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for a sustainable future

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Index of Contents

Index of Figures

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1 Executive Summary

DIALOGUES aims at supporting the Energy Union through operational research pertaining to energy citizenship that encourages citizens to take a central role in the low-carbon energy transition. This is mainly achieved through citizen engagement with energy topics, awareness of the greenhouse gas emissions caused by their individual choices, equity, and justice. To this end, DIALOGUES operationalizes, contextualizes, measures, and supports the framework environments, policies, and institutions, which enable inclusive energy citizenship to emerge.

The objective of this report is to provide an in-depth perspective regarding the concepts and dimensions of energy citizenship. This is achieved by compiling all findings from different research perspectives into a comprehensive, interdisciplinary assessment of how energy citizenship is perceived, and how pathways to energy citizenship are conceptualized in the literature.

This report presents a systematic literature review, the results of which are aligned with the meta-analysis performed in DIALOGUES Integrated Research White Paper (Biresselioglu et al., 2021).

Assessing the significance of the energy citizenship concept provides an understanding of how it has evolved, and how different disciplines approach energy citizenship. The analysis shows that the concept of energy citizenship has gained prominence and wider usage in the second decade of this century, yet not until relatively recently has energy citizenship been given attention in various scientific disciplines including psychology, sociology, political science, economics, behavioural science, community research, environmental sciences, gender research and ethics. In this regard, the concept refers to the active and responsible participation of citizens, through individual and collective actions, in the development of technologies, solutions, facilities, entrepreneurial ventures and projects aimed at expanding energy access and achieving the energy transition. When the concept is assessed within the discipline of Social Sciences and Humanities (SSH), a set of key themes emerge, including: prosumers and energy prosumerism, energy communities, collective action/identity/ownership, bottom-up and participatory action-based policies, awareness and responsibility, energy justice, gender equality and inclusivity, energy poverty, environmental consciousness and attitudes, energy democracy, and democratic governance.

Evidence from the systematic literature review also demonstrates that energy citizenship is the result of a combination of a wide variety of factors at the individual, collective and institutional levels. Such a combination emphasises certain factors, motivators, and barriers. These factors, pertaining to energy citizenship, include the following: environmental consciousness and awareness (e.g., knowledge and willingness to engage in environmental issues), technological knowledge as a signifier for engagement, psychological and behavioural factors at the individual level (e.g., willingness to engage, level of information, personal value system), structural and organizational factors (e.g., access to and quality of services, community living conditions, type of homeownership, ownership of a renewable energy system, geographical location of the dwelling), economic factors (e.g., levelized cost of electricity, energy price changes at the

household level, the general competitiveness of the economy), social factors, individual climate perceptions, financial factors, gender related issues and policy-related factors.

The motivators pertaining to energy citizenship are listed as individuals' concern over and attention to climate change and environmental aspects, a person's willingness to take climate actions and support climate policies, intention to invest in community-owned renewable energy, and close interaction and mutual trust between the local governments and the representatives of the local communities. Barriers include regulatory, financial, infrastructural aspects as well as socio-political facets like the; lack of willingness to participate as a result of political disobedience and social hesitation, lack of awareness and access to information provision regarding technology alternatives, public values and concerns, and general lack of knowledge about energy topics, and citizens' perception that their individual involvement will make no difference.

The identified themes, factors, motivators and barriers are then utilized to explain the individual, community/social and external dynamics concerning energy citizenship. Furthermore, the specific aspects, contextual dynamics on vulnerable and marginalised groups, and individuals' role in energy citizenship are assessed.

2 Introduction

This report aims to set the ground for the research strategy of DIALOGUES, and introduces a variety of disciplinary contributions to the concept of 'energy citizenship'. That is, it ensures the consistency of the scientific approach in DIALOGUES, and provides a framework for the whole project, to allow coordination across the research activities. To this end, this report focuses on integrating and refining theories across disciplines and methods, thereby establishing an effective interdisciplinary research co-creation process.

Accordingly, DIALOGUES' research starts with an interdisciplinary review of the state-of-the-art energy citizenship research, including a comprehensive review and analysis of the existing works, approaches, perspectives, methods and relevant concepts. This comprehensive literature review served to establish a common understanding of key concepts, terms, and variables within the DIALOGUES consortium, and the creation of a DIALOGUES glossary.

The comprehensive literature reviews also formed the basis and background for the research activities to be conducted throughout the project by providing an in-depth perspective of the concepts and dimensions of energy citizenship, compiling findings from multiple perspectives into a comprehensive, interdisciplinary assessment of how energy citizenship is perceived in research, and how pathways to energy citizenship are conceptualized in the literature.

In what follows, this report defines the methodology utilized, including the literature review and meta-analysis (Section 3). This is followed by Section 4, which provides an assessment of the significance of the energy citizenship concept from perspectives such as legal, regulatory, psychological, policy, governance, political, institutional, organizational, social, behavioural, anthropologic, geographical, and sociological. Section 5 analyses the conceptualization of energy citizenship and relevant key parameters, via the identification of main themes, indicators, dimensions, and variables

associated with energy citizenship (Subsection 5.1), and key factors, motivators and barriers pertaining to energy citizenship (Subsection 5.2).

Section 6 focuses on the dynamics and pathways to energy citizenship including self-identity, actions, habit change, and cognitive-emotive processes. Subsection 6.1 presents a discussion of individual, community-related and social dynamics such as inter and intra-social processes, trust, connection, common benefits, shared goals, and external dynamics, such as the relative openness of institutional or corporate environments, availability of sympathetic interlocutors, and access to financial or other sources of support impacting the pathways to energy citizenship. In Subsection 6.2, an assessment of the impacts of specific aspects such as age, gender, race, ethnicity, socio-economic status, geographic isolation on energy citizenship is given. These factors are either directly relevant to, or may indirectly affect, the dynamics of energy citizenship. The impacts of contextual dynamics of energy citizenship on vulnerable groups is analysed in Subsection 6.3, and the individual's role in energy citizenship is elaborated in Subsection 6.4. This subsection involves a discussion of targeted contributions of individuals in energy citizenship, including energy efficiency, technology uptake, innovation, digitalisation, storage, flexibility, renewable generation, as well as the dimensions of equity and justice and social innovation. In subsection 6.4, types of individual participation regarding energy citizenship as demonstrated by external energy-related choices or internal decision processes are discussed. Also in Subsection 6.4, types of participation, e.g., lifestyle adoption, civic participation, political participation, financial participation, economic participation, social participation, e-participation, and industrial or workplace participation are exemplified. Concluding remarks are presented in Section 7.

3 Methodology

3.1 Methodological Framework

The overarching framework of DIALOGUES is based on operational research that supports the Energy Union and the key role of citizens in the energy transition. To reach this objective, DIALOGUES will operationalize, contextualize, measure, and support the framework environments, policies and institutions that allow deep, inclusive energy citizenship to emerge. Hence, inclusivity is key in the project in terms of citizens' involvement on the margins of the energy transition.

DIALOGUES utilizes an inter- and trans-disciplinary methodology based on co-creation, i.e. a 'dialogue' between its stakeholders. On the grounds of the broad methodological approach of the project, this report, in which the key question is how inclusive energy citizenship can be understood and operationalized in practice, adopts an approach grounded in establishing a common inter- and transdisciplinary research framework. Currently, research on citizen engagement in energy topics remains quite fragmented and oriented towards specific situations/technologies - without any overarching conceptual framework. To this end, this report offers a meaningful and comprehensive, structured analysis on energy citizenship research.

One of the prominent ways to conduct a comprehensive and in-depth analysis on a particular topic is systematic literature review which identifies and critically assesses research to address a clearly formulated question (Boell and Cecez-Kecmanovic, 2015).

In this context, 'systematic' means the review process is comprehensive, transparent and reproducible, avoiding any potential bias (Pare and Kitsiou, 2017; Dyba et al., 2005). Pittway (2008) proposes key principles for a systematic literature review, including "transparency, clarity, integration, focus, equality, accessibility, and coverage". The majority of the studies utilizing a systematic literature review underline that these principles should be strictly pursued (Grant and Booth, 2009; Liberati et al., 2009; Xiao and Watson, 2019). In addition, a predefined protocol or plan is key in providing a systematic review, which requires the criteria for review to be clearly stated. Therefore, the search strategy is formulated to answer a well-defined question.

- A clear and accountable research question is formulated, considering that the research question is "clear, focused, concise, complex and arguable". A clear research question drives the entire literature review process (Kitchenham and Charters, 2007).
- The review protocol is developed to explain the research rationale and methodology. The review protocol is the pre-set plan that facilitates the cross-check and verification. A review protocol describes all the elements of a review, such as "purpose of the study, research questions, inclusion criteria, search strategies, quality assessment, criteria and screening procedures, strategies for data extraction, synthesis, and reporting" (Gates, 2002; Gomersall et al., 2015).
- Systematic searches are conducted to provide the evidence base for the research. To this end, decisions are made on the search strategy, text mining and search filters, database selection, types of documenting and reviewing.
- A set of prospective studies are determined in order to decide on whether they will be further considered for data extraction and analysis.
- The included articles are critically appraised to examine whether the selected study fulfils criteria for trustworthiness, value and relevance in the particular context of the research.
- The data is extracted and synthesized in a structured manner consistent for each study. The outputs of the review should be easily interpretable by the other stakeholders involved during the research. In general, data extraction might be conducted through coding (Suri and Clarke, 2009). Depending on the extracted keywords, the outputs are synthesized on the basis of a reporting structure identified in the literature review protocol/template.
- The review is reported, written and published in sufficient detail, highlighting key themes, characteristics, groups or subgroups (Okoli and Schabram, 2010; Rowley and Slack 2004). This is the final stage in ensuring robustness and transparency of the systematic literature review. Consequently, the review is re-examined by the research team for checks and balances (Andrews and Harlen, 2006).

The methodological framework of this report is based on a systematic literature review. The review is considered systematic since the review process follows the principles and steps suggested by Xiao and Watson (2019), identified above.

As the initial stage, DIALOGUES' research questions pertaining to energy citizenship were clearly identified. Following this, the review protocol and guideline were developed in the form of a systematic literature review template to be followed by each of the authors. This template described all the elements of the review, including both the

structural and contextual properties of the reviewed studies and their conceptualization of "energy citizenship", to ensure the incorporation of collective and inclusive contexts.

In the following step, systematic searches were conducted. The systematic literature review of DIALOGUES consists of two phases. In the initial phase, a state-of-the-art literature review was applied, aiming at establishing a common inter- and trans-disciplinary research agenda (see also Biresselioglu et al., 2021). Accordingly, the sources reviewed for inclusion were retrieved from academic databases, such as Web of Science, ScienceDirect, Scopus, and ResearchGate. Also considered were books and book chapters, scientific and technical project reports, and policy briefs pertaining to energy citizenship. The main keywords to delimit the research were: "empowerment (of citizens in the energy system)", "individual energy behaviour", "inclusion (in energy transition)", "energy justice", "energy poverty", "(energy) self-sufficiency", "energy democracy", "energy citizen", "(citizen) energy community", "public engagement (in energy system)", "energy transition", "consumer empowerment", "gender inequalities (in energy transition)" and "prosumers".

In the preliminary analysis, of nearly 750 sources identified, 161 sources were refined and critically appraised according to their relevance to energy citizenship and capability of addressing significant topics, providing a comprehensive perspective, and introducing new concepts. This step identified how current literature relates to the idea of "energy citizenship", and conceptualises "energy citizenship" as incorporating collective and inclusive contexts (as considered in Biresselioglu et al., 2021). The structure and parameters of the first phase of the literature review includes a set of headlines including selection criteria, keywords, type (article/review article/case study/project report/policy document, etc.), context (individual, household/community, local/regional, national/supranational, etc.), geographical coverage, discipline/domain, focus (general, low-income, energy poor, gender, ethnic minorities, etc.), defining the framework for energy citizenship, important definitions/terms/terminology, objectives of the research, research questions, theories, methodologies, identified gaps, and results of the research.

The second phase of the methodological framework further improves on the outputs of Biresselioglu et al. (2021), and provides an encompassing framework. The structure and parameters of the underlying literature review in the second phase include the following: different perspectives in research (legal, regulatory, psychological, policy, governance, political, institutional, organizational, social, behavioural, anthropologic, geographical, sociological, behavioural economic, economic development etc.), key variables (important factors, motivators, barriers, drivers, etc.), individual pathways to energy citizenship (self-identity, actions, habit change, cognitive-emotive processes, etc.), community/social dynamics (inter and intra- social processes, trust, connection, common benefits, shared goals, etc.), external dynamics (structural inequalities, relative openness of institutional or corporate environments, availability of sympathetic interlocutors, access to financial or other sources of support, etc.), social dimensions (age, gender, race, ethnicity, socio-economic status, geographic isolation, etc.), targeted contribution (energy efficiency, technology uptake, innovation, digitalisation, storage/flexibility, renewable generation, equity and justice, social innovation, etc.), and finally, types of participation (lifestyle adoption, civic participation, political participation, financial and economic participation, social participation, e-participation,

industrial/workplace participation, etc.). Accordingly, the state-of-the-art literature review conducted in the second phase of this deliverable aims at the following:

1. To assess the significance of the energy citizenship concept,
2. To conceptualize energy citizenship and relevant key parameters via identifying main themes, indicators, dimensions, and variables associated with energy citizenship as well as key factors, motivators and barriers pertaining to energy citizenship,
3. To analyse dynamics and pathways to energy citizenship via discussing individual, community-related, social, and external dynamics impacting the pathways to energy citizenship, assessing how energy citizenship is impacted by social dimensions (e.g., age, gender, race, ethnicity, socio-economic status, geographic isolation), evaluating the impacts of contextual dynamics of energy citizenship on vulnerable groups, and assessing the individual's role in energy citizenship.

Based on these two phases of the systematic literature review, the data for the appraisal and analysis of the energy citizenship approach was extracted and synthesized for the purposes of this report. Accordingly, the research partners completed the literature review template in a structured and easily interpretable manner. The results of the analysis were compiled in a written and publishable deliverable.

Figure 1 illustrates the methodological framework adopted in the following discussions.

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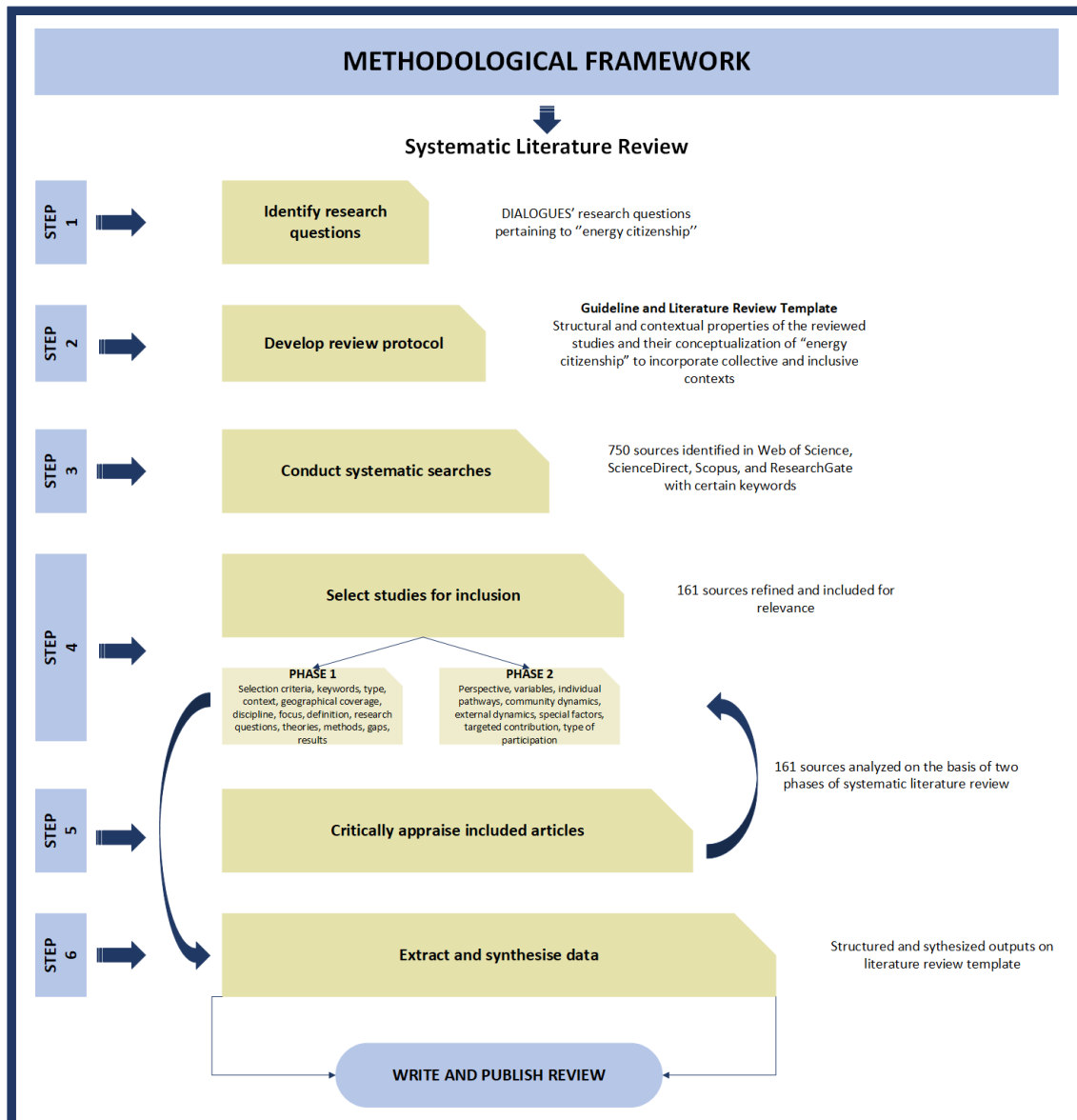
Figure 1. Methodological Framework

3.2   Aligning Existing Systematic Review with Meta-analysis of D2.1

Biresselioglu et al. (2021) utilized the VOSviewer software to identify energy citizenship themes through bibliometric analysis, based on a state-of-the-art literature review and involves 101 manuscripts from the literature review from the Web of Science database.

The results demonstrate that terms with the highest number of occurrences in the reviewed literature include energy transition, citizenship, behaviour, woman, project, individual, consumption and attitude. On the other hand, the highest number of links was found for terms including individual, project, energy transition, consumption, household, decision, and attitude. The terms with the highest link strengths in total are energy democracy, political consumerism, prosumerism, demand response, consumption, attitude, energy transition, and citizens' attitude.

The results of the bibliometric analysis are the statistical analysis of the studies covered in the state-of-the-art literature review. In addition, the research team conducted a manual analysis during the literature review phase via extracting keywords reflected in the literature review template.

There are different visualization techniques in VOSviewer software, including network visualization, density visualization, and overlay visualization. The results of the bibliometric analysis conducted through different visualization techniques (mainly network visualization) show that the concept of energy citizenship interacts more frequently with the terms individual, energy transition, consumption, and household. The comprehensive literature review conducted for this report supports the results of the bibliometric analysis. For instance, the overlay visualization results reveal that the theme of energy citizenship emerged approximately in 2019. The evolution in the energy citizenship literature started with certain topics, such as energy transition, energy poverty, public participation, and organization in the years 2017-2018, followed by energy community, energy democracy, energy transition, prosumerism, and co-creation in 2020. Consequently, both the statistical analysis and the manual analysis conducted by the research team in literature review templates imply similar evolution patterns in energy citizenship literature. Both analyses demonstrate that the concept of energy citizenship has become increasingly addressed in the literature in recent years, and that the concept interacts with many others, for example, public participation, individual, attitude, citizen dialogues, behaviour, citizenship, decision, environmental concern, household energy, and prosumerism.

4 Assessment of the Significance of the Energy Citizenship Concept

4.1 Energy citizenship is a historical category

The concept of energy citizenship needs to be understood in terms of energy and citizenship aspects. After some reflections on the energy transition and on the evolution of the concept of citizenship, the report discusses the significance attributed to energy citizenship in various scientific disciplines.

The energy transition is a response to the existential threat of climate change to the natural basis of human life on earth. The shift between energy systems, from fossil to renewables, or from high to low energy usage, known as efficiency or sufficiency, accompanies a profound economic and social transformation that reaches deep into peoples' lives. The scale of change needed in the energy transition is unprecedented, and requires planned and concerted action from the global to local level (Sarrica et al., 2014). While much discourse on the energy transition has emerged in recent years, there is a lack of effective, systemic and rapid action. What role citizens might play in such a transition is a key area of interest.

The Conference of Parties of the United Nations (COP), the European Green Deal, the national and regional Climate and Energy Plans and the Sustainable Energy and Climate Action plans of the cities that are signatories of the Covenant of Mayors are all examples of entities engaged in the energy transition. At the same time, it is abundantly clear that

in order for people to change how they heat their homes, use electricity, and travel, their collaboration, better still, their pro-active participation, is needed. The concept of citizenship needs to be extended to the realm of energy in a specific historical situation of rapidly progressing climate change because of its vital importance for the future of humanity.

Energy citizenship has gained wider usage only in the second decade of this century, and it is only very recently that various scientific disciplines have directed their attention to this concept (see Section 3.2 and Biresselioglu et al., 2021), variously from a psychological, sociological, political science, and economic point of view. In good part the different interpretations of citizenship coincide with the perspectives of the different scientific disciplines.

It is not surprising that a psychological approach views individuals, perceived as self-determined actors, as driven by their subjectivity. The identity aspect is further underlined by gender studies, although these studies also pay much attention to more structural dynamics. The individual perspective holds also true for economics, where the emphasis is on rational choices, where sometimes the population as a whole comes into view, but essentially in an additive model. SSH studies also focus on the development of social identities based on shared understandings and their symbolic representations (Tilly, 1995). They emphasize to differing degrees the historical evolution of these cultural identities along class, social (gender, ethnicity) and geographical lines (global/local dimensions, centre/periphery, or the urban/rural division). Before returning to the approach of the different disciplines that have taken up energy citizenship, a brief discussion of the recent evolution of the concept of citizenship is given in the following section, of which the link to the energy transformation - and more generally to climate and environment – is the latest field of significance.

4.2   Notes on the evolution of the citizenship concept

In Western modern usage, the term citizenship tends to have two distinct meanings: the theoretical-political, and the legal. In the first case, citizenship designates the social status of a citizen, i.e., the set of political, economic, and cultural conditions guaranteed to those, who are full members of an organized social group. In the second case, the meaning of the term citizen is directly opposed, even before that of *foreigner*, to that of subject (or, more historically, to slave, servant, etc.). The citizen, unlike the subject, is the holder of civil and political rights (in the 20th century, also of "social rights") and is in principle also entitled to assert them vis-à-vis the political authority. In the second case, the term "citizenship" designates a normative status, i.e., the inclusion of a person - through territorial connections, family ties, free choice, etc. - in the legal system of a State. In this formal sense, the term citizen is nowadays opposed, in both domestic and international law, exclusively to the term *foreigner* (or stateless person). Citizenship in this case concerns the legal or factual situations that each State defines - under the distinct profiles of private and public law - as conditions for the possession, acquisition or loss of the status of citizen and the entitlement to the rights and duties connected with that status (Zolo, 2000). Between the 19th and 20th centuries, we witnessed the

emergence of the democratic-social concept of citizenship, structured in three main components: belonging, understood as status and as a sense of identity; guaranteed rights and related duties; and participation, which is the most important factor for judging the democratic character of citizenship (Moro, 2020). Democratic citizenship has become a key concept for policy makers, and the idea that more active and aware citizens are a valuable addendum to democracy has become mainstream. At present, the debate on citizenship has been revived for a number of reasons, including the globalisation process and the substantial migration flows of recent decades, and most recently, climate change and the energy transition.

We are faced with an expansion of the concept of citizenship from its original legal and political meanings, through the social citizenship recognised by T. H. Marshall, to a series of contemporary declinations of democratic citizenship, such as European, multicultural, active and also environmental and energy citizenship (Moro, 2020).

The energy citizenship discourse recognizes the important roles that citizens, especially innovators and entrepreneurs in small and medium scale enterprises, can play in the energy sustainability transitions. The concept indicates the active and responsible participation of citizens, through individual and collective actions, in the development of technologies, solutions, facilities, entrepreneurial ventures and projects aimed at expanding energy access (Devine-Wright and Murphy, 2007). Energy citizens in this context refers to all individuals or legal persons involved in the production, distribution and sale of energy, without discrimination as to nationality or domicile and, in case of a legal person, without discrimination as to the location of their registered seat or effective centre of their activities. Energy citizenship therefore advocates a fundamental shift from energy infrastructure and facilities being centrally managed, government owned or driven by large companies, towards a more decentralized, diversified, and distributed energy generation model, in which citizens actively participate across the entire energy value chain.

Regarding the concretisation of this concept, Olawuyi (2021) has analysed fundamental questions of law and practice, which must be addressed, if the current national visions and policies on energy citizenship aimed at achieving the United Nations Sustainable Development Goals 7 on energy for all are to be transformed from mere political aspirations into specific actions. For example, the ability of individuals to develop and launch energy technologies, solutions and ventures has been increasingly stifled by pre-existing legal barriers caused by regulatory complexities and delays in project approval and registration. Other issues concern an inadequate legal framework for public-private partnerships, challenges in integrating renewable energy sources into national grids and existing challenges to public participation (Olawuyi, 2021).

4.3   State of the Energy Citizenship discourse in various disciplines

The systematic DIALOGUES literature review shows that the concept of "energy citizenship" has been assessed in a variety of disciplines and fields, but mainly Sociology, Social Psychology and History, and in a wide variety of sub-disciplines and domains that aim to demonstrate and assess the significance of the energy citizenship

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concept. These include behavioural science, community research, environmental sciences and environmental politics, environmental sociology, social psychology, energy economics, energy ethics, political science and governance, gender research, sustainability studies, geography, and anthropology and culture.

The following sections illuminate how the sub-disciplines and domains under Social Sciences and Humanities discipline define and assess energy citizenship.

Behavioural science concentrates on individual energy behaviour and practices, personal norms and values, beliefs, and their reflections on community behaviour and practices. Shi et al. (2019) argue that values significantly shape individuals' personal energy conservation norms and their conservation behaviour. This potentially entails a moral responsibility to take more conscious steps in the energy system as a significant aspect of citizenship. Moreover, the interactions between cognitive norms, energy practices and material culture accompanied by wider social, environmental and economic forces affect individual energy behaviour, outlining the energy citizenship perspective through a linkage between individual motivations in the energy system and their capability to shape policies (Stephenson et al., 2010). There are few studies on possible links between household energy-saving behaviour and the stance on wider ecological and political issues, yet. However, F. Belaïd and H. Joumni (2020) suggest that activity in a civil society organization, a union or a political party can have a positive effect on energy-saving attitudes.

Besides the individual behaviour and practices, behavioural science also covers community behaviour and practices. Energy is represented as a concept that belongs to humans who are a part of larger communities (Sarrica et al., 2014). Therefore, social representation and practice define the roles of citizens in the community they belong to. To the extent to which active citizen participation comes into view as crucial for energy transitions, in addition to energy consciousness, a decisive role is played by literacy, behaviour and practices as well as collective social and political engagement (Ingeborgrud et al., 2020). Community empowerment is a significant component of energy citizenship in terms of a deeper inquiry into community equity (Slee, 2014). Hence, community empowerment and equity are key aspects to assess the significance of energy citizenship in community-oriented behavioural science.

Environmental sciences and environmental politics also concentrate on participatory and inclusive governance structures and organizational formats to empower citizens to become full stakeholders while sharing environmental benefits in the process. Environmental science points at the "co-designed character" in the energy transition with local communities practicing energy democracy through participatory models (Lennon et al., 2019; Alcock et al., 2017; Chilvers and Longhurst, 2016; Sarid and Goldman, 2021).

For social psychology, energy citizenship can make an important contribution in the wider arena of citizenship studies (Stevenson et al., 2015). Social citizenship rights and responsibilities are shaped by existing perceptions regarding self and society (Anderson and Gibson, 2020). There are important social-psychological benefits for citizens involved in the energy transition, such as increasing control in the local development

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decisions and competence at the individual and collective levels, positive emotional responses and elevated self-esteem and self-efficacy (Devine-Wright and Murphy, 2007).

For energy ethics (Chilvers et al., 2017), taking an individualistic perspective, energy social science research needs to develop a new register to address normative demands, capable of giving expression to relational notions of responsibility, interdependence, and necessity. To this end, a careful ethical approach stresses mutual respect and responsive engagement, and the responsibility of both participants and 'facilitators', for enabling effective processes of engagement (Damgaard, 2021). An important dimension here is exclusion and inclusion. A shared understanding of energy citizenship in a given context harbours the risk of including some and excluding others, undermining a broader ethico-political framing of the entitlement of all citizens to be part of the transition to a low-carbon society.

The political science and energy governance perspective prioritizes empowerment of citizens and local communities. In this regard, key issues in energy governance are "energy democratization, decentralization of the governance of energy security and the emergence of new energy actors, namely prosumers and renewable energy cooperatives" (Leal-Arcas, 2019).

In sociology, research has focused on the role of citizens as prosumers (Ritzer 2015), who contribute their labour to producing renewable energy, for example. In this perspective, the often rather passive role ascribed to a consumer is transformed into a more active role (Ekström and Glans 2011). In relation to how energy is used, sociologists offer an approach that rejects the individualization of energy usage, to rather focus on how 'energy demand' is a result of everyday life dynamics, including social practices that use energy services (Shove and Walker 2014, Hui et al 2017). Rather than see (rational or irrational) people as central to change, social practices are the focus for energy transition - which require a consideration for the role of material arrangements and technologies, collective conventions and regulatory frameworks, as well as skills and competencies. Here, there are clear synergies with Science and Technology Studies. As such, everyday actions can be prefigurative of forms of more collective and transformative change (Yates 2020). Social movement theories in sociology will also attend to the role of citizens in energy transitions, for example by studying the role of eco-neighbourhoods or transition towns. In a sociological approach, the question of social norms, cultural meanings, and power dynamics (inclusion/exclusion), are also central.

Gender studies start from an understanding of gender as socially and culturally constructed roles and relationships, including characteristics, behaviours, values and power, that societies are attributing to people according to their sex assigned at birth typically to the disadvantage of women. It shows how structural gender inequalities impact both women's access to energy and their concrete involvement in energy policy making. It focuses on energy citizenship from the perspective of inclusivity in the energy system above all in terms of gender-just participation in the transition asking how to integrate gender specific needs, interests, and diversity into the policy design (Gram-

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Hanssen et al., 2017; Wilhite, 2017) as part of the wider issue of democratic participation (Lieu et al., 2020). An intersectional approach must address overlapping axes of difference (e.g., sex, race, ethnicity, age, disability, nationality, sexual orientation etc.), considering these categories as not only adding to one another and thus reinforcing oppression on certain population groups but as "mutually constituent systems", where gender analysis is a privileged entry point to then look into the interdependence with other relevant social categories (Bell et al. 2020).

Other disciplines under Social Sciences and Humanities such as sustainability studies, geography, anthropology, and sociology also define energy citizenship. These domains concentrate on the relationship between energy flows and infrastructure, grassroots initiatives for social citizen participation and local community energy projects, and the energy transition (Bouzarovski and Bassin, 2011; Radtke, 2014). These aspects are generally the complementary pillars of the energy citizenship approach in the reviewed literature.
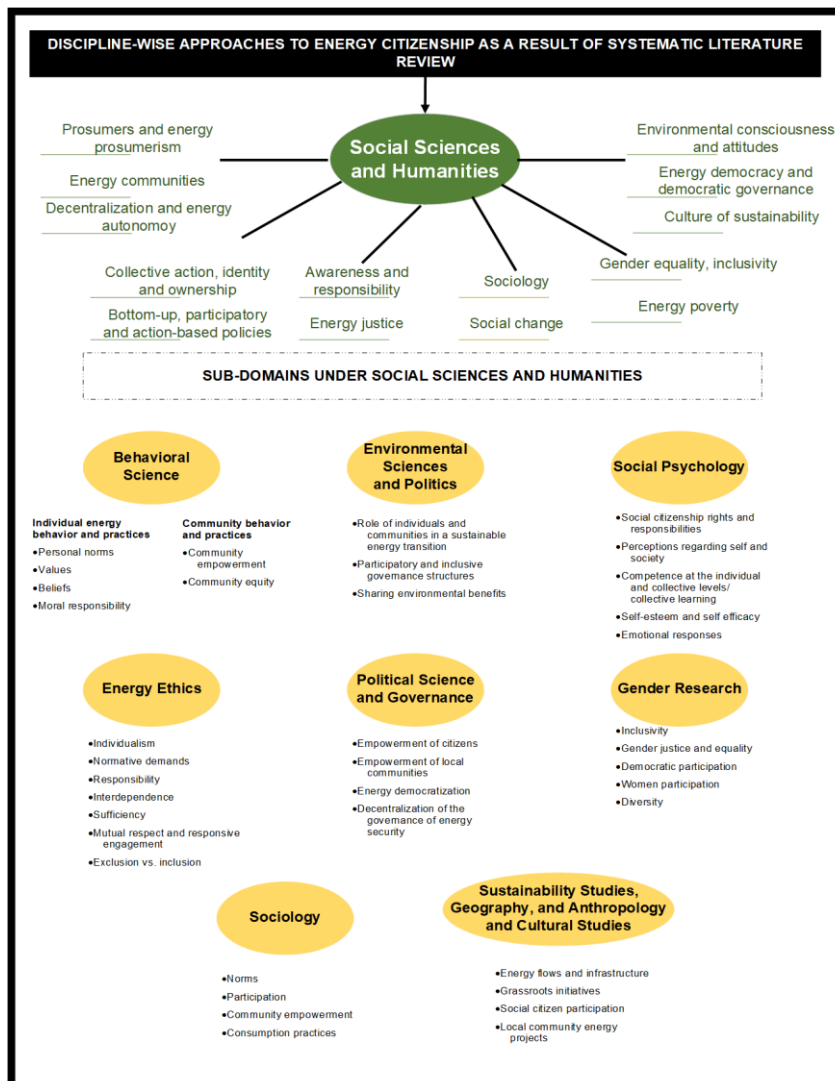

Figure 2. Assessment of energy citizenship from the perspective of different disciplines/sub-domains

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4.4   Energy citizenship as a dynamic concept and the life world of citizens

The historical evolution of the citizenship concept in general, and the field of activity that "energy citizenship" aims to conceptualize, particularly is only coming into being. In a first phase energy citizenship referred nearly exclusively to the role of prosumers, i.e. citizens that produce and consume energy. A more encompassing view has only recently made its way into the disciplines at the centre of attention in this report, exploring the active involvement of individuals and communities within energy systems, and the use of political power to shape new energy policies (Wuebben et al., 2020). This interest is not limited to those who are already actively involved in the energy transition, but starts from the other side. Thus, the focus is on the life world of different social groups, not only trying to understand the empirically manifest forms of energy citizenship, but also the potentials of this form of belonging for the energy transition unfolding before our eyes and will be an epochal force in the decades to come.

In the coming years and decades, the possible contribution of citizens to the energy transition who until now have played a marginal and largely passive role characterized by indifference or a vague understanding often coupled with distrust, will be decisive. Beyond the empirical study of existing expressions of energy citizenship and their dynamics, which continue to be a central theme, the research in this field will also have to look at the largely passive or uninvolved persons and the conditions of their empowerment to claim the energy dimension of their citizenship (Beaucampet and Walsh, 2021). Because factually all European citizens are energy citizens in the sense that energy plays an important role in their lives which they need to manage in one way or another – to provide a comfortable temperature in their dwelling, to have electricity at their disposal, and for getting from A to B. The core question is how to render this latent energy citizenship conscious and create pathways for deepening it.

5 Conceptualization of energy citizenship and relevant key parameters

As discussed in the previous sections, energy citizenship research provides an opportunity to link the Energy Union's strategic objectives (decarbonising buildings, renewables uptake, energy storage, and sustainable mobility) and the various contributions of citizens under one conceptual framework focussing on broad trends in citizen engagement with energy topics, awareness of GHG impacts of their choices, equity, and justice. To achieve these goals, a tangible and operational concept of energy citizenship needs to be produced that is useful to energy policy/market actors and stakeholders. Such a concept encompasses the many themes associated with energy citizenship (see Section 3 of this report and Biresselioglu et al., 2021)

Conceptualizing energy citizenship will support our understanding of the ways in which this engagement can either help or hinder the energy transition.

Until very recently energy transition policies tended to understand citizens as a homogenous group, assuming equal access to resources and equal agency (see e.g. Lennon et al. (2020) and thus one-size-fits-all policy. The EU in the past generally mainly

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equated energy citizenship with (green) energy consumption, largely using the terms 'citizen' and 'consumer' interchangeably. Yet, agency in the clean energy transition process should not be limited to one's ability to consume and/or invest.

Energy citizenship thus includes and transcends the consumer/investor perspective referring to citizens as bearers of rights and duties (See Section 4.2).

In the following two chapters, the main themes, indicators, dimensions, and variables associated with energy citizenship will be derived from the extensive literature review done in Biresselioglu et al., 2021. Further analysis to highlight the key factors, motivators and barriers pertaining to energy citizenship are presented as well.

5.1 Identification of main themes, dimensions, indicators and variables associated with energy citizenship

This subsection continues the interdisciplinary analysis introduced in 4.3, examining how the various disciplines that have studied energy citizenship conceptualised the main themes, dimensions, indicators and variables relating to this phenomenon.

With an objective of understanding how the different disciplines have approached energy citizenship, it is useful to consider the main themes which have been associated with this concept. Examining topics that have emerged as relevant to energy citizenship helps contextualise the term. Within Social Sciences and Humanities, energy citizenship has often been discussed from a normative perspective and primarily in relation to themes that have pronounced ethical aspects, such as energy justice (energy equity, just energy futures) (Sanz-Hernández, 2019; Somerville, 2019; Bommel and Höffken, 2021), inclusion in energy-related processes (Cantoni et al., 2018; Lennon et al., 2019), energy poverty (fuel poverty) (Longo et al., 2020; Fitzpatrick, 2014; Bouzarovski, 2018), right to energy (Shyu, 2021) and energy democracy (Szulecki and Overland, 2020; Allen et al., 2019; Ruostetsaari, 2020).

Community Studies - one of the Social Sciences and Humanities fields which has paid considerable attention to questions relating to energy citizenship - has generally taken a social justice approach to the topic. Some of the main issues addressed by authors pertaining to this subdomain are community equity and the common good with respect to energy distribution, local energy projects and environmental decision-making (Slee, 2014; Islar and Busch, 2016; Kenis, 2016). Boamah and Rothfuß (2020) have applied the framework of recognition theory to the study of ethical problems and have assessed the significance of participation-related concepts, in particular human agency and recognition and entitlement of actors in energy processes.

Gender Studies have also made an important contribution to the analysis of normative issues related to inclusion and exclusion by providing insights into the perspectives of women. Some main themes examined include women's participation in energy governance (Gonda, 2019), the impact of gender on energy access, capacities and opportunities (Wilhite, 2017; Johnson et al., 2020; Lazoroska et al., 2021), female agency

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in the context of the energy transition (Walk et al., 2021), and the transformative potential of women's involvement in the sustainable energy transition (WECF, 2020).

In contrast to Social Sciences and Humanities, Science and Technology Studies literature has prioritised more technical themes, such as renewable energy and smart energy technologies (Ryghaug et al., 2018). Intersections between technical and socio-political issues, for example in relation to socio-technical (energy) systems, have also been explored (Chilvers and Longhurst, 2016; Hyytinen and Toivonen, 2015), albeit to a lesser degree. In contrast, Environmental Studies research appears to have adopted a more interdisciplinary approach focusing on topics that have not only technical aspects but also pronounced social, political and moral facets, including just energy systems, a fair and inclusive energy transition (Lennon et al., 2019), inequalities of energy participation (Chilvers et al., 2018), and framings of the common good in community renewable energy transitions (Islar and Busch, 2016).

5.1.1   Dimensions pertaining to energy citizenship

The review of the literature in Biresselioglu et al., 2021 clearly demonstrates the multidimensional nature of energy citizenship. Nevertheless, with regard to the internal/external dimensions of this phenomenon, it appears that there is an imbalance across the various disciplines as authors have more readily tackled questions related to the external rather than the internal manifestations of energy citizenship. According to the working definition established by DIALOGUES, energy citizenship can manifest both externally through individual and collective actions and internally through reflection and concern. There is a significant body of work inquiring into internal dimensions of concepts related to energy citizenship and acknowledging the significance of psychological aspects, such as environmental self-identity (Czibere et al., 2020; Elgaaied-Gambier and Mandler, 2021) and a sense of personal responsibility for environmental outcomes (Pohjolainen et al., 2021; Devine-Wright and Murphy, 2007). However, more research is needed into the internal dimensions of energy citizenship more specifically.

Some authors explored internal manifestations of energy citizenship, for example Campos and Marín-González (2020) emphasise citizens' recognition of their responsibility for climate change and energy justice, yet other critical psychological aspects of this phenomenon remain understudied. In this regard, Radtke (2014) - writing from the perspective of Anthropology and Culture Studies - stresses the importance of inquiring into the internal processes of citizen participation in community energy undertakings. He points out that there is little systematic investigation into individuals' motivation for participating and the subjective meanings they assign to their membership of such initiatives (Radtke, 2014). The disciplines and subdisciplines of Psychology, Social Psychology and Behavioural Science have the potential to substantially contribute to addressing this research gap by examining the core internal manifestations of energy citizenship.

With respect to the external dimension of energy citizenship, the Social Sciences and Humanities manuscripts analysed in the literature review look into personal actions at

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the household level as well as individual and collective participation in community, social and political processes and developments related to energy systems and energy transitions. Some of the main areas of citizen participation studied are energy governance and political decision-making (Devine-Wright and Murphy, 2007), including bottom-up, participatory and action-based policies (Gonçalo et al., 2020; Komendantova et al., 2021; Schall, 2019); prosumerism (Fitzpatrick, 2014; Kampman et al., 2016; Leal-Arcas, 2019; Moncecchi et al., 2020; Sanz-Hernandez, 2019); bottom-up local community action (Campos and Marín-González, 2020; Watson et al., 2020), including energy communities (Wuebben et al., 2020; Catney et al., 2013; Moncecchi et al., 2020); and environmental movements (Kennis, 2016).

Scholars examining participation from a constructivist perspective emphasise that new manifestations of energy citizenship that have emerged recently, particularly at the local level, should be considered within their own historical process and (local) power relations (Rasch and Köhne, 2015). This is essential to understand how and why such processes result in (new) categories of inclusion and exclusion of citizens in/from political decisions regarding local issues that directly affect communities (Rasch and Köhne, 2015). In some cases, patterns of inclusion and exclusion could be linked to the notion of a collective identity (among the members of a community or a sub-group), which often provides a basis for bottom-up local community action (Campos and Marín-González, 2020; Kalkbrenner and Roosen, 2016).

Academics and professionals who have explored the external dimensions of energy citizenship from the perspective of Science and Technology Studies have delved into similar questions related to the power dynamics that characterise citizen participation in energy decision-making. Chilvers and Longhurst (2016), for example, investigate the effects of power produced by the (pre)definition of particular forms of collective participation. Their analysis shows that forms of participation and democratic engagement are co-produced in mutual interaction with the evolution of socio-technical (energy) systems, rather than existing as separate procedures or tools (Chilvers and Longhurst, 2016).

Environmental Studies research has also looked into these aspects. For instance, Lennon et al. (2019) emphasise that a sustainable energy transition requires participatory and inclusive governance structures and organisational formats, which empower citizens to become full stakeholders. According to the findings of their study - which has engaged six communities in five European countries - participants have experienced restricted agency as citizens engaged in energy systems, and have felt locked into a limiting set of false choices as "energy consumers", which do not translate into real or meaningful power (Lennon et al., 2019). In this regard, it is important to note that the prioritisation of the consumer dimension of citizen involvement has taken place not only at the practical but also at the academic level. Some disciplines, in particular Economics, have primarily focused on the consumer aspect thus overlooking other essential facets of the energy citizenship phenomenon (e.g., see Mah and van der Vleuten, 2012; Ozaki and Sevastyanova, 2011).

5.1.2 Indicators associated with energy citizenship

While there is an abundance of scholarly and professional work on the themes and dimensions pertaining to energy citizenship, sources proposing or examining indicators of energy citizenship and closely related phenomena are more scarce.

From the perspective of Community studies, Olivadese et al. (2021) have developed the idea of Positive Energy Districts (PEDs), which could be understood as a metric of positive energy behaviour at the local level. PEDs are defined as "energy-efficient and energy-flexible urban areas or groups of connected buildings, which produce net-zero greenhouse gas emissions and actively manage an annual local or regional surplus production of renewable energy" (Olivadese et al., 2021). This new indicator can be measured by tallying up the number of villages, districts and areas that bear the characteristics of a PED (Olivadese et al., 2021). The authors surmise that by 2050 45% of EU households would have developed the features of a PED household.

Adopting a Human Geography approach with a view to evaluating levels of energy use within a geographical context, Bouzarovski (2018) has proposed measuring energy services in the home (such as heating, lighting, cooling, etc.). He maintains that an analysis of energy services is pivotal to acquiring a spatial and geographic understanding of energy poverty and energy citizenship (Bouzarovski, 2018). However, difficulties related to widespread data collection and comparison of levels to a "standard" based on subjectivity have not allowed for coherent indication (Bouzarovski, 2018).

Within Science and Technology Studies, Xu et al. (2021) have proposed and validated a strategy called "Household Energy Saving Option" (HESO) which could be employed to measure energy efficiency at the household level. HESO is an option-based intervention that allows participants to obtain rewards when they achieve certain energy-saving goals in their household (Xu et al., 2021).

The analysed manuscripts that belong to other disciplines, including Business and Management, Political Science, Law and Anthropology, have not put forward indicators of energy citizenship.

In Ecological Economics and energy studies, as an interdisciplinary field, increasing attention is being paid to wellbeing in relation to the energy transition, or how energy services can deliver a 'good' life for all. A distinction is made between individual and collective wellbeing in the energy transition (Millward-Hopkins, J. et al.; 2020)

5.1.3 Variables associated with energy citizenship

This subsection gives an overview of the general variables associated with energy citizenship in the literature. The more specific factors, motivators and barriers will be explored in the next subsection (Section 5.2). There is a wide array of variables that affect energy citizenship. These operate on the personal, community/ local, social, national and transnational levels.

The impact of psychological variables, such as personal values, norms, attitudes and habits, on the internal and external dimensions of energy citizenship has been explored primarily in studies pertaining to Sociology, Social Psychology, and Behavioural Science (Shi D et al., 2019; Chilvers et al., 2018; Devine-Wright and Murphy, 2007; Czibere et al., 2020). For example, Shi et al. (2019) recognise that personal values have a direct effect on energy conservation beliefs and an indirect effect on energy conservation norms. However, the authors do point out that personal energy conservation norms do not automatically translate into energy conservation behaviour (Shi et al., 2019). Other works suggest that environmental attitudes and self-identity significantly influence energy and environmental behaviour (Nakamura, 2017; Pohjolainen et al., 2021). However, further research is needed into the impact of psychological variables on energy citizenship. Belaïd and Joumni (2020), for instance, identify an important gap. They argue that the effects which household values and opinions regarding environmental and energy issues have on energy-saving behaviour remain under examined (Belaïd and Joumni (2020).

At a broader societal level, public opinion and emotional attitudes towards societal change and technological developments can greatly affect energy citizenship (Sanz-Hernández, 2019; Chilvers et al., 2018). Bosch and Schmidt (2020) analyse public scepticism and "emotionally defensive" anti-renewable resources and new energy technologies stances that have taken root in certain German cities. They contend that such attitudes create a negative public opinion towards environmentalism and hamper energy citizenship (Bosch and Schmidt, 2020). The antithetical concept – that of social acceptance of energy related socio-technological transformations – has been analysed by a number of social scientists (Dwyer and Bidwell, 2019; Walker et al., 2013; Lennon et al, 2019). Levenda et al. (2021), for instance, distinguish four aspects to social acceptance: political, market, societal and community acceptance.

Other social-level variables that have profound consequences for energy citizenship are social context, norms and meanings, including structures of societal inclusion and exclusion (Kalkbrenner and Roosen, 2016; Czibere et al., 2020; Wilhite, 2017; Mori and Tasaki, 2019). Bosch and Schmidt (2020), adopting a Human Geography approach, have looked into the relations between power structures and social spaces produced by leading actors of the energy transition. They have found that such dynamics may generate unjust energy landscapes that reproduce social conditions of inequality, including energy underclass, energy dispossession and energy peripheralization (Bosch and Schmidt, 2020). From the perspective of Energy Economics, Ozaki and Sevastyanova (2011) have inquired into the effects that social values and socially constructed meanings have on consumer behaviour with respect to hybrid technologies.

In addition to individual- and societal-level variables, the analysis of the literature suggests that there are also a number of national-level factors that exert significant influence on the dynamics of energy citizenship. Among those are national energy governance models (Gonda, 2019; Horstink et al., 2020; Leal-Arcas, 2019) as well as state and local policies in the fields of energy and gender (Vigoda-Gadot et al, 2008; Feenstra and Özerol, 2021; Csutora, 2021). Authors generally agree that centralised

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modalities of energy governance (based on questionable technological choices) represent a serious obstacle to energy citizenship (Brondi et al., 2016; Heldeweg and Séverine Saintier, 2020; Thomas et al., 2020). Thus, apart from constituting a key dimension of energy citizenship, the nature and degree of citizen involvement in energy decision-making processes also emerges as an important factor affecting energy citizenship. Catney et al. (2013) argue that the prevailing citizen detachment from energy politics is to a large extent explained by the lack of citizen involvement in the making of energy-related decisions. In a similar vein, Nakamura (2018) explains that shifting the role of government toward empowering people is correlated with increased citizen potential to engage in discussions on energy and environmental policy. Some researchers suggest that certain limiting assumptions about citizens underpinning policy-making impede citizen involvement in energy policy debates (Brondi et al., 2016; Devine-Wright and Murphy, 2007).

A country's form of government also emerges as a variable that may have consequences for energy citizenship. A number of authors insist that democratic governance and a higher level of procedural and substantive democracy encourage the emergence of energy citizenship (Pohjolainen et al., 2021). Szulecki and Overland (2020) write that the notion of energy democracy calls for much more democratic control of electricity and energy resources by the people, and that energy democracy processes require that the people "resist, reclaim and restructure energy systems". Furthermore, Dwyer and Bidwell (2019) have looked into how perceived deficiencies in the fairness and quality of decision-making on issues related to the deployment of renewable energy technology have contributed to the gap between the widespread general support for renewable energy and the relatively slow technology uptake by individuals and communities.

Relevant literature also discusses the interlinkages between national- and social-level variables, on the one hand, and other factors that affect energy citizenship, such as technology and economics, on the other. Social scientists, for example, argue that material and technological transformations take place in parallel with changes in culture, behaviour, and practice (Walker and Devine-Wright, 2008). Similarly, behavioural scientists and social psychologists Shi et al. (2019), in the context of a study aimed at illuminating the complex relationships of a number of drivers of energy behaviour, conclude that wider social, environmental and economic forces structure (though do not determine) people's cognitive norms, practices and material cultures.

On a more general note, a consensus seems to exist in the literature on the importance of considering the interplay between the different variables influencing energy citizenship rather than attempting to study their effects in isolation.

5.2   Key factors, motivators and barriers pertaining to energy citizenship

Energy citizenship is the result of a combination of a wide variety of factors at the individual, collective and institutional levels. Some of these factors assist the development of a stronger sense of involvement in energy matters whilst others deter from this involvement. Building on the literature review, the following section discusses

how specific factors pertaining to energy citizenship form and influence energy citizenship.

5.2.1 Factors pertaining to energy citizenship - a general discussion

Environmental consciousness has been found to raise the propensity to participate in deliberations related to energy matters (Nakamura, 2017). It is interesting to note that the effect of environmental attitudes on citizens' participation dispositions is larger than that of political and social attitudes (Nakamura, 2017). People are also motivated by high self-assessed awareness of their electricity consumption and saving possibilities (Stikvoort et al., 2020).

In energy-related matters, technological knowledge is an important factor for engagement. For example, citizens with high knowledge of wind energy prefer active involvement and cooperation opportunities to more passive forms of participation (Langer et al., 2017). Nevertheless, in case a pro-environmental attitude has been established by appropriate information or knowledge provision, the evidence suggests that it does not necessarily lead to pro-environmental behaviour (Alcock et al., 2017).

Psychological and behavioural factors on the individual level emerge as crucial in regard to energy citizenship. Engagement in pro-environmental behaviours is often based on the belief that it will improve environmental outcomes and one's own life quality (Stikvoort et al., 2020). However, the belief that the global environmental crisis can be avoided by individual efforts is found to be negatively related to collective behavioural intention (Mori and Tasaki, 2019). The willingness to engage is a prerequisite and it depends on the information people have and their value system, implying that some people might not be interested in some or even all types of energy citizenship (Mendes et al., 2020). Furthermore, the attitude towards renewable energy technologies has a strong influence on the involvement in the energy transition (Ernst and Shamon, 2020).

Once awareness, knowledge and willingness to engage are in place, the ability of citizens to engage is required if they are to actually participate in the energy transition (Mendes et al., 2020). With regard to acceptance of socio-technological transformations, imagination is of crucial importance, thus the energy transition depends on the ability to imagine other possible ways of living while creating a different future with creativity (Yusoff and Gabrys, 2011). Introduction to emergent energy technologies may foster the adoption of new energy practices too (Ryghaug et al., 2018).

Structural and organizational factors, such as access to and quality of services as well as community living conditions, have an impact on whether citizens will engage in energy matters (Coy et al., 2021). Radtke (2014) states that smaller bottom-up co-operatives are more participative and represent a stronger and committed community. Other factors such as type of homeownership (Ruostetsaari, 2017), ownership of a renewable energy system and geographical location of the dwelling (Kalkbrenner and Roosen, 2016) influence the citizen's ability to participate in energy matters. According to the findings of a survey conducted by Kalkbrenner and Roosen (2016), the likelihood of participation in

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energy matters increases if there is ownership of sustainable energy infrastructure and if citizens live in rural areas.

The practicability of fossil fuel alternatives needs to be taken into account (Scott and Powells, 2020) as well. Xu et al. (2021) consider the comfort of an individual as the most critical impact factor for energy-saving behavior, followed by user experience. Key factors for social and public acceptance in energy policy matters were found to be economic rationality, namely the levelized cost of electricity, energy price changes at the household level and the general competitiveness of the economy (Komendantova et al., 2021). Transport policies offering financial benefits for purchasing hybrid vehicles is another example of motivation (Ozaki and Sevastyanova, 2011).

Pohjolainen et al. (2021) studied the effects of the national affluence and democracy level on individual climate perceptions. In democratic and wealthy countries, higher perceived climate responsibility leads to greater willingness to support higher fossil fuel taxation. Affluence was observed to have no effect on other climate policy measures and personal climate action. Democracy was found to be positively connected with engagement in climate action but not with support for climate policy. Many feel that higher costs for fuel alternatives may aggravate existing fuel poverty (Scott and Powells, 2020).

Studies show that financial participation and participatory governance increase citizen acceptance. Participatory governance means working together with citizens for social solutions to mitigate climate change consequences (Komendantova et al., 2021). Access to clear, comprehensive and reliable information also increases public acceptance. Musall and Kuik (2011) established that community co-ownership of wind energy projects is more effective in promoting local acceptance of the nearby wind turbines, than commercially owned wind farms and improves the overall attitude towards wind energy.

Energy behaviour is influenced by social and community-related factors, such as interactions between cognitive norms, energy practices, collective identity and social norms (Kalkbrenner and Roosen, 2016; Stephenson et al., 2010; Q. Xu et al., 2021). Catney et al. (2013) make a distinction between knowledge and information by emphasizing that it is necessary to investigate *"the complex processes and relations through which individuals come to know about energy"* instead of merely providing top-down information. For an effective energy policy, the existing networks of knowledge and practice, which citizens already trust, need to be used. The social and community-related factors are described in sections 5.1, 6.1.2 and 6.2. Socio-economic factors are analysed in Section 6.2.

Policy-related factors are analysed in Section 6.1. Some of these factors which constitute potential motivators for engaging citizens in energy matters will be described in the next subsection.

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5.2.2 Motivators

A key goal of DIALOGUES is understanding the many factors that influence human beings and their environment from a non-normative perspective and considering the interrelations and conditionalities of the factors' effects and determinants. There is no single factor with uniform explanatory power for the engagement of a citizen with the energy transition. Individuals have different values and concepts on how to make energy-related decisions and those depend on their responsibilities (for example family care) or their economic status. They may also respond differently to regulatory framework conditions - some may react with resistance, while for others regulation may be a welcome guidance helping them to improve their carbon footprint. DIALOGUES accepts the natural heterogeneity of humans and their value-systems and creates impact by facilitating a new understanding of such factors, their interrelation, synergies and contradicting effects. In this subsection, we first look at factors which motivate engagement.

A first motivator discussed in the literature is individual concern about climate change and environmental issues. Prior research conducted as part of the ECHOES project, shows that the share of people who believe climate change is actually happening is above 70% for most European countries. While this large-scale European survey thus shows that there is awareness of the reality of climate change, the figure also points out the considerable differences between European nations, which in turn raises the question of how and why these differences manifest.

(a) Beliefs that global temperatures are rising   (b) Beliefs about the causes of global temperature rise

Figure 3. Awareness on climate change (Source: Cohen et al., 2021)

In a recent study, Cohen et al. (2021) analyse a large-scale survey done in the ECHOES project to better understand cross-national differences and emphasize that concern for future consequences of action are all relevant determinants of a person's willingness to take climate action and support climate policies. Results from another Cross-European study, the European Value Survey (Pohjolainen et al., 2021), which engaged more than 44,000 respondents in order to shed light on the relationship between individual-level

climate perceptions and a country's contribution to climate change highlight a second motivator: (perceived) responsibility which appears to be linked to climate concern. The researchers suggest that the underlying policy implication of their finding is that public campaigns should focus on encouraging citizens to take personal responsibility. Also, Damgaard (2021) points out that *"a relational conception of energy citizenship is intimately linked to the notion of shared and mutual responsibility"*. Furthermore, Islar and Busch (2016) analyse two local energy communities in Germany and Denmark and emphasise the link between collective identity and collective responsibilities and how diffusing them within a community secures collective identity. Stikvoort et al. (2020) show in their study of Swedish consumers and prosumers that the individual's perceived moral responsibility was a motivating factor for engaging in pro-environmental behaviour. Yet, they also point out that this feeling of moral responsibility was stronger in prosumer than in consumers. While more research is needed to understand how different groups of citizens (prosumers and consumers being just two of them) can best be motivated and what kind of targeted messaging is needed, recent studies of local energy communities point at specific motivating factors. For example, Koirala et al. (2018), who study the factors motivating consumers' participation in local energy communities, find that, among several other factors, environmental concern and energy independence play a key role in citizens' willingness to engage in local energy communities.

The findings of a recent study by Proudlove et al. (2020) looking into the predictors of the intention to invest in community owned renewable energy show the importance of the belief that such a project will provide benefits for the community and highlight that this factor is stable across socio-economic characteristics like gender, age, employment and income. Furthermore, Watson et al. (2020), in their analysis of energy communities in Ireland, demonstrate that working with and for a community encourages active citizen participation. In a similar vein, Cohen et al. (2021) report that the preferred administrator of community renewable energy (CRE) is an energy cooperative run by a community organization thus also providing evidence of the importance of the community aspect.

Energy-related policy and its implementation may influence whether and how citizens become active in this field. Lennon et al. (2020) described the potential of smart cities and positive energy districts to foster energy citizenship by creating inclusive collective spaces where the latter can evolve. Hoppe et al. (2015) investigated the role local governments played in a successful citizen-led solar energy cooperation in two European best-practice cases. They found that the close interaction and mutual trust between local governments and representatives of the local communities was a crucial prerequisite to manage energy corporations effectively. Similar findings are reported by Dwyer and Bidwell (2019). Devine-Wright (2012) has also studied governance aspects of the energy transition and argues that the "energy system evolution is best guided by sustainability principles, including social aspects such as public participation, local action, equity and justice alongside remedying poverty" (p. 78).

5.2.3   Barriers

Regarding barriers pertaining to energy citizenship, the reviewed literature points to a wide range of framework factors varying from regulatory, financial to infrastructural (see e.g., Olivadese et al. (2021). Other barriers that emerge in the analysed body of work relate to socio-political aspects. For instance, Nakamura (2017) studies participatory energy and environmental processes in post-Fukushima Japan and contends that political obedience and social hesitation lead to lower willingness to participate. Beauchampet and Walsh (2021) examine energy citizenship aspects in the Netherlands focusing on the adoption of gas-free heating alternatives at the household level. They find several obstacles to citizen engagement, including financial restrictions and a lack of awareness of, access to, or ability to make sense of information provision regarding technology alternatives. Furthermore, they emphasise the influence of social cohesion, which - if low - creates barriers to stimulating collective actions and citizen involvement.

Chilvers et al. (2017) map UK public engagement with energy in the years 2010-2015 and show that there are diverse and interconnected forms of public participation ranging from individual behavioural change and social acceptance practices to citizen-led, grassroots action. They highlight that not accounting for public values and concerns can create resistance and barriers to public involvement in the low carbon transition and conclude that *"[a] broader, whole systems approach to public engagement with energy is needed to build on major advances in the theory and practice of participation in recent years."*

Comeau et al. (2015) analyse the results of a survey of public perspectives on energy issues in Canada. They find that both a general lack of knowledge about energy topics and citizens' perception that their individual involvement will not make a difference are barriers to engagement in energy-related discussions and decision-making processes. In their study, they also specifically looked at gender differences and stated that *"[w]omen were far less certain of what they knew about energy development in Canada than men, were less successful answering factual questions, and believed their lack of knowledge was a barrier to participating in energy-related discussions and decision-making processes. Also, younger participants perceived that they knew less about energy sources in Canada."*

6   Dynamics and pathways to energy citizenship

6.1   Individual, community-related, social, and external dynamics impacting the pathways to energy citizenship

The path towards energy citizenship can be shaped by multiple dynamics. Indeed, very different meanings can be attached to citizenship: is citizenship an extension of sustainable or ethical consumption, as a form of prefigurative politics?; is it based on individual or group awareness and identity?; should it be a form of collective action, where people exercise their rights to organize and vote in democratic systems?; or is citizenship best expressed through collective ownership and the re-appropriation of the

means of production, through renewable energy collectives for example. While some authors see citizenship as an individual achievement, others advocate that it can only be created through collective dynamics. Another debated issue is whether citizenship can be implemented from the top down, through national measures for example, or should rather arise from self-organised individuals and communities. In this section, we look at the various mechanisms and processes through which "energy citizenship" can be understood and achieved.

6.1.1   Individual dynamics

Much of the literature insists on the role of individuals and tries to identify what triggers their active involvement in the energy transition (see also Section 5.2.2). Two main strands can be identified: the first focuses primarily on individuals as energy consumers becoming more aware and conscious about their possible contribution to a lower carbon energy system; the second is more interested in the way people engage with energy policy through direct participation in the decision-making processes.

The first strand examines consumer choice, lifestyle and identities, through different lenses. For scholars inspired by behavioural science, one major dimension to take into account when studying the pathways towards energy citizenship is how beliefs and knowledge shape individual behaviours (Shi et al., 2019; Stephenson et al., 2010). Education is therefore seen as the key driver for change, as it can help consolidate environmental values (Asilsoy and Oktay, 2018; Sarid and Goldman, 2021).

However, more rational motives, such as energy bill reductions, can also encourage energy saving behaviours (Belaid and Joumni, 2020; Xu et al., 2021) – through the maximization of utility and based on cost-benefit analysis, for example. Building on this approach and based on liberal paternalism in relation to behaviour change, nudge theory is often applied towards behaviour change, based on the assumption that people may not always behave rationally and might require 'nudges' towards raising awareness and making choices, deemed to be the 'right' or 'good' choices by those designing the nudge. This approach relies on the assumption that changing behaviours "can be done through targeted communications that stimulate this sense of responsibility" and "a healthy competition in terms of adoption of worthy behaviours" (Amadori and Votta, 2021, p. 240). Nudge strategies vary, in addition to communications to support simplified choices: certain nudges are based on default positions, such as opting out of renewable energy programs (Thaler et al., 2013). This approach, however, bears the risk of overlooking the civic capacities of individuals and may contribute to depoliticizing them (Button, 2018), while also reinforcing market-based rationality, so that you "can know", and "should know", and thus "can do" (McMahon, 2015), which can be a limited way of understanding how changes takes place.

According to the second strand of literature looking at individual dynamics, the "energy consumer paradigm" is not sufficient because the choices left to individuals *do not translate into real or meaningful power"* (Lennon et al., 2020, p. 1). Instead, it is argued that individuals should be *"co-designing their own energy transition pathways"* (Lennon et al., 2020, p.15). This approach relates to the framework of energy justice and is mainly

concerned with distributive and procedural justice, i.e., the need for more inclusive decision-making processes. At the individual level, related scholars are interested in how trust and a sense of fairness can be built by participatory efforts (Dwyer and Bidwell, 2019). However, participation is also conceived as an empowering process granting "practical recognition" to the people involved (Boamah and Rothfuss, 2020).

Some scholars argue that female leadership will be required to significantly challenge existing energy systems (Allen et al., 2019; Buechler et al., 2020; Mang-Benza, 2021). This appears necessary in a context where women are still mainly seen as passive and vulnerable subjects (Lieu et al., 2020). This suggests that the pathways towards energy citizenship, particularly when women and other marginalized groups are considered, can partly rely on individual actors when they gain skills and agency (Coy et al., 2021; Giardullo et al., 2019).

If individual dynamics appear central in the pathways towards energy citizenship, most scholars acknowledge that individuals are embedded in social groups and communities, infrastructures and institutions, which contribute to shaping the opportunities made available to them as energy citizens.

6.1.2 Community/social dynamics

Authors in the fields of community studies, human geography and sociology contest the idea that citizenship is about values and individual lifestyles, but rather suggest that it could be understood as a process emerging from participation and community organizing (van Veelen and van der Horst, 2018). The notion that changing attitudes to then influence behavioural change, and ultimately, choices has been contested in this strand of literature (Shove, 2010). Rather, it is the social practices of everyday life that are seen as the locus for social change and citizen engagement. Being part of a community of practices (Lave and Wenger, 1991/2009) allows for the sharing of ideas and habits within networks, and therefore reinforces a sense of sustainable commitment (Coy et al., 2021; Mendes et al., 2020). Scholars also insist that it is within "emerging low-carbon communities" that solutions can be found to change individual behaviours (Heiskanen et al., 2010).

In much of the literature, collective action is the main dynamic enabling energy citizenship to emerge (Campos and Marin-Gonzalez, 2020; Cantoni et al., 2018; Coy et al., 2021; Devine-Wright, 2012; Lennon et al., 2020; Wuebben et al., 2020). For Lennon et al. (2020), this collective dimension of citizenship has become residual and should be placed back at the center of the energy citizen concept. Collective dynamics are often captured by the concept of "participation" in the energy system. Participation can be broadly defined as "the different ways people act upon, negotiate, interpret, reframe, make sense of, and deal with new technologies and systems" (Ingeborgrud et al., 2020, p.9). In line with Nancy Fraser's conceptualisation of participation, it also implies more generally that *"just arrangements are those that enable all members of society to interact as peers"* (Lazoroska et al., 2021, p.2).

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In some definitions, participation can include the way people interact with technologies at home, but go beyond individual dynamics, by exchanging information, services and assets with other households (Kloppenburg and Boekelo, 2019). Such perspectives also draw from scholars in Science and Technology Studies, whereby the introduction of new energy technologies also offers a strong potential for "mundane energy citizenship" rooted in everyday practices (Ryghaug et al., 2018). In this approach, new objects can raise awareness and orientate consumers towards more sustainable practices and habits (Ryghaug et al., 2018). In this perspective, individual energy autonomy is compatible with the creation of a local energy community (Kloppenburg et al., 2019). Indeed, while relying on individual consumption, prosumerism can be framed as a social movement, especially when it takes the form of cooperatives, energy communities and social enterprises (Campos and Marin-Gonzalez, 2020; Shi et al., 2019), see also Section 5.2.2. Musall and Kuik (2011) show that the co-ownership of renewable energy technologies can contribute to creating energy citizenship. It increases collective awareness and tends to empower local communities.

Analyses of participation dynamics can also be concerned by citizens' involvement in energy policy and planning (Ingeborgrud et al., 2020). Although participation in deliberative processes depends on the individual willingness to be informed and talk about energy issues (Nakamura, 2018), looking at the collective dimension of participation is crucial. It helps understanding which social groups are more or less taken seriously within participatory processes (Pallett et al., 2019). Participation should not target a "general public" but rather consider the diverse and interconnected publics of energy transition policies (Pallett et al., 2019), in this approach. Energy citizenship can emerge from participation in protests and resistance actions. Indeed, collective action offers people forms of engagement that go beyond their status of consumer (Kenis, 2016). Cantoni et al. (2018) argue that mobilisations can shape a collective understanding of energy policy and instigate new relations between citizens and representatives of the administration. In this perspective, the concept of energy justice proves particularly efficient to gather and empower people (Cantoni et al., 2018).

Finally, social dynamics in relation to citizenship have also emerged in the literature engaging with social practice theory, where people explore different ways of engaging with 'sustainable energy' practices and 'communities of practices', while pursuing wellbeing. While this approach has yet to be studied in relation to energy citizenship specifically, authors have contributed to theorizing how consumption dynamics can lead to forms of consumer action and citizenship engagement (Warde 2015). In such an approach, it is social practices that would need to change, supported by citizens and policymakers that recognize the social embeddedness of everyday life, in relation to energy services (Shove 2020). Crucial to this approach is the question of agency, or the capacity and power to act; rather than see agency at the level of individuals, or in technologies, it is the doings and sayings of everyday life that have agency – including the act of organizing, advocating or enacting forms of energy citizenship. The power dynamics of communities of practices, such as those found in eco-villages, are also an object of study (Duarte, Sahakian and Ferreira Neto, 2021).

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6.1.3 External (Institutional) dynamics

Both individual and collective dynamics can be encouraged, or accompanied by 'institutional' dynamics, including changes in regulatory conditions and the policy arena. Some authors stress the importance of direct government support, especially in the form of economic support, particularly for vulnerable groups' (Thomas et al., 2020) and women's involvement in the energy transition (Wilhite, 2017).

Regarding participatory processes, most scholars agree that participation should go beyond informing individuals and communities about decisions already approved, and instead making participation a priority of energy policy (Sarrica et al., 2014). National and local policy framing is central in this regard for the inclusion of different publics in the energy transition, especially for women's involvement (Bell et al., 2020; Johnson et al., 2020).

According to Beauchampet and Walsh (2021, p.2) several dynamics can encourage citizens' engagement in the energy process: "'(a) iterative dialogue between powerful stakeholders (e.g. planners, developers) and local citizens, (b) timely communication and meaningful consultation, (c) a fair and inclusionary planning process for specific projects, (d) increased control and opportunities for self-sufficiency or co-production through material participation in the energy transition (e.g. through individual/community, part/full ownership of renewables, electric cars etc.), and (d) public dialogues on energy issues." In contrast, Lennon et al. (2020) stress the general factors that impede on energy transition acceptability, such as "inequalities in existing power structures", "deliberate rules-based barriers to citizen participation" and "a lack of transparency in government decision-making".

Sanz-Hernandez (2019) also shows that the way citizens engage with the energy transition depends on the role played by the media in shaping public opinion. For some issues like the one of "energy poverty", people may prefer to turn directly to the media if they are seen as a powerful stakeholder. Here the media can be seen as part of an institutional landscape, which might favour certain forms of (citizen) engagement over others.

Other institutional dynamics impacting on energy citizenship pathways depend on the level of decentralisation of the energy system. Indeed, participation may depend on the scale at which the energy production system is organised (Huh et al., 2019). In this respect, cities are seen as important spaces to support sustainable participative projects, given the diversity of actors in urban centres (Olivadese et al., 2021). For van Veelen and van der Horst (2018) as well, citizen involvement is more likely to occur when local self-organisation of energy provisioning is encouraged. This can happen through the expansion of the energy infrastructure to include households in new roles (producing and selling electricity, storing energy in electric vehicle batteries or via ground storage), as well as internal and external e-markets, and the more systematic inclusion of new and small renewable electricity producers (van Veelen and van der Horst, 2018), but also through institutional support. Supporting the participation of local communities then

requires formal recognition from authorities, in order to encourage the development of similar projects (Islar and Busch, 2016).

6.2 Assessing the impacts of specific aspects (e.g., age, gender, race, ethnicity, socio-economic status, geographic isolation) on energy citizenship

When discussing energy citizenship, several specific variables impacting such a construct and its related aspects should be considered. These variables include age, gender, education, ethnicity, socio-economic, and geographic factors. Due to the not abundant literature directly addressing the concept of energy citizenship, in this review we consider also related concepts such as environmental self-identity or energy-saving behaviours in general.

As regarding age, several studies report that younger and elder people behave differently when dealing with environmental and energy-related issues. Furthermore, the literature in this field suggests that people of different ages might be driven by different motivations. Accordingly, in a previous work investigating household energy-use behaviour (Mills & Schleich, 2012), it was reported that households with younger people are more likely to enact energy-saving practices and are generally mainly driven by environmental motivations, while elder people are more driven by economic reasons (e.g., money-saving). Indeed, according to this and to further literature (Barnicoat & Danson, 2015), when dealing with energy-related behaviours, the older population should be specifically investigated, considering several age-related aspects such as, that their energy consumption may be different and that they might have more difficulties in changing their habits and in dealing with technology. Accordingly, equity, efficiency, effectivity, and economic-related aspects should be taken into account when developing strategies for energy-related behaviour change in such populations (Barnicoat & Danson, 2015). On the other hand, as regards the willingness of local citizens to participate in local energy systems, findings show that some socio-demographic factors, such as age and gender, are not statistically significant predictors (Schall, 2020), especially if compared to environmental psychological factors, such as environmental concern and climate change beliefs, as well as to community-related and social institutional factors, such as community trust and energy independence (Koirala et al., 2018). Another recent case study suggests that the major determinants of solar technology adoption are factors such as political orientation, visual exposure to solar technology, public engagement in energy issues and perceived knowledge, rather than general factual knowledge, socio-economic indicators, age or geographical variations (Parkins, Rollins, Anders, & Comeau, 2018).

Interestingly, education also seems to influence energy conservation. Indeed, households characterized by low educational levels are reported to be primarily driven by economic motivations and those with higher educational levels, by environmental reasons (Mills & Schleich, 2012). Also, research on socio-psychological drivers of citizen financial participation in the energy transition in Germany shows a relation between educational level and the likelihood of Renewable Energy (RE) investments of private citizens. Not surprisingly, those with a college or university education are more likely to

invest in RE projects, probably also because of their better access to financial resources (Schall, 2020). Furthermore, Stigka, Paravantis, and Mihalakakou (2014) found a correlation between the willingness to pay to favour environmental goods and education, as well as between general environmental concern and knowledge about renewable energy. Again, in a study conducted in Germany, it was observed that education and age were the most important socio-demographic aspects related to individual acceptance of renewable energy sources and grid expansion (Bertsch, Hall, Weinhardt, & Fichtner, 2016). This study also found that an important variable in shaping participants' acceptance was distance between participants' dwellings and the energy infrastructure location. Indeed, it has been previously suggested that "large-scale energy generation would be preferred and sited at a maximal distance from centres of population; for example, off-shore or in remote areas" (Devine-Wright, 2012; p. 69).

Gender may also impact various aspects related to energy citizenship. Indeed, notwithstanding the core role that energy plays in daily life, energy policies might not always be totally gender neutral: different energy-related needs, differences in energy availability as well as in energy poverty status are issues worth considering regarding energy citizenship (EIGE, 2016). In this regard, it has been reported that as compared to men, women, and especially elderly women, are more likely to incur in energy poverty. On the other hand, it has been also reported that, as compared to men, women show a more sustainable consumption behaviour, which might be expressed, for example, by being more likely to buy ecological products. Furthermore, women have been reported to be more likely to modify their own behaviours in favour of sustainability measures, and to adopt more energy efficient travel modes such as public transport (Danielsen, 2012; EIGE, 2013, 2016). Gender gaps have also been linked to energy-related education (as women and men often choose different study fields), energy access, job market, and decision-making roles (because stereotyped gender roles and disparities tend to assign fewer energy-related decisions to women than men; EIGE, 2016). For example, the previously mentioned research on socio-psychological drivers of financial citizen participation in Germany points out a significant positive association between being male and investing in RE (Schall 2020).

Even if consistent literature findings support the assumption that women have stronger pro-environment attitudes than men, the persisting gender stereotypes on energy and technology being perceived as more masculine domains, might still obstruct women's participation in energy decisions (Standal, Talevi, & Westskog, 2020). A research on participation in 11 solar energy communities and one housing association in Sweden, with a focus on energy gender justice, revealed that "despite the relative potential for inclusion that ECs hold, most of the members were men" (Lazoroska, Palm, & Bergek, 2021; p. 10).

Moreover, also cultural or ethnicity issues seem to play a role in aspects related to energy citizenship. In this regard, in a previous study in the area of Detroit in Michigan, no relationship was observed between ethnicity and heating energy consumption, but a correlation was observed between ethnicity and heating energy use intensity (Bednar, Reames, & Keoleian, 2017). More specifically, the study showed higher heating energy

use intensity in African American and Latin American communities and lower use in European American ones. Interestingly, the study also found higher heating energy consumption but lower energy use intensity in association to higher median income and dwelling-ownership.

In the conceptualization of energy citizenship, geographic location and isolation should be taken into account. Indeed, the supply and the access to energy significantly differ from global North and South and between differently developed countries, leading to great "energy inequalities and inequities" (van Zyl-Bulitta, Ritzel, Stafford, & Wong, 2019). Furthermore, country differences in energy use behaviour have also been reported (Mills & Schleich, 2012). For example, compared to Western Europe, Eastern European countries display a lower adoption of energy-efficient technologies, are less driven by environmental motivations in energy-saving practices but, in turn, are more likely to adopt practices for conserving energy (Mills & Schleich, 2012).

On a different level, it has also been argued that in more democratic countries, there might be a stronger link between climate concern and perceived climate responsibility (see also Section 5.2.2). These aspects are also reinforced by general national wealth. In this regard, it has been suggested that both national affluence and democracy could support citizens in promoting individual action (Pohjolainen et al., 2021). Another geographic aspect is the inverse relation between community size and the decision to invest in RE projects. A larger fraction of private RE investors in Germany live in smaller communities compared to the distribution of the overall population (Schall, 2020). Therefore, concerning the links between energy citizenship and energy poverty, other authors have argued that "energy poverty is a deeply geographical and political phenomenon. It is unequally distributed and experienced across different places and is articulated through complex politics of distribution and recognition. One of the main implications of these arguments is that, in terms of vulnerability to energy poverty, where a person lives seems at least as significant as the socio-economic group that they are part of" (Bouzarovski, 2018; p. 29).

Indeed, the socio-economic status of individuals could impact energy citizenship related behaviours as well. It is usually argued that citizens with poor financial resources have fewer means and opportunities to act to promote energy transition (e.g., Lennon et al. 2020). Furthermore, in a case study from Germany, Bertsch et al. (2016) observed that income and age were crucial factors determining interest in environmental sustainability.

A recent research experience in Italy, a project of the Department of Architecture of Roma Tre University (called Spin Time Labs) has focused on promoting the construction of an energy community in an occupied building in Rome (see Tonelli, Montella, Cardone, & Moscheni, 2018). The building object of the study and intervention project is occupied by people of different ages, nationalities and cultural and economic backgrounds. Users were trained and involved in more sustainable energy practices, and were helped to manage their home on a daily basis and develop a stronger responsibility for its energy consumption. The results of this project suggest that, in the case of very marginalized or fragile communities or problematic individual situations, the

creation of economic and social value may be a vehicle for liberation and social inclusion, generating virtuous micro-economies. The experimental phase of the Spin Time Lab project is still in progress, with the aim of building an innovative housing model based on a function-user mix and on the active participation of inhabitants, which could lead to higher social, environmental and economic sustainability through the leverage of energy features (see also the following section for a discussion of vulnerable groups in the energy transition).

In the context of the ECHOES Project, two meta-analyses (Carrus et al., 2021; Vesely et al, 2021) have been performed. A first series of meta-analyses (Carrus et al., 2021) assessed the relations between energy-saving behaviours and many individual psychological predictors (values, attitudes, behavioural intentions, beliefs and emotions, while a second series of meta-analyses (Vesely et al., 2021) assessed the relation between pro-environmental behaviours in general (including energy-related ones) and a range of socio-identity factors, such as environmental self-identity (i.e., considering oneself as being a pro-environment type of person) and connectedness to nature (i.e., the individual feeling to be connected and part of the nature as a whole).

Interestingly, in the first meta-analysis it was found that emotional-motivational processes have a consistent role in promoting energy saving behaviours, while values and attitudes have a less consistent role, especially when energy saving is measured through objective outcomes (such as actual energy consumption, for example). However, the strength of this relation may be variable, as a function of factors such as age and gender. These factors emerged in fact as significant moderators of the relation between such behaviours and emotions, as the role of emotional variables seems to be stronger among younger individuals and in men compared to older people and women.

In the second meta-analysis, results showed that both nature connectedness and environmental self-identity (a construct which could be seen as related to energy citizenship) play a consistent role in promoting pro-environment actions and intentions. Particularly, a relationship between connectedness to nature and pro-environmental behaviours emerged among women and inhabitants of more individualistic countries, compared to men and to people from countries with lower levels of individualism. Furthermore, it has been reported that an important driver of pro-environmental behaviours is represented by having a pro-environmental social identity or place identity (in this last case, especially among younger individuals).

Taken together, all these aspects should also lead us to reflect on the issue of intersectionality when accounting for the dynamics and the processes at the basis of energy citizenship. Indeed, in the context of energy citizenship, the intersections among socio-demographical and socio-economic variables such as, age, gender, ethnicity, education, and economic status might "shape patterns of privilege and exclusion" (Lennon et al., 2020; p. 17). Similarly, it has been suggested (Biresselioglu et. al., 2018) that decisional processes related to the energy transition at an individual level might be influenced by the interplay among demographic, social, psychological, economic variables as well as by concerns about the environment. Interactions among such factors

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could have a promoting or a hampering effect on the process of energy transition for different individuals, groups and communities. Therefore, considering such aspects, including geographical location and isolation, could properly address critical issues related to the extent to which these variables can act as drivers or barriers to an individuals' participation in energy citizenship and energy transition processes.

According to what is reported in the above paragraph, policies promoting energy citizenship should thus consider all these specific aspects, including socio-demographic and socio-economical ones, as well their possible interactions. Indeed, strategies promoting energy citizenship should be sensitive to the specific aspects characterizing specific populations of reference and by considering issues of social equity, efficiency and effectivity, together with economic-related aspects.

6.3   Impacts of contextual dynamics of energy citizenship on vulnerable groups

The literature revolving around the concept of energy citizenship often refers to the complex position of vulnerable individuals and groups in the energy transition. On the one hand, energy transition is a process expected to considerably improve the daily lives and wellbeing of underprivileged groups such as poor households, ethnic minorities, women or rural communities; on the other, this transition also comes at a cost that might fall more heavily on those same groups. Scholars agree that the outcome varies according to the approach and the method adopted by energy actors in the pathway towards a lower carbon system. This section outlines the two-sided impact of the energy transition on vulnerable groups and the dynamics that can potentially overcome this contradiction.

Energy is an unevenly distributed commodity and access is one of the leading contemporary sources of inequality. This issue is often approached through the concept of energy poverty, which has multiple definitions across Europe (Longo et al., 2020). From the perspective of households, energy poverty designates "the individuals' inability to adequately heat, cool, or provide other required energy services in their homes at affordable cost" (Longo et al., 2020). It can be more generally related to the idea of a fundamental and universal "right to energy" put forward by certain scholars (Shyu, 2021). The cost of energy is the most common barrier in the literature, but some authors point to the lack of information on prices and on the way the energy system functions as another issue (Axon and Morrissey, 2020). In addition to existing inequalities, it is widely acknowledged that "poor, racialised and otherwise marginalised communities" will be more subject to environmental burdens in the future (Levenda, Behrsin and Disano, 2021).

One of the major challenges of the energy transition is therefore to move towards an socio-technical and socio-economical energy system that does not ignore or aggravate existing inequalities. To do so, authors have identified concrete policy measures supporting energy poor households such as retrofitting programmes or equity schemes that combine social and ecological objectives (Fitzpatrick, 2014). However, other authors also notice that low-carbon initiatives, and especially the ones implemented through top

down decisions, can have "unintended social consequences" on vulnerable groups, such as low-income communities (Axon and Morrissey, 2020).

Thomas et al. (2020) indeed find that energy transition dynamics can have "a range of potential injustices, from the imposition of less accessible procedures for engagement with the energy system, to the exacerbation of existing patterns of inequality and marginalisation". Moreover, many projects fail to address vulnerable groups, focusing mainly on the technological and built aspect of fuel poverty (Longo et al., 2020). For Bouzarovksi (2018), there is no doubt that low-carbon technologies can considerably improve social welfare. He sees "potential synergies between climate change, poverty alleviation and economic development agendas". Yet, the author also recognises that "transitions render some actors more socially and economically vulnerable to internal shocks and external pressures, creating new inequalities across time and space" (Bouzarovksi, 2018, p.24).

One way of addressing this contradiction between energy transition goals and its potential negative impact on vulnerable groups is to improve those groups' participation in the energy system and the energy decision making process. Indeed, if the issues vulnerable groups face can be understood as a lack of distributive justice, their position with regards to the energy transition and energy citizenship is closely linked to broader stakes of procedural and recognition justice (LaBelle, 2017).

To address this issue, some scholars use the framework of capabilities (Day, Walker and Simcock, 2016). Energy poverty is defined as "an inability to realise essential capabilities as a direct or indirect result of insufficient access to affordable, reliable and safe energy services, and taking into account available reasonable alternative means of realising these capabilities" (Day, Walker and Simcock, 2016). In this perspective, authors note that energy poverty often goes hand in hand with social stigmas and the "deprivation in many capabilities" (Bartiaux et al., 2014).

An alternative view is to see alleviating energy poverty as a condition for fostering energy citizenship (Bouzarovski, 2018; Caramizaru and Uihlein, 2020). For Axon and Morrissey (2020), vulnerable communities should be supported in the process of transitioning to new energy technologies, and energy actors should ensure that there are no "substantial disruption to daily routines and energy pricing". Caramizaru and Uihlein argue in favour of "lowering the barriers that prevent socially vulnerable groups and local authorities from participating in distributed generation and communities" (2020). Similarly, for Gonzalez-Eguino (González-Eguino, 2015), while energy poverty is rooted in more general socioeconomic inequalities, its effects can be limited by granting access to energy infrastructures. Bartiaux et al. (2014) even suggest that energy justice policy shifts priority: instead of trying to equalise energy consumption, they should focus on reducing inequalities in capability deployment.

This approach that bridges structural transformations with active participation of vulnerable groups is particularly relevant for women. Feminist scholars underline that although women are among the most energy deprived groups, middle- and low-income

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women as well as elderly women remain mostly understudied in the energy literature (Buechler et al., 2020). At the same time, they also stress that women are generally mainly regarded as vulnerable groups, instead of active agents able to take part in the energy transition (Lieu et al., 2020). The same goes for local communities, which are seen by certain scholars as collective actors particularly appropriate for promoting social cohesion and alleviating energy poverty (Caramizaru and Uihlein, 2020). For instance, local cooperatives and prosumerist initiatives are seen as favourable dynamics in the fight against energy poverty (Campos and Marin-Gonzalez, 2020). However, local authorities do not always have appropriate guidelines for engaging with vulnerable groups in the field or to understand how facilitating the emergence of energy citizenship within those groups can be helpful in their practice (Haf and Robison, 2020).

6.4 Individual's role in energy citizenship

Within the framework of DIALOGUES, the role of individuals in energy citizenship has been analysed under two main directions. The first refers to the targeted contribution of individuals by energy citizenship, and the second is the type of participation of individuals in energy citizenship. The former focuses on the importance and priorities of the concept of energy citizenship at the level of individuals. Main headings in this respect are energy efficiency, technology uptake, innovation, digitalization, storage/flexibility, renewable generation, equity and justice, and social innovation. The latter focuses on the potential means through which individuals may participate in energy citizenship, exemplified by issues such as lifestyle adoption, civic participation, political participation, financial and economic participation, social participation, e-participation, and industrial/workplace participation. Both targeted contribution and type of participation are critical as drivers towards defining pathways to energy citizenship of individuals, including the goal of their participation and what kind of participation should be provided.

6.4.1 The role of energy equity and justice

An overview of the literature concerning targeted participation shows that the concepts of energy equity and justice emerge as the most cited terms in the literature (see Biresselioglu et al., 2021 for an in-depth discussion of concepts).

The concept of equity and justice has been discussed in the literature from a number of different perspectives. Campos and Marín-González (2020) emphasize the significance of consumer collective action for energy justice, inclusiveness and a more sustainable energy model. Another perspective couples the notion of energy equity and justice with energy poverty. According to Sanz-Hernández (2019), the media's advocacy of energy justice and collective empowerment reflect positively on energy poverty and energy citizenship. Similarly, Day et al. (2016) associate energy poverty with energy inequality and justice, through the idea that the participation of individuals in energy citizenship is possible by ensuring energy welfare, and also point out the need for comprehensive solutions, distributing energy justice and an accessible, affordable, and reliable system (see also Section 6.3).

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Another viewpoint highlights the relevance of equity and justice for energy transition. Accordingly, Chilvers et al. (2017) identify social inclusion and adaptation of innovation approaches for equity and justice as significant drivers towards facilitating sustainable transitions in energy. Active participation of consumers and fair distribution of energy systems are important for a more sustainable and global energy transition (van Zyl-Bulitta et al., 2019). Within the framework of energy democracy, the fair distribution of electricity systems is deemed crucial in terms of energy citizenship and operating in a low-carbon economy, and access to electricity grids should be equal for all (van Veelen van der Horst, 2018). Mullally et al. (2018) examine the integration of Ireland's energy sector into environmental policies and frame energy citizenship through six different discourse coalitions: paternalistic, majoritarian, consumerist, constitutionalist, communitarian, and deliberative. From the perspective of targeted contribution towards energy citizenship, paternalistic, majoritarian and consumerist discourse structures focus on education and increasing the awareness of individuals, while constitutionalists, collectivists, and negotiators focus on the equality aspect of energy citizenship (Mullally et al., 2018). Slee (2014) identifies another area of intersection, targeted contribution and equality and justice, and argues that in line with the goals of sustainability in energy and rural development, production and investments should be conducted equally and fairly, society should develop more strongly, and alternative financing models should be provided for the development of energy projects.

The literature review also highlights gender as a key concept in terms of equality and justice aspects of energy citizenship. In this respect, the main themes emphasized in the literature are as follows: addressing gender issues in the energy system, conceptualization of gender-related topics in energy transition, understanding the possible equality and justice problems of low-carbon technologies, and a clear understanding of the concept of gender in energy democracy (Gram-Hanssen et al., 2017; Wilhite, 2017; Walker et al., 2016; Lieu et al., 2020; Johnson et al., 2020; Bell et al., 2020; Buechler et al., 2020; Mang-Benza, 2021; Szulecki and Overland, 2020; Sovacool and Dworkin, 2015; Bosch and Schmidt, 2020).

Civic participation and political participation are significant themes of type of participation in energy citizenship, as well as within the broader perspective of energy transition. This mainly stems from the indispensable role of individuals and policy makers in energy transition. In this respect, concepts such as co-creation and justice and democracy emerge as the foremost topics: It is important for energy systems to be developed in an organized and mutually beneficial manner. In addition, a fair transition against energy poverty should be ensured. A correct understanding of the importance of collective energy initiatives can lead to fairer approaches to energy transitions, and inequalities can be more accurately identified (Bartiaux et al., 2018; Allen et al., 2019; Gjørtler et al., 2021; Łapniewska, 2019).

6.4.2   The role of technology and innovation

As one of the most-cited themes regarding type of participation for individuals in energy citizenship, the topic of technology and innovation is typically framed around three main pillars: social innovation, smart systems, and technological uptake. Huh et al. (2019)

foresee the need for a concrete common transition path in the political, social and economic framework, together with technology and innovation as relevant for the future of energy transitions. A similar vision perceives energy-oriented transition as the next socio-technical transition where every individual should have a share in the technological transition, together with concrete applications (Giardullo et al., 2019). This viewpoint places smart system technologies as an innovative approach to energy saving, energy efficiency and renewable energy systems. In contrast, the concept of conscious consumption combines consumers and smart systems towards energy citizenship, as well as consumers taking an active role in energy systems (Mah et al., 2012). The authors also argue that motivation and obstacles should be re-discussed for the formation of such supportive bonds. Schweiger et al. (2020) point out the necessity of evaluating smart energy systems at the individual consumer level under social, environmental, digital, and economic conditions. Similarly, Heldeweg and Saintier (2020) argue that social innovations approaches should be addressed in harmony with the perspectives of the energy community.

6.4.3 The role of renewable energy, energy consumption behaviour and energy communities

Concerning type of participation, the literature also highlights the theme of renewable energy. Renewable energy and renewable energy technologies are generally mainly discussed within the context of the future of energy. Europe aims to transition to a zero-carbon economy by 2050. In line with these goals, not only policy makers but also individuals are of great importance. In this respect, supporting the transition to carbon-free lifestyles in every field, from energy consumption to conscious citizenship concepts is emphasized as every individual's responsibility. Related to renewable energy, energy communities' role in energy transition is also commonly discussed, for instance, from the perspectives of strategies and incentives for encouraging individual participation in energy citizenship. Moncecchi et al. (2020) remark that incentives need to be shaped according to the user portfolio, and argue that self-consumption benefits resulting from energy sharing should be considered. Walker (2013) emphasizes the complex, dynamic processes of renewable energy projects in terms of public participation. A common perspective of studies in the literature that focus on renewable energy as a means of participation of individuals in energy citizenship highlights social and demographic factors. Moreover, social norms, confidence, environmental distress and community identity are highlighted as other key factors in terms of community energy initiatives. The production of renewable energy and its awareness at the level of individuals along with incentives is an important common discourse (Czibere et al., 2020; Johansen and Emborg, 2018; Parkins et al., 2018; Kalkbrenner and Roosen, 2016; Radtke, 2014). Concerning the topic of financial and economic participation pertaining to the type of participation and renewable energy, the most-cited themes are investment costs, the level of incentives, and the financial dimension of the formation of new smart systems.

Energy efficient, savings-oriented conscious consumption is among the responsibilities of energy citizenship for individuals and their target participation in society. In this sense, the literature analyses energy efficiency and savings from a broad perspective. One

research direction associates technology and social innovation with differentiated and efficient policies that aim energy efficiency and savings. Another aspect is the long-term planning for energy consumption targeting efficient use of energy. With this viewpoint consumption habits of households regarding energy use, and measures for the households to use energy efficiently are important areas of research. The literature also points to productivity, the emergence of new productivity models (e.g., REScoop projects), significance of individual behaviours, and social practices as key factors for participation of individuals in energy citizenship (Burchell et al., 2016; Hoppe et al., 2015; Stikvoort et al., 2020; Alcock et al., 2017; Belaïd and Joumni, 2020; Tuniki et al., 2021; Xu et al., 2021; Davoudi et al., 2014). On the other hand, lifestyle adoption as a type of participation also relates closely to energy efficiency and savings. This, in turn, requires a better understanding of energy demand and supply in terms of citizens' attitudes (Ruostetsaari, 2020). Energy demand management and a more accurate understanding of social awareness also have common grounds with gender-oriented themes (Standal et al., 2020; Grünewald and Diakonova, 2020; Hargreaves and Middlemiss, 2020).

When the participation goals in energy citizenship are examined from the perspective of energy communities, the types of participation are generally civic participation in decision-making, and social participation in initiatives and implementations. In the literature, a line of studies suggests energy citizenship through energy communities, emphasizing the idea that energy citizenship will be more constructive over the communities and that their policies will progress positively. As communities develop, awareness also increases. The collective type of action in the communities favours civic participation more than political participation (Olivadese et al., 2021; Coy et al., 2021; Islar and Busch, 2016; Koirala et al., 2018; Watson et al., 2020).

Concerns related with sustainability and the environment are identified as significant drivers of energy citizenship. In terms of targeted participation, the associated themes are highlighted as climate policies, fossil fuel reduction, ecological identity and cities, sustainable development and lifestyle, and energy efficiency. Concerning type of participation, a line of studies in the literature frames the concepts of sustainability and the environment with the participation of individuals in energy citizenship under the theme of lifestyle adoption. In this context, a cluster of terms concerning the significance of education on environmental issues, the importance of organizational citizenship behaviours, social psychology and behavioural psychology are also discussed in the literature.

Within the perspective of energy citizenship, sustainability and environmental concerns are also connected to collective behaviour and collective action, such as in the case of acceptability and implementability of environmental policies for sustainable transitions. At this point, researchers argue that global crises can be prevented with individual efforts, but this needs to be realized by adhering to social norms. In addition, the effects of social norms are less binding, however collective action is more challenging for young people who have weaker collective consciousness than others (Mori and Tasaki, 2019). An important area for energy citizenship relates to the energy behaviour of households. Considerable achievements towards energy citizenship are possible by changing

individual behaviours and habits for example, by reducing carbon footprints based on individual mobility or food waste. However, this is dependent on a number of key factors, such as individuals' environmental awareness, education, and cultural background (Asilsoy and Oktay, 2018). To foster such behavioural change targeting individuals' sustainable energy consumption behaviour policies should promote rapid and effective compliance promotion (Csutora et al., 2021). On the other hand, Piggot et al. (2019) point out to the explicit consideration of distribution justice and procedural justice for policy making and energy transition planning. In this respect researchers have identified policies and recommendations for different countries towards the transition to a fair low-carbon economy (Vigoda-Gadot et al., 2008; Nakamura, 2018; Damgaard, 2021; Langer, et al., 2017; Sarrica et al., 2014; Bouzarovski, 2018).

One of the main objectives of the DIALOGUES Project is to support the Energy Union through operational research pertaining to energy citizenship that encourages citizens to take a central role in the low-carbon energy transition. In this respect, the DIALOGUES characterizes energy citizenship as "*the degree to which, and the ways in which, the goals of a sustainable energy transition enter into the everyday practices of an individual*".

In order to operationalize this definition, concepts identified in this report, including the individual, community-related and social dynamics and external dynamics are critical. The specificities concerning parameters such as age, gender, race, ethnicity, socio-economic status, geographic isolation on energy citizenship as well as the impacts of contextual dynamics of energy citizenship on vulnerable groups need to be addressed for inclusive energy citizenship. Conceptualization of the individual's role in energy citizenship form the perspectives of targeted contributions including energy efficiency, technology uptake, innovation, digitalisation, storage, flexibility, renewable generation, as well as the dimensions of equity and justice and social innovation and types of individual participation in energy citizenship (e.g., lifestyle adoption, civic participation, political participation, financial participation, economic participation, social participation, e-participation, and industrial or workplace participation) also provide key points of concentration for DIALOGUES.

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7 Conclusions

The comprehensive, interdisciplinary report on energy citizenship exploits the results of the state-of-the-art literature review done as part of DIALOGUES research activities, documented in Biresselioglu et al. (2021), to provide an assessment of how energy citizenship is perceived in research, and how pathways to energy citizenship are conceptualized in the literature. This approach establishes an in-depth perspective and a broad scope pertaining to the concepts and dimensions associated with energy citizenship. This conceptualization enhances the framing of the engagement of citizens with energy systems, including issues of equity, justice, citizens' awareness, and decisions, and impacts of these decisions on GHG emissions, as well as the strategic objectives of the Energy Union, including zero-emission buildings, renewables uptake, energy storage, and sustainable mobility.

Energy citizenship is a specific form of citizenship; its true nature will emerge against the background of the current discussion of citizenship in a world of growing inequality, weakening liberal democracies and climate change. An active citizenship bears the hope of strengthening democratic societies and making a vital contribution to the energy transition. The substantial evolution of the historical concept of citizenship has provided the basis for empowering the position and participation of citizens in matters in which they are personally involved, such as the energy sector.

The urgency of the energy transition to prevent the destruction of the natural base of human life on the planet through climate change has brought energy citizenship forcefully onto the agenda in the recent past. The term has come to represent active public participation within energy systems: from this fundamental definition, different disciplines have contributed to defining the contours and implications of this new concept.

The inter- and transdisciplinary conceptualization of energy citizenship confirms the "bottom-up" power of individual citizens as key actors for a successful energy transition. From these analyses, important questions have emerged around energy citizenship: they concern the rights and responsibilities of energy citizens as well as issues of energy justice, democracy and diversity. The three levels discussed extensively in this report are the individual, the community and the institutional levels. In all of these, age, gender, ethnicity, education, geography, and income play crucial roles for all forms of citizenship. Concerning the dimensions pertaining to energy citizenship, the internal dimensions mainly refer to psychological aspects, including environmental self-identity, personal responsibility regarding climate change and energy justice. An area for further research in this context is the internal processes regarding the participation of citizens in collective energy initiatives. As for the external dimensions of energy citizenship, the Social Sciences and Humanities literature focuses on individual behaviours of households, participation in collective and political practices of energy systems, energy governance, political decision-making, bottom-up, participatory and action-based policies, prosumerism, bottom-up local community action, energy communities, and environmental movements. The concepts of inclusion and exclusion are also discussed, with reference to collective identity and bottom-up local community action. The research

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on Science and Technology Studies identify power dynamics as a significant driver for energy citizenship. Environmental Studies refer to citizen empowerment, participatory and inclusive governance structures, organisational formats, and prioritisation of the consumer.

Energy citizenship is influenced by individual social, community, local, national and transnational level variables. Social and psychological variables can be exemplified by personal values, norms, attitudes and habits, environmental attitudes and self-identity. At the society level, the highlighted variables are public opinion and emotional attitudes towards societal change and technological developments, public scepticism, social acceptance including political, market, societal and community acceptance, social context, norms and meanings, structures of societal inclusion and exclusion. The national-level factors include national energy governance models, state and local policies of energy and gender, degree of citizen involvement in energy decision-making processes, and form of national government. It is also important to acknowledge and analyse the interactions between these different types of variables, and their influence on energy citizenship.

Key factors regarding energy citizenship include awareness, environmental consciousness, technological knowledge on energy-related issues, and psychological and behavioural factors, including the belief that engagement in pro-environmental behaviours will improve environmental outcomes and one's own life quality, and the willingness to engage, positive attitudes towards renewable energy technologies, social and community-related factors, such as interactions between cognitive norms, energy practices, collective identity and social norms. Also important are structural and organizational factors, such as access to and quality of services, community living conditions, type of homeownership, ownership of a renewable energy system and geographical location of the dwelling. The economy related factors pertaining to energy citizenship include the welfare level of an individual, economic rationality, and financial benefits.

Concerning the motivators of energy citizenship, the foremost emerging motivators are individual concern about climate change and environmental issues, perceived moral responsibility regarding climate concerns, community attachment (working with and for a community), acceptance of sustainability principles, including social aspects such as public participation, local action, equity and justice, and alleviation of poverty.

In the literature, there is a discussion of barriers in a range of contexts involving regulatory, financial, infrastructural, and socio-political aspects. Examples of barriers are political obedience, social hesitation, financial restrictions, lack of awareness, low social cohesion, not accounting for public values and concerns, and citizens' perception that their individual involvement will make no difference. It is also worthwhile noting that these barriers are more prominent for certain age groups and genders.

The individual dynamics of energy citizenship are discussed in different contexts in the literature. One approach concentrates on consumer choice, lifestyle, identities, and

another, on individual dynamics, relating to the framework of energy justice, distributive and procedural justice, emphasizing the need for more inclusive decision-making processes. On the other hand, the line of research on community and social dynamics generally positions collective action as the main dynamic enabling the emergence of energy citizenship. Collective dynamics are often framed through participation in the energy system. External dynamics are perceived complementary to individual dynamics and external dynamics. These include regulatory conditions, energy market structure, national and local policy framing, and the role of media in shaping public opinion. In this sense, government support to vulnerable and marginalised groups is emphasized as key to enable their involvement in the energy transition. When discussing energy citizenship, several specific variables impacting such a construct and its related aspects should be considered. Due to the not abundant literature directly addressing the concept of energy citizenship, in this review we considered also related concepts such as environmental self-identity or energy-saving behaviours in general.

Vulnerable or marginalised individuals and groups are particularly important in terms of energy citizenship, from two main perspectives. The first refers to the viewpoint that the process of energy transition as well as energy citizenship ultimately targets to improve the daily lives and wellbeing of underprivileged groups including such as poor households or. The second perspective acknowledges that the associated processes induce costs, which are more likely to affect vulnerable individuals and groups. Hence, the pathways to energy citizenship need to be adopted to overcome this contradiction.

Concerning the role of individuals in energy citizenship, two main directions have been discussed in the literature. The first pertains to the targeted contribution of individuals, and the second, to the type of participation of individuals in energy citizenship. The main approaches to targeted contribution include energy efficiency, technology uptake, innovation, digitalization, storage/flexibility, renewable generation, equity and justice, and social innovation. When the type of participation is considered, the main themes are lifestyle adoption, civic participation, political participation, financial and economic participation, social participation, e-participation, and industrial/workplace participation. Both aspects of individuals' role in energy citizenship are significant as drivers towards defining pathways to energy citizenship of individuals, including the goal of their participation and what kind of participation should be provided.

The comprehensive, interdisciplinary review of the energy citizenship concept has brought into view a rich and growing number of studies that correlates a wide variety of variables with the various researchers' definitions of energy citizenship. These findings are important but they need a further step before they can be used by policy makers. A general request that policies promoting energy citizenship should take into account all the many demographic, social, economic, psychological, geographic, etc. factors does not translate in and by itself into policies. More is needed than numerous correlations and a general indication that all factors should be taken into account. DIALOGUES will work on the policy relevance of energy citizenship research bringing together the existing scientific findings presented in this paper with a practice-oriented perspective to be

developed together with citizens, examining the dynamics and processes that determine their energy life.

The ultimate goal is to provide policy makers with the tools to design policies that contribute, among other things, to educating citizens on environmental energy issues, empowering them in the context of energy justice, and removing legal barriers. The convergence of top-down policies and bottom-up citizen activity is the necessary basis for the emergence of energy citizenship, and its potential contribution to the low-carbon energy transition.

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