to survive by shifting their focus beyond electricity. Communities are now more attracted to the likes of investing in electric vehicle programmes, energy efficiency in homes and heat systems which are becoming more financially viable. Of course these projects are important within the energy transition, however it reflects the unappealing nature of taking on renewable electricity projects at the community level.

It is apparent that the institutions in place; that should be facilitating community energy, such as energy policy and regulations are not facilitating. Energy policy seems to have limited ambition to the development of the sector, with much more preference on large scale renewable projects to meet carbon emission targets (Strachan, 2015). This is reflected in this quote by the State of the Sector report in 2021:

"The UK parliament has declared a climate emergency, with a target of net zero by 2050, but the policy landscape is still the main barrier to the community energy sector achieving a just transition. The UK government's Energy White Paper mentions community energy just once." - (State of the Sector, 2021)

And this quote from Bradford Community Energy....

" I would be lobbying the government for more, more support and more sympathetic legislation to enable us to operate. We see very little coming back from central government, to be honest." - (Respondent 1, Bradford Community Energy.)

Showing how energy policy is not correctly addressing the needs of community energy. This is an emerging and vulnerable sector. If it is to succeed it needs the ambition from the national government to support its development. This is not the case, as aforementioned in national energy transition policy community energy is rarely mentioned. And when it is, there are limited suggestions as to what actions are going to take place to support it. Similarly, energy communities have shown throughout the interviews and reports that complicated regulations surrounding energy projects inhibit local initiatives as this complexity is difficult to navigate for small scale communities. Luckily support organisations such as Community Energy England are willing to lobby and connect with politicians in order to promote the use of community initiatives at the national stage. However, there is still an apparent gap, and both policy and regulation have been said to not be in favour of energy communities. Many in the sector think this needs to be addressed.
The national governments seem unambitious, however what about local levels of government? Generally speaking, from the interviews the respondents had two main points surrounding local council support. Firstly, local councils were of course very ambitious to support local initiatives, whether that is through funding schemes, providing sights for project implementation and cooperating purchasing power agreements with electricity generation projects. However, the second point is that

local governments tend to have insufficient funding to properly support community energy projects. And this goes back to the lack of local, decentralised and community based ambition from the national government.

In addition, various other barriers have been presented beyond the government. Firstly, the aforementioned issue of lack of capacity. Due to small scale organisations being composed of mainly volunteers, there is a lack of capacity and expertise within these communities (Respondent 1, Bradford Community Energy.). However, this would be considered an internal and operational issue, rather than a barrier presented by the regime. One could argue a lack of capacity and ability to hire staff is a reflection of how little financial support the industry is receiving from governmental bodies for instance. One barrier that is being presented from a different sub-regime actor is that of the national electricity grid. There are high costs associated with selling electricity back to the grid and this makes small scale community projects less financially viable. This is mainly an issue in rural areas where costs are higher. In contradiction to this, the respondent from Community Energy Scotland reflects on the national and district level electricity grids, emphasising that it can depend where you are located. Some grids are more supportive of community energy than others. On top of this they say that generally speaking the district grid operators are coming to terms with new local energy projects. Hopefully in the future better cooperation between grid and energy communities can be stimulated to lower costs.

The barriers presented from the government and beyond have slowed the progress of the community energy sector. This mainly is due to the fact that projects are becoming less and less financially available, especially within small communities who have less capability to raise finances. Mainly energy generation projects have been stalled throughout the country as the financial incentives for producing electricity have vanished due to the lack of subsidisation presented by the government. It is interesting to point out that the CE sector is a resilient one. There has been a shift away from traditional forms of finance for instance. Utilising charity schemes and community action in order to finance projects. The sector aims to utilise strong partnerships outside of the national government in order to steadily grow the sector. On top of this, communities have increasingly been looking to diversify in their approaches. Moving beyond electricity projects to energy efficiency, renewable heat and electric vehicle schemes which seem to be more financially viable for communities to operate. Reflecting on these findings onto the multi-level perspective shows how the incumbent regime actors can have an inhibiting influence on the development of emerging social innovations such as community energy. The sector will continue to champion their role within the energy transition through continued partnerships and with continued lobbying to governmental bodies. With the aim of presenting the associated benefits of CE and in turn fostering greater support from Westminster.

4.5) Progress in the Devolved Nations of Scotland & Wales

The documentation research and interviews covered the three sub-nations within the United Kingdom, England, Scotland and Wales. With the exception of Northern Ireland where community energy is essentially non-existent. One emerging trend between these three sub-nations was the different rates

that community energy is being supported. The partially devolved nations of Scotland and Wales have seen a greater policy and institutional support compared to England. This is down to the fact that these sub-national governments (especially Scotland) have some devolved powers from the UK government and are able to implement more ambitious support schemes for community projects. Scotland partial devolution means that they have certain legislative powers they can implement without the influence of the UK government. These include powers to initiate renewable energy projects and to delegate planning approval for projects. On top of this, having more legislative power in terms of law, order and in judiciary means. Showing how the nation has the ability to influence its energy transition without the need to go through the UK government's approval processes. Scotland have set their own ambitious climate targets for instance, within this they set aims to produce a certain amount of locally generated renewable energy.

"Following the early achievement of the Scottish Government's 500 MW target for community and locally owned energy in 2017, an increased target of 1GW by 2020 was set." - (State of the Sector, 2022)

Showing the ambition of the Scottish government to utilise local initiatives in contributing to renewable energy targets. This is in stark contrast to that of the UK government's ambitions which many feel are limited.

"Although I think I think it's fair to say that Wales and Scotland have a bit more support in terms of financial support from the National governments, just in terms because they have actual community energy focused government funds, that helps to support development, which doesn't really well, there's not a national programme as such that exists in England." - (Respondent 3, Community Energy Scotland).

And this is evident. The Scottish has not only integrated community renewable electricity targets into its energy transition ambitions. They have also set up government funded support organisations and schemes that will aid the sector. The Community and Renewable Energy Scheme (CARES), is a government run funding scheme in Scotland that provides funding for energy communities. After interviewing a director at Local Energy Scotland (the organisation that runs CARES), it was clear how vital this scheme was for the energy communities. It allows them to overcome the significant financial and capacity barriers that are associated with energy projects. Moreover, this scheme represents the Scottish government's vision to integrate community based energy into their future energy system. In Wales, the patterns are also very similar. The government has provided for sufficient support mechanisms for community energy projects. The 'Ynni Lleol/Local Energy support service' (State of the Sector, 2020) is a funding scheme for local energy projects. Yet again displaying how the governmental level can play a crucial role in supporting community energy. These schemes rarely exist in England. Some partial subsidy mechanisms have been in place such as the FiT and the rural energy fund, however, these did not target the whole sector and have since been removed. There is a lack of national ambition or vision where community energy is accepted as a key player in England's energy goals. This

is intriguing as it shows how various regime actors across geographical contexts can have varied attitudes towards social innovations such as community energy.

Haf (2018) suggests that the difference in ambition between the sub-nations of Scotland and Wales and the UK government could have an impact on how the CE sector evolves in these nations. With the UK government emphasising the need for more private investment in the renewable energy transition (Strachan, 2015). And with Scotland and Wales displaying more supportive ambitions towards the development of the CE sector. With these nations not being completely devolved from Westminster rule, UK energy policy will continue to have an inhibiting impact on the development of the sector. A good example of this is the national grid that operated within UK law, remains to be centralised in nature and will continue to inhibit community projects throughout the UK (Haf, 2018). Although the Scottish and Welsh governments, who are categorised as key regime level actors, are ambitious to foster community energy development. There is still the concern that with a lack of ambition from the UK government, this social innovation will continue to struggle against a reluctant, incumbent regime in the UK government.

5. Discussion

Bringing these findings together represents a clear vision of how the community energy sector operates in the UK. On top of this, these findings can be directly contrasted with the theoretical model that was aforementioned (Figure 4).

'To what extent do renewable energy communities practise democratic processes within their organisations?'

Firstly, from the interviews and the multiple documents analysed it is apparent that energy communities can to some extent practice in democratic governance processes. These communities present an emerging opportunity to move away from traditional centralised energy systems which are owned and run by large private and public companies. To a system where local people now have the opportunity to participate in their own energy transition by investing in renewable projects across the country. These communities very much have the ideals of the energy democracy movement at their core. There is an emphasis on the community being the number one priority in all their actions, where members have the ability to have an influence on decision making processes. Annual elections as well as general meetings are held and do represent core democratic practices. However, the extent to which individual members are involved in democratic governance processes such as decision making, accountability and dispute resolution is limited. These processes are more likely to be undertaken by elected board members. This somewhat falls in line with the idea presented by van Veelen (2018), who emphasised that democratic processes can be subverted due to the internal workings of a community. This is somewhat the case, as communities have shown to present a representative democracy style, where core decisions are operated by directors and elected members. But in the wider socio-technical context of the UK's energy transition, these energy communities represent an emerging social innovation where communities are at the forefront of stimulating localised energy transformations through more participative means.

'To what extent can renewable energy communities, as a social niche, have a transformative impact on the present energy regime?'

Social innovations such as community energy can have a transitioning impact on the whole system when it has the ability to interact and enter the regime. In this context, that would mean community energy would become a mainstream actor in the UK's energy transition. From the research that has been undertaken, there are multiple indications that the sector and the individual communities, can establish themselves as a key player in localised energy ambitions. Energy communities exist within a vulnerable space, where high costs and level of expertise is required to undertake complex energy projects matched with a sector made of communities that consist of high levels of volunteers and limited capacity. So it is crucial that communities can have access to supportive mechanisms, especially in the early stages of their development. One core stabilising factor embedded in the theoretical model is the ability of communities to form a global niche (Dóci et al, 2015). Essentially forming a network between communities in order to strengthen their position in a volatile energy market. In the UK this global niche exists in the form of support organisations. These organisations continue to play a crucial role not only in addressing organisational issues within communities, for example, limited technical expertise. They also play a crucial role in stimulating learning processes across communities but also with key sub-regime actors in both the public and private sector. Further backing the theory that niche level actors with similar goals and ambitions can stimulate growth through learning with one another (Geels, 2006). Hence showing the capability of the sector to grow into the regime, where it can establish itself. This establishment comes through community energy projects becoming widespread in the United Kingdom as an established means of producing local energy.

To what extent will regime actors support or resist social innovations from the niche level, renewable energy communities?

However the ability of community energy to develop has been hindered by certain regime level actors. In particular the lack of ambition presented by the UK national government. Although showing some signs of interest, the net zero climate ambitions barely mention how the community energy sector can be integrated into the UK's ambitious energy targets. Clearly representing the attitude of the national government to hand its energy transition goals to large scale, private investors. This is further reiterated by the government's continual reduction in tariff and subsidy schemes that previously aided the emerging sector. Ultimately slowing the development of localised energy generation projects. This runs parallel to the evidence provided by both Park (2021) and Cappellan-Perez (2018), where the likes of Spain and Korea's community energy sector has been hindered by insufficient institutional support. Although, regime support is still evident in some cases. Local governments are very much willing to help incorporate community projects into their councils; however, with low levels of public funding, the financial capability of local governments to support CE can be limited in places. The national grid, traditionally a barrier for CE, has begun to present its willingness to open up to community initiatives. With better cooperation between district networks and communities, communities are hoping that purchasing agreements can be established with the national grid in order to ease the financial burden. So there are some instances of regime support, however, without the crucial support of the national government it will be difficult for energy communities to continue to grow in the UK, at least with any ease.

6. Conclusion

This research has aimed to understand the role renewable energy communities play in shaping a democratised energy transition. Energy communities have the means to promote an emerging pathway in the energy transition. A way of organising our energy systems in a way that is centred around a localised level and incorporates the ideals of energy democracy. In turn, allowing communities to become more involved in participating and owning their own energy projects as well as addressing key societal issues such as energy efficiency in homes and energy poverty. Within transition theory, the social innovation that is community energy has shown to be a transformative sector in the UK. Through the formation of various global niches or support organisations and utilising the strength of partnerships within and beyond the industry, has helped promote the sector and essentially aim to enter the regime by becoming a mainstream actor in the energy transition. However, the sector itself is being inhibited by unsupportive regime actors which may hinder its development in the energy sector, mainly the UK national government who have removed support mecahnisms. This falls in line with the theoretical understanding that there is a codependency between the emerging niche actors and the incumbent regime. The development of a social innovation can greatly be determined by the regimes willingness to accept the innovation (Geels, 2016. Dóci et al, 2015). The UK government, which has mainly promoted the use of the private sector to address its large scale renewable energy ambitions (Brummer, 2018), has somewhat neglected the benefits that local initiatives can bring to the energy transition. This has been reflected in the lack of recognition and removal of support mechanisms for community energy. This clearly lays out why the UK's community energy sector has had to become much more resilient in how it operates and evolves, turning to alternative support schemes and diversifying their ambitions beyond renewable electricity generation.

This research has also displayed the subnational divisions of the attitudes toward community energy. With the somewhat devolved nations of Scotland and Wales having a greater ambition to support the community sector by introducing government run support mechanisms. However these nations still not being fully devolved from the UK government still restricts their ambitions to do so. It is interesting when reading about the strength of the CE sector in the likes of Germany and Denmark where core governmental support is so apparent and vital to the sector (Cappellan-Perez, 2018. Ozgul, 2020. Holstenkamp, 2016). And contrasting this with the UK, where there is a lack of support from the central government. This shows the distinct interrelation between various scales within a country and how national actions can inhibit or promote local community led initiatives such as the community energy movement. It is then clear that in the UK the national context must be addressed. Where a more supportive regime must be formed that is willing to aid the development of the community energy sector. For instance, the sector is imploring for the reintroduction of support schemes such as the feed-in tariff. On top of this to overcome the barrier that is the national grid, there must be better cooperation between the two actors and in turn come to purchasing agreements which promote community energy not hinder it. It will also be beneficial to learn and adopt from Scottish and Welsh progress, where community energy is being supported to a greater degree. If the country has ambitions

not only to stimulate an energy transition but also to do it in a way that is more just for society then it must understand the obvious benefits that community energy can bring to the energy transition in the UK. With a greater recognition of the sector will hopefully in turn promote policy and political willingness to support its development.
With a greater support from the regime level, especially with national and local governmental support. Will in turn lead to a transition. The niche innovation that is commuity energy will be able to enter the regime. Bringing with it the multiple benefits associated with a more decetrlaised form of managing our energy system, including a more representative democratic form of governance.. The sector will continue to achieve its goals in growing throughout communities across the United Kingdom, although this growth will continue to be stunted without regime level support.

7. References:

Agrawal, A. and Gibson, C.C., 1999. Enchantment and disenchantment: the role of community in natural resource conservation. *World Development*, 27 (4), 629–649. doi:10.1016/S0305-750X(98)00161-2

Anderson, A.R. and Gaddefors, J., 2016. Entrepreneurship as a community phenomenon: reconnecting meanings and place. *International journal of entrepreneurship and small business*, *28*(4, pp.102-111

Barca, S., 2011. Energy, property, and the industrial revolution narrative. *Ecological Economics*, *70*(7), pp.1309-1315

Bauwens, T. and Devine-Wright, P., 2018. Positive energies? An empirical study of community energy participation and attitudes to renewable energy. *Energy Policy*, *118*, pp.612-625.

Bennett, J. 2010. *Vibrant matter: a political ecology of things*. Durham, NC: Duke University Press.

Blee, K.M., 2012. Democracy in the making. How activist groups form/Kathleen M. Blee. New York: Oxford University Press.

Bregje Van Veelen. 2018. Negotiating energy democracy in practice: governance processes in community energy projects, Environmental Politics, 27:4, 644-665, DOI: 10.1080/09644016.2018.1427824

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. *Renewable and Sustainable Energy Reviews*, *94*, pp.187-196.

Burke, M.J. and Stephens, J.C., 2018. Political power and renewable energy futures: A critical review. *Energy Research & Social Science*, *35*, pp.78-93.

Capellán-Pérez, I., Campos-Celador, Á. and Terés-Zubiaga, J., 2018. Renewable Energy Cooperatives as an instrument towards the energy transition in Spain. *Energy Policy*, *123*, pp.215-229.

Creamer, E., 2015. The double-edged sword of grant funding: a study of community-led climate change initiatives in remote rural Scotland. *Local Environment*, 20 (9), 981–999. doi:10.1080/13549839.2014.885937

David, M. and Schönborn, S., 2018. Bottom-up energy transition narratives: linking the global with the local? A comparison of three German renewable co-ops. *Sustainability*, *10*(4), p.924.

Dóci, G., Vasileiadou, E. and Petersen, A.C., 2015. Exploring the transition potential of renewable energy communities. Futures, 66, pp.85-95.

Dryzek, J., 2000. *Deliberative democracy and beyond. Liberals, critics, contestations*. Oxford: Oxford University Press.

Eikeland, P.O. and Inderberg, T.H.J., 2016. Energy system transformation and long-term interest constellations in Denmark: can agency beat structure?. *Energy Research & Social Science*, *11*, pp.164-173.

Featherstone, D., *et al*., 2012. Progressive localism and the construction of political alternatives. *Transactions of the Institute of British Geographers*, 37 (2), 177–182. doi:10.1111/tran.2012.37.issue-2

Gautney, H., 2009. *Democracy, states, and the struggle for global justice*. London: Routledge.

Gross, C., 2007. Community perspectives of wind energy in Australia: The application of a justice and community fairness framework to increase social acceptance. *Energy policy*, *35*(5), pp.2727-2736.
Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy*, *31*(8-9), pp.1257-1274.

Geels, F.W., 2005. *Technological transitions and system innovations: a co-evolutionary and socio-technical analysis*. Edward Elgar Publishing.

Geels, F. and Raven, R., 2006. Non-linearity and expectations in niche-development trajectories: ups and downs in Dutch biogas development (1973–2003). *Technology Analysis & Strategic Management*, *18*(3-4), pp.375-392.

Geels, F.W. and Schot, J., 2007. Typology of sociotechnical transition pathways. *Research policy*, *36*(3), pp.399-417.

Geels, F.W., 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental innovation and societal transitions*, *1*(1), pp.24-40.

Hansmann, H., 2000. *The ownership of enterprise*. Harvard University Press

Haf, S., Parkhill, K., McDonald, M. and Griffiths, G., 2019. Distributing power? Community energy projects' experiences of planning, policy and incumbents in the devolved nations of Scotland and Wales. *Journal of Environmental Planning and Management*, *62*(6), pp.921-938.

Hasanov, M. and Zuidema, C., 2018. The transformative power of self-organization: Towards a conceptual framework for understanding local energy initiatives in The Netherlands. *Energy Research & Social Science*, *37*, pp.85-93.

Healy, N., Stephens, J.C. and Malin, S.A., 2019. Embodied energy injustices: Unveiling and politicizing the transboundary harms of fossil fuel extractivism and fossil fuel supply chains. *Energy Research & Social Science*, *48*, pp.219-234.

Hoffmann, C. 2018. Beyond the resource curse and pipeline conspiracies: energy as a social relation in the Middle East. *Energy Res. Social Sc.* 41, 39–47. doi:10.1016/j.erss.2018.04.025.

Holstenkamp, L. and Kahla, F., 2016. What are community energy companies trying to accomplish? An empirical investigation of investment motives in the German case. *Energy Policy*, *97*, pp.112-122.
Huber, M. T., and McCarthy, J. 2017. Beyond the subterranean energy regime? Fuel, land use and the production of space. *Trans. Inst. Br. Geogr.* 42 (4), 655–668. doi:10.1111/tran.12182.

Huijts, N.M., Molin, E.J. and Steg, L., 2012. Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and sustainable energy reviews*, *16*(1), pp.525-531.

Islar, M., and Busch, H. 2016. We are not in this to save the polar bears! - the link between community renewable energy development and ecological citizenship. *Innovat. Eur. J. Soc. Sci. Res.* 29(3), 303–319. doi:10.1080/13511610.2016.1188684

Jones, C. and Reinecke, D., 2017. Infrastructure and democracy. *Issues in Science and Technology*, *33*(2), p.24.

Kunze, C., Becker, S., 2014. Energy democracy in Europe: A survey and outlook. Rosa Luxemburg. Stift. Bruss. Off.

Little, A., 2002. *The politics of community*. Edinburgh: Edinburgh University Press.

McConnell, G., 1966. *Private power and American Democracy*. New York, NY: Alfred A. Knopf.

Menges, R., 2003. Supporting renewable energy on liberalised markets: green electricity between additionality and consumer sovereignty. *Energy Policy*, *31*(7), pp.583-596.

Mumford, J. and Gray, D., 2010. Consumer engagement in alternative energy—Can the regulators and suppliers be trusted?. *Energy Policy*, *38*(6), pp.2664-2671.

Özgül, S., Koçar, G. and Eryaşar, A., 2020. The progress, challenges, and opportunities of renewable energy cooperatives in Turkey. *Energy for Sustainable Development*, *59*, pp.107-119.
REScoop (2022). Available at: https://www.rescoop.eu/ (Accessed: 6 July 2022).
Park, S. and Yun, S.J., 2021. Multiscalar energy transitions: Exploring the strategies of renewable energy cooperatives in South Korea. *Energy Research & Social Science*, *81*, p.102280.

Robinson, S., Community Energy England, 2020. *Community Energy, State of the Sector, 2020.*

Saintier, S., 2017. Community energy companies in the UK: a potential model for sustainable development in "local" energy?. *Sustainability*, *9*(8), p.1325.

Seyfang, G., Haxeltine, A., Hargreaves, T. and Longhurst, N., 2010. *Energy and communities in transition: Towards a new research agenda on agency and civil society in sustainability transitions* (No. 10-13). CSERGE working paper EDM.

Simcock, N., 2016. Procedural justice and the implementation of community wind energy projects: a case study from South Yorkshire, UK. *Land Use Policy*, 59 (December), 467–477. doi:10.1016/j.landusepol.2016.08.034

Sorman, A.H., Turhan, E. and Rosas-Casals, M., 2020. Democratizing energy, energizing democracy: Central dimensions surfacing in the debate. *Frontiers in Energy Research*, *8*, p.499888.

Strachan, P.A., Cowell, R., Ellis, G., Sherry-Brennan, F. and Toke, D., 2015. Promoting community renewable energy in a corporate energy world. *Sustainable development*, *23*(2), pp.96-109.

Szulecki, K., 2018. Conceptualizing energy democracy. *Environmental Politics*, *27*(1), pp.21-41.

Szulecki, K. and Overland, I., 2020. Energy democracy as a process, an outcome and a goal: A conceptual review. *Energy Research & Social Science*, *69*, p.101768.

Taylor Aiken, G., 2015. (Local-) community for global challenges: carbon conversations, transition towns and governmental elisions. *Local Environment*, 20 (7), 764–781. doi:10.1080/13549839.2013.870142

Truelove, H.B., 2012. Energy source perceptions and policy support: Image associations, emotional evaluations, and cognitive beliefs. *Energy Policy*, *45*, pp.478-489.

UK Government, 2021. *Net Zero Strategy: Build Back Greener.* Gov.uk official documents

Van der Brugge, R., Rotmans, J. and Loorbach, D., 2005. The transition in Dutch water management. *Regional environmental change*, *5*(4), pp.164-176.

Van Veelen, B., 2018. Negotiating energy democracy in practice: governance processes in community energy projects. *Environmental politics*, *27*(4), pp.644-665.

Visschers, V.H. and Siegrist, M., 2014. Find the differences and the similarities: Relating perceived benefits, perceived costs and protected values to acceptance of five energy technologies. *Journal of Environmental Psychology*, *40*, pp.117-130.

Walker, G., Hunter, S., Devine-Wright, P., Evans, B. and Fay, H., 2007. Harnessing community energies: explaining and evaluating community-based localism in renewable energy policy in the UK. *Global Environmental Politics*, *7*(2), pp.64-82.

Walker, G., *et al*., 2010. Trust and community: exploring the meanings, contexts and dynamics of community renewable energy. *Energy Policy*, 38 (6), 2655–2663. doi:10.1016/j.enpol.2009.05.055

Walker, G., 2011. The role for 'community' in carbon governance. *Wiley interdisciplinary reviews: climate change*, *2*(5), pp.777-782.

Young, I.M., 1990. *Justice and the politics of difference*. Princeton, NJ: Princeton University Press.

8. Appendix:

List of figures/tables:

List of abbreviations:

CE: Community Energy
RES: Renewable Energy Sources
REC; Renewable Energy Communities
MLP: Multi-level Perspective
FiT: Feed-in Tariff