



Is the German energy transition perceived as gender- and socially-just?

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(Accept)

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Notes

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1 Introduction

1.1 Background

European governments must work more ambitiously to transform their national energy systems if Europe is to achieve the 1.5 °C target in the Paris Agreement (Habersbrunner, et al., 2021). This is also required if Europe is to shoulder its global responsibility with regard to North-South power relations (ibid). To achieve the goal of climate neutrality and follow a 1.5 °C path, a zero-emissions economy by 2030 would be necessary, with a 100 % renewable energy supply at its centre, accompanied by increased energy efficiency and energy savings.

In the publicly available coalition agreement (SPD, BÜNDNIS 90/DIE GRÜNEN, FDP, 2021), the new German government aims to increase the share of renewables in gross electricity demand to 80 % by 2030, based on the assumption of a demand increase of between 680 and 750 terawatt hours (TWh) per year due to the electrification of the heating and mobility sectors. Although this target seems insufficient with regard to the Paris Agreement, the goals and measures set out in the agreement could trigger strong dynamic growth, assuming that the German government rapidly turns the stated goals into effective legislation. In particular, the goal of strengthening the decentralized expansion of renewable energies in Germany is being approached more ambitiously than ever before.

Redesigning the national energy system and enabling 100 % renewable energy in all sectors requires not only legislative acts, but also a wider societal transformation that guarantees the active involvement of citizens and considers their needs. A first important step is to increase the public acceptance of the energy transition. So far, there is no clear definition or coherent approach to acceptance policies, but such an approach should include several measures to enhance public approval of energy transition projects such as citizen energy projects¹. Furthermore, as elaborated by an impulse paper from 2020, Germany's acceptance policy should focus on five fields of action: 1) Shaping new narratives for the energy transition, 2) Establishing local supply as the new norm/normality, 3) Empowering citizens to participate in the energy transition, 4) Investing in trust and transparency, and 5) Enabling a just area planning (Local Energy Consulting, 2020).

To really pursue such an acceptance policy, it is important to reach every citizen, regardless of their gender, ethnicity, religion, age, or income. The existing energy system has been and is still described as a hierarchical, male-dominated field, characterised by great inequalities in terms of power and economic strength (EIGE, 2021). These hierarchies and inequalities need to be considered. It is essential to not only understand the energy system in terms of its technical aspects, but also its social-cultural dimension. This means that it is necessary to comprehend the ways in which the energy system is shaped by socio-cultural factors such as gender or age, and how higher acceptance of the energy transition can contribute to achieving a just energy system.

1.2 Objective

This working paper is one result of the 'Accept' project, led by Fraunhofer ISI and WECF Deutschland e.V., and funded by the Federal Ministry for Economic Affairs and Climate Action. The project's

¹ The term 'citizen energy' in this paper refers to participatory energy projects at local level, which are run by citizens, i.e. which are managed by natural persons, municipalities or local authorities [see also REScoop.eu (2019)].

overall objective is to explore citizens' perceptions of the energy transition as well as its non-monetary and monetary impacts. Using a mixed methods approach, citizens' perceptions have been elaborated using surveys as well as a series of workshops.

This paper is embedded in the broader research project and presents results from data collected during workshops. While some data have already been used for other analyses [see Burghard, Breitschopf, Wohlfarth, Müller, & Keil (2021)], this paper aims to analyse another set of data from a socially- and gender-just² point of view by answering the following research question:

How do citizens perceive the energy transition initiated by the German government in terms of social justice aspects?

This question makes it possible to identify citizens' perceptions of the risks and opportunities that the energy transition provides for distinct social groups, mainly marginalised ones. In this context, there is a particular focus on women as one of the main underrepresented groups and how their chances of participating in the energy transition are perceived.

To answer the research question, the first step is to provide a theoretical framework. This deals with the links between gender aspects and the energy system (gender-energy nexus), with participation schemes in the German energy transition as well as with the social acceptance concept following Wüstenhagen et al. (2007). Then the methods used in this research are presented, including how the sample was selected and how the workshops were conducted. Finally, the main results of the workshops are described and discussed by applying the theoretical concepts.

² The authors of this paper understand social and gender justice as full equality between all genders (male/female/diverse) in all spheres of life, e.g. political, economic, and private. Gender justice aims to analyse existing power relations and hierarchies, and to transform them into structures, policies and instruments that shape the life of all persons fairly by especially considering the needs of oppressed social groups.

2 Theoretical framework

2.1 Gender-energy nexus

Decisions within the fossil fuel-based energy sector of the last two centuries were, and still are, male-dominated. This is illustrated by considering essential domains of the energy system such as I) **power and decision-making** as well as II) **public resources and infrastructure**.

Ia) Regarding the sub-domain of **political power**, it is well-known that women are underrepresented in political decision-making-structures in the EU, as demonstrated by the share of women in ministries, parliaments and regional assemblies. In the case of Germany, women hold 41 % of the ministries, 33 % of the seats in the federal parliament and, on average, 31 % of the state parliaments (EIGE, 2021). At the municipal level, the share of female representatives ranged from 20 to 41.9 % in 2019 (BMFSFJ, 2021).

Ib) The sub-domain of **economic decision-making** is generally assessed by the share of women on corporate boards of the largest nationally registered companies. On average, women account for 30 % of the corporate board members in the EU (EIGE, 2021). This figure is slightly higher in Germany, where women account for 36 % of board members (EIGE, 2021). The energy sector, in particular, is characterized by the underrepresentation of women in managerial positions: Fewer women reach senior roles in the energy sector (only 13.9 % of the global senior management positions in 2019) than in the broader economy, with notable variations between sub-sectors (IRENA, 2019). In Germany, a recent study conducted by PwC (2022) shows that, despite a steady increase, the share of female executives in the energy sector is still only 15.5 % and only 6 % of CEOs. Women in executive positions head primarily the marketing (57 %) and human resources (41 %) departments, while the production, IT and logistics departments continue to be led largely by men. In the European Union, gendered differences in the energy sector are also indicative. For instance, 26.2 % of senior roles in the gas sector, and 18.7 % in the electricity sector are held by women (IEA, 2020). Furthermore, the underrepresentation of women in economic power and decision-making positions is reflected in gross gender gaps in innovation and entrepreneurship of the European energy sector: Women are much less likely to be listed as inventors on patent applications associated with the energy sector (ibid).

II) The fact that women have fewer land rights and less access to **public resources and infrastructure** also has an impact on their participation in the energy transition, since this requires access to land and buildings. Gender disaggregated data on land allocation are rather scarce in the European context. However, the distribution of agricultural holders, i.e. the person who makes decisions regarding resource use and exercises management control over the agricultural holding, can be used as an indicator. In Europe, the share of female holders ranges from 6.1 % in the Netherlands to 47.7 % in Lithuania (FAO, 2021). In Germany, women account for 8.4 % of agricultural holders (ibid). Moreover, since most energy project operators approach property owners and community leaders, women are often excluded. Due to the lack of corrective measures, the system has been failing to include women in consultation processes regarding energy communities and private solutions.

Power relations and decision processes on the use of land and resources for fossil fuel extraction projects often neglect women's energy needs, practices, and skills. Hence, the extractivist energy

model³ has constantly neglected gender aspects, thereby creating systematic gender inequalities regarding the access to and control of energy.

2.2 Participation schemes in the German energy transition

Overall, two different approaches to the energy transition can be observed in Europe and beyond. One is a top-down approach that orchestrates innovation and leadership mainly from the governmental, political, and institutional side (hereafter referred to as 'energy transition initiated by the federal government'). The second is a bottom-up approach that encourages local or community driven initiatives and involves the affected citizens to varying degrees. In a broader sense, such bottom-up approaches can be referred to as 'energy communities'.

In this paper, the focus lies on the acceptance of the energy transition initiated by the federal government, hence acceptance of the top-down approach. Nevertheless, this perception can still be influenced by a bottom-up perspective of the participants, since some of them are already actively involved in the energy transition via citizen energy projects.

Citizen energy concepts are one kind of energy community. Germany, for example, has become well-known for its bottom-up-movement of the so-called "Bürger*innenenergie" (citizen energy), which was initiated by the anti-nuclear movement (Bauwens, Gotchev, & Holstenkamp, 2015). In principle, concepts of citizen energy "cover both, groups and individuals" (Morris, 2021), hence these bottom-up approaches have different forms of legal organisation, e.g. cooperatives. To stick to the German example, its bottom-up approach paved the way for the national energy transition and was started primarily by committed citizens and then further developed by mainly community energy projects and medium-sized companies. It is mainly based on citizens' voluntary and very professional engagement. Almost a third (30.2 %) of the installed capacity of German renewable energies in 2019 were in the hands of private citizens and another 10 % in the hands of farmers (Agentur für Erneuerbare Energien e.V., 2019). However, the share of citizen energy is currently declining, because bigger market players have also entered the renewable energy market (ibid.).

Moreover, it should be noted that the energy transition is often understood as a process in the area of (renewable) electricity production, marketing and sale. The transformation process in the mobility and heat sectors is commonly ignored in the research literature as well as media coverage, even though the necessity of sector coupling is well-known in politics, economics, and academia. In these other sectors, successes and breakthroughs are mainly due to fostering community projects in the sense of local development.

Since citizen energy projects lead to a de-monopolization and pluralization of economic structures and strengthen the individual and collective understanding of energy issues, they contribute to a democratization of the energy system (Karl & Bode, 2021). It is important to mention that such citizen energy projects should integrate distinct social groups with their specific needs.

³ In this paper, the extractivist energy model refers to a model that is based on the exploitation of resources (e.g. extracting coal), which is embedded in a capitalist society and rooted in colonialism. The economic model of extractivism is often related to Latin America, since multinational companies from the Global North have long used this region as one of their biggest suppliers of raw materials for their own profit (Brand, 2016). Later, this economic model was promoted as a development strategy for Latin American countries by claiming that resource extraction would benefit their own economic growth (known as neo-extractivism) (ibid.). Although this led to an economic boom in the 2000s, it also resulted in dependence on international markets or rather multinational companies, which often neglect indigenous rights such as land rights, human and environmental rights. Furthermore, it upheld and reinforced neocolonial structures and the unequal power relations between the Global North and Global South.

2.3 Social acceptance of the energy transition

Together with a clear regulatory framework and the commitment of decision-makers, broad social acceptance is considered one of the main factors contributing to a successful transformation of the energy system (Local Energy Consulting, 2020). Recently, increasing attention has been paid to the determinants of local resistance to or support for the implementation of renewable energy projects and the literature available on this theme has expanded. In one of the most important studies on the subject, Wüstenhagen et al. (2007) state that social acceptance comprises three dimensions: socio-political, community acceptance, and market acceptance.

Socio-political acceptance refers to the approval of renewable energy technologies and policies by the general public, key stakeholders and policy makers (ibid). It focuses on institutional challenges to the implementation of renewable energy and on the set of policies and incentives that could increase acceptance (Fast, 2013). **Market acceptance** deals with “the process of market adoption of an innovation” (Wüstenhagen, Wolsink, & Bürer, 2007, p. 2685). It is not limited to consumers but includes the decisions of investors and other market actors (ibid). A central topic when referring to market acceptance is the willingness to pay for /willingness to invest in renewable energy (Fast, 2013). **Community acceptance** focuses on the local level and can be broadly defined as specific support or rejection exerted by communities and local authorities hosting renewable energy projects (Wüstenhagen, et al., 2007). Community acceptance is determined by diverse factors including the distribution of cost and benefits, the fairness of the related decision-making processes and the community’s trust in the project developers (ibid).

Recent studies show that, despite the increasing and widespread acceptance of renewable energy and the energy transition (high socio-political acceptance), conflicts and concerns about impacts on the local environment continue to emerge (low community acceptance) and constitute a potential barrier to the achievement of energy transition targets (Wüstenhagen, et al., 2007; Segreto, et al., 2020). For instance, a study on acceptance and local participation in the energy transition in Germany by Local Energy Consulting (2020) revealed that 66 % of the respondents fully support increased use and expansion of renewable energies, but only 39 % fully accept wind turbines in their local environment.

This paper focuses on the perception of the general public (as part of socio-political acceptance) and on community acceptance.

3 Methods

The 'Accept' project uses a mixed methods approach, which includes a literature review, surveys, and workshops. The detailed approach has already been described by Burghard et al. (2021), who also carried out the literature review as well as an analysis of a first set of data from the survey and the workshops. This paper is an extension of that work and concentrates on the results of the online workshops regarding the public perception of social justice in the German energy transition. The qualitative data collection took place in the form of online workshops, which were conducted digitally due to the COVID-19 pandemic. This made it possible to record and subsequently analyse the data obtained in the workshops. The software tool used was "Clickmeeting", which offered options for pre-prepared whiteboards, questionnaires, and presentations.

Recruitment of the target group

To analyse the civic perception of the energy transition initiated by the federal government and its dependency on personal engagement, two different target groups were recruited for the workshops:

The first target group (TG 1) are individuals already actively participating in the energy transition either financially (e.g. ownership of a PV system) or through membership in an energy initiative/project/network or energy cooperative (e.g. wind or solar systems or neighbourhood heating networks). TG 1 were recruited by a project partner of the 'Accept' project called "Bündnis Bürgerenergie e.V.". For the recruitment stage, a pre-questionnaire was used to collect initial information about the level and form of engagement in the energy transition as well as socio-demographic information.

The second target group (TG 2) are individuals who are not (yet) actively involved in the energy transition (e.g. do not own a PV system or are not a member of an energy network/cooperative) at the time of recruitment. The recruitment of the second target group was outsourced to a market research institute, which recruited participants using the screening questionnaire from their contact directory to ensure heterogeneity. The participants of TG 2 received compensation for their participation in the workshops.

Separate workshops were held for each target group, as it was assumed that they have different levels of knowledge and understanding regarding the energy transition.

Workshop material

During the workshop, a survey and whiteboards were used to collect inputs from the participants. The survey used closed questions, whereas the whiteboards were used to address open questions. The open format of the whiteboards allowed for a moderated exchange and discussion between the participants. Oral and written contributions were possible.

For the discussion in the workshops, a standardised guideline was developed by all project partners to ensure non-discriminatory language regarding social and gender aspects. The guideline included guiding questions as well as a list of relevant topics to ensure comparability between the workshops. The workshop guideline was published by Burghard et al. (2021) in chapter 8.3. At the beginning, the moderators and the project were introduced and information on procedures and data protection was provided. The first part of the workshop opened with questions about knowledge and general perception of the energy transition. A short presentation of the energy transition initiated by the federal government was then given by the moderators. In the next part of the workshop, in a guided focus group discussion, the participants were asked to share their perception of the energy

transition from both individual and societal perspectives. Subsequently, participants were given a short introduction to the concept of just energy transition, gender mainstreaming and different forms of participation in the energy transition. Those topics were also addressed in the part with the open format using whiteboards and roundtable discussions. Finally, additional closed questions on the overall acceptance of the energy transition were asked.

Workshop database

In total, nine online workshops were conducted – six within TG 1 and three within TG 2. Altogether, 53 individuals (31 from TG 1, 22 from TG 2) participated in the workshops, which took place between 2nd December 2020 and 15th February 2021. Between four and 12 participants took part in the individual online workshops, each of which lasted 1 hour 45 minutes. However, some workshops lasted up to 30 minutes longer.

Ages in the groups ranged from 19-86 years; in terms of gender, men are overrepresented in TG 1, while the distribution in TG 2 is more balanced. In TG 1 the majority of participants had university degrees, while in TG 2 the level of education was comparable to that of the overall population in Germany (Burghard et al. 2021).

Workshop data analysis

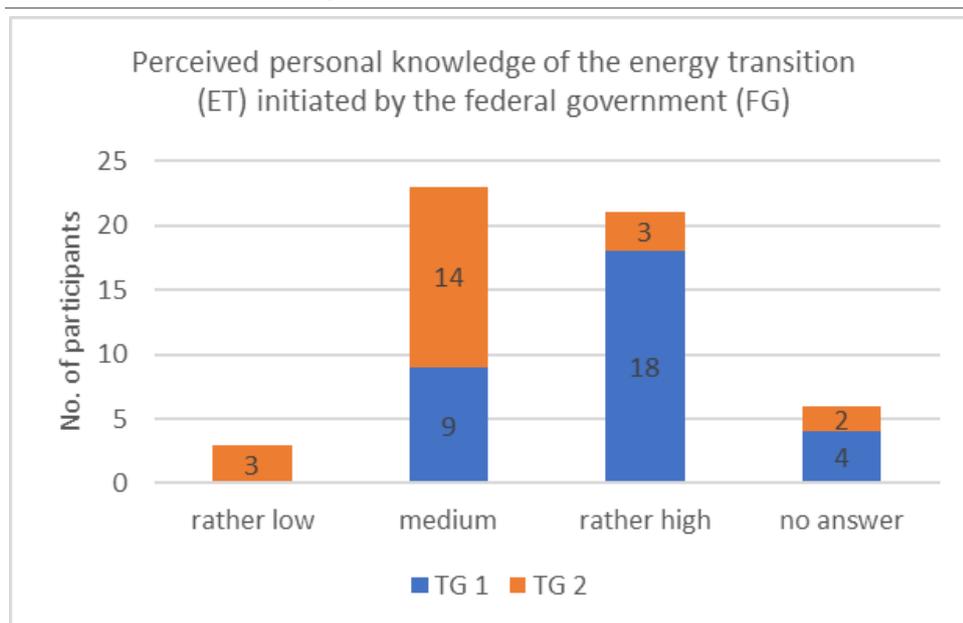
The software tool used in the workshops was able to link the workshop questionnaires to each participant using personal codes. The whiteboard inputs were not assigned to individual persons. The analysis of the qualitative data on acceptance and participation was carried out in two stages. First, the answers of the survey presented in the workshops were analysed. These answers represent the perception of justice in the energy transition initiated by the federal government in general as well as in relation to the actual level of engagement by the participant. Second, the inputs on the whiteboards were presented, which dealt mainly with gender aspects. These answers were analysed with the software MAXQDA according to a cluster of main aspects, further elaborated in chapter 4.2., such as the economic status of women or the level of participation in the energy transition.

4 Workshop results

This chapter summarizes the survey results as well as whiteboard inputs. The first part illustrates and describes the survey results. The results show the answers given by the overall group as well as by TG 1 and TG 2, separately, and display the most and least given answers and the averages. The second part presents the open answer results obtained from the whiteboard inputs.

To start with, participants of both pre-defined groups TG 1 and TG 2 were asked to rate their own level of knowledge about the federal energy transition. Three responses were possible: "rather low", "medium" and "rather high". The results of this rating are illustrated in Figure 1.

Figure 1: Perceived personal knowledge of the energy transition (ET) initiated by the federal government (FG)



It was expected that the participants' answers regarding their own knowledge would reflect their personal level of engagement in the energy transition. As shown in Figure 1, for the majority of participants, this expectation was echoed by the results. 18 of 31 members of TG 1 rated their knowledge as high, whereas 9 rated it as medium. In comparison, most participants of TG 2 (14 out of 22) rated their own knowledge as medium.

The following analysis is based on the pre-defined assumptions rather than the participants' rating of their own knowledge. Although their subjective estimation might influence the answers given, the focus in this paper was on participants' active or inactive involvement in the energy transition to enable better comparability of the results.

4.1 Survey

As part of the survey, the participants were asked to evaluate five closed statements assessing their personal perception of the energy transition initiated by the federal government with regard to equal opportunities and risks for different groups of people. The five statements were:

- i) The energy transition initiated by the federal government is generally just.

- ii) The energy transition initiated by the federal government provides equal opportunities and risks for all genders.
- iii) The energy transition initiated by the federal government provides equal opportunities and risks for all ages.
- iv) The energy transition initiated by the federal government provides equal opportunities and risks for all income groups.
- v) The energy transition initiated by the federal government provides equal opportunities and risks for all educational levels (referred to as equity issues).

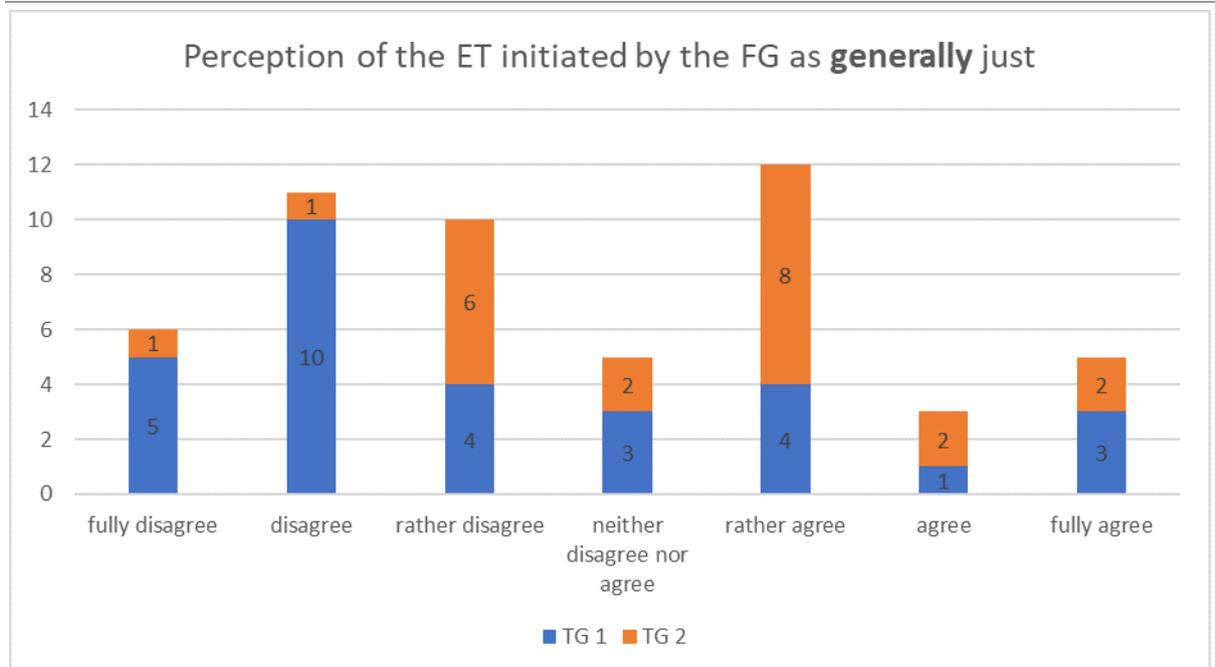
The answer categories were the following: 1 = "fully disagree", 2 = "disagree", 3 = "rather disagree", 4 = "neither disagree nor agree", 5 = "rather agree", 6 = "agree", 7 = "fully agree" and 0 = "no answer". For the following data analysis, the disagreement spectrum includes the answers "fully disagree", "disagree" and "rather disagree", while the agreement spectrum includes the answers "fully agree", "agree" and "rather agree".

One participant from TG 1 did not answer any of the survey questions. Hence, the following graphs only analysed 52 answers (30 from TG 1 and 22 from TG 2). Since TG 1 and TG 2 did not have the same number of participants, a detailed comparison was not carried out. Instead, the frequencies and the arithmetic mean value (also referred to as 'average' in the following) of the answers of the whole group (TG 1 and TG 2 together) and of each target group separately were analysed.

The detailed number of responses for each option and each statement are shown in the following graphs.

i) The energy transition initiated by the federal government is generally just.

Figure 2: Perception of the ET initiated by the FG as generally just



The first statement explored the participants' perceived level of general justice in the energy transition initiated by the federal government. The ratings are presented in Figure 2.

The arithmetic mean of all answers is between “rather disagree” and “neither disagree nor agree” (3.7), since the answers are distributed on both sides of the spectrum. On average, TG 1 answered with “rather disagree” (3.2), whereas TG 2 answered with “neither disagree nor agree” (4.3).

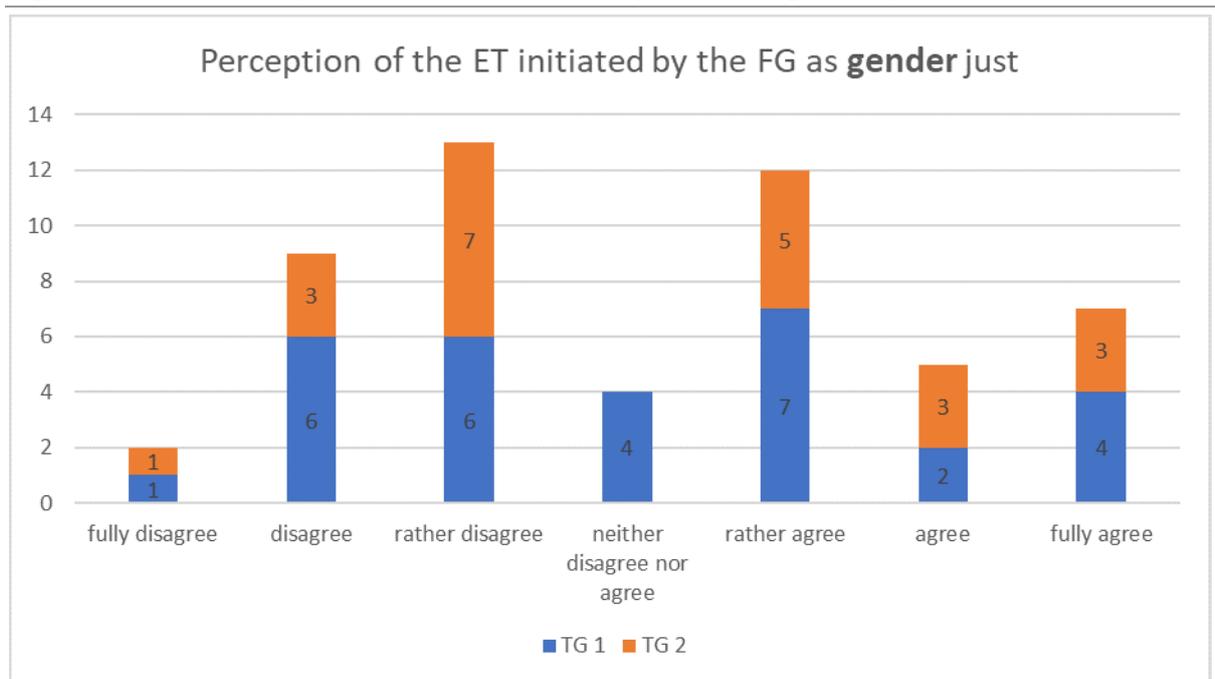
The most common answer overall (combining TG 1 and TG 2) is “rather agree” given by 12 participants overall, 8 of them from TG 2. The second most common answer is “disagree” by 11 participants, 10 of them from TG 1. This corresponds to the most common answer for TG 1, which is “disagree”. For TG 2, the most common answer is “rather agree” with 8 votes.

The least given answer overall is “agree” with only three votes, which is also TG 1’s least given answer. The least common answer for TG 2 is “fully disagree” with 1 vote.

To sum up, those actively involved in the energy transition (TG 1) disagree more strongly with the perception that the energy transition initiated by the federal government is generally just than those who are less involved (TG 2).

ii) The energy transition initiated by the federal government provides equal opportunities and risks for all genders.

Figure 3: Perception of the ET initiated by the FG as gender-just



In the next step, the participants were asked to rate whether the energy transition initiated by the federal government provides equal opportunities and risks for all genders. Figure 3 shows the participants’ perceptions.

The average overall answer (4.1) as well as for TG 1 (4.1) and TG 2 (4.2) was “neither disagree nor agree”.

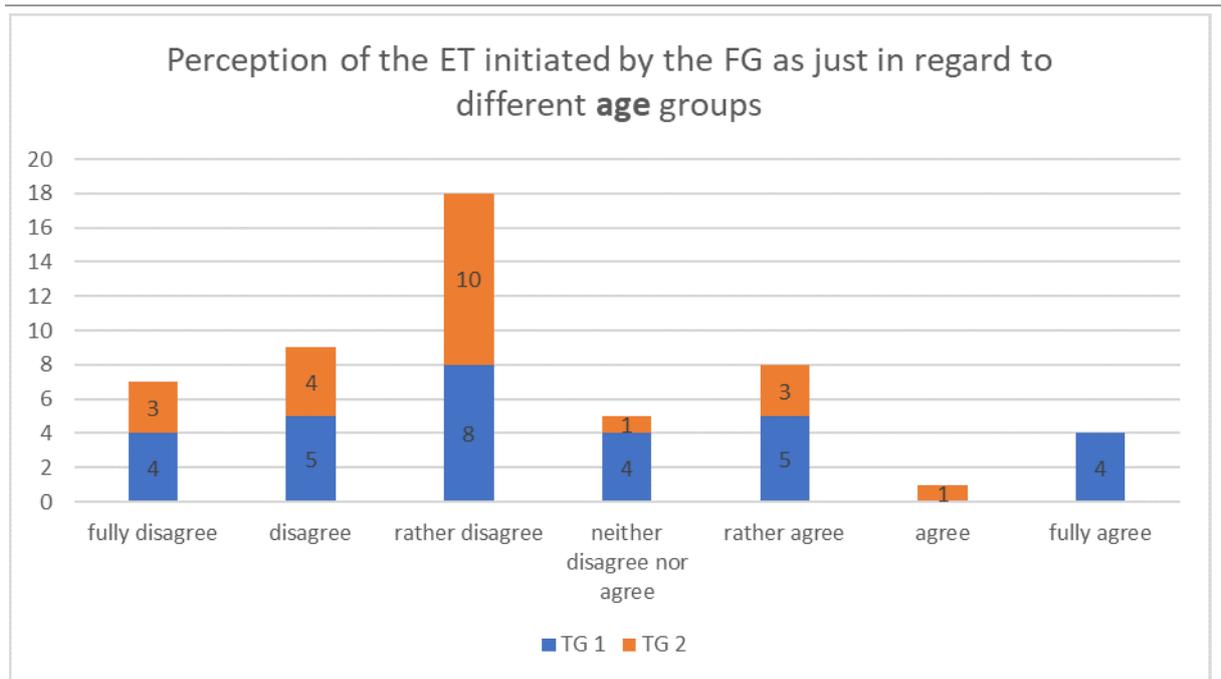
Overall, the most common answer given was “rather disagree” with 13 votes. For TG 1, the most common answer given was “rather agree” with 7 votes, closely followed by “rather disagree” and “disagree” with 6 votes each. For TG 2, the most common answer given was “rather disagree” with 7 votes, followed by “rather agree” with 5 votes.

The least given answer overall, as well as for TG 1 and TG 2, was “fully disagree” with 1 vote each.

In general, looking at Figure 3, it is clear that the answers of both TGs cover all answer options and no clear trend can be identified, since out of all answers, 24 participants answered on the disagreement spectrum and another 24 on the agreement spectrum.

iii) The energy transition initiated by the federal government provides equal opportunities and risks for all ages.

Figure 4: Perception of the ET initiated by the FG as just regarding different age groups



The third statement examined whether the energy transition initiated by the federal government is perceived as providing equal opportunities and risks for all age groups. The results of the rating are illustrated in Figure 4.

The average overall answer was between “rather disagree” and “neither disagree nor agree” (3.3), the same as the average answer of TG 1 (3.6). The average answer of TG 2 was “rather disagree” (3.0).

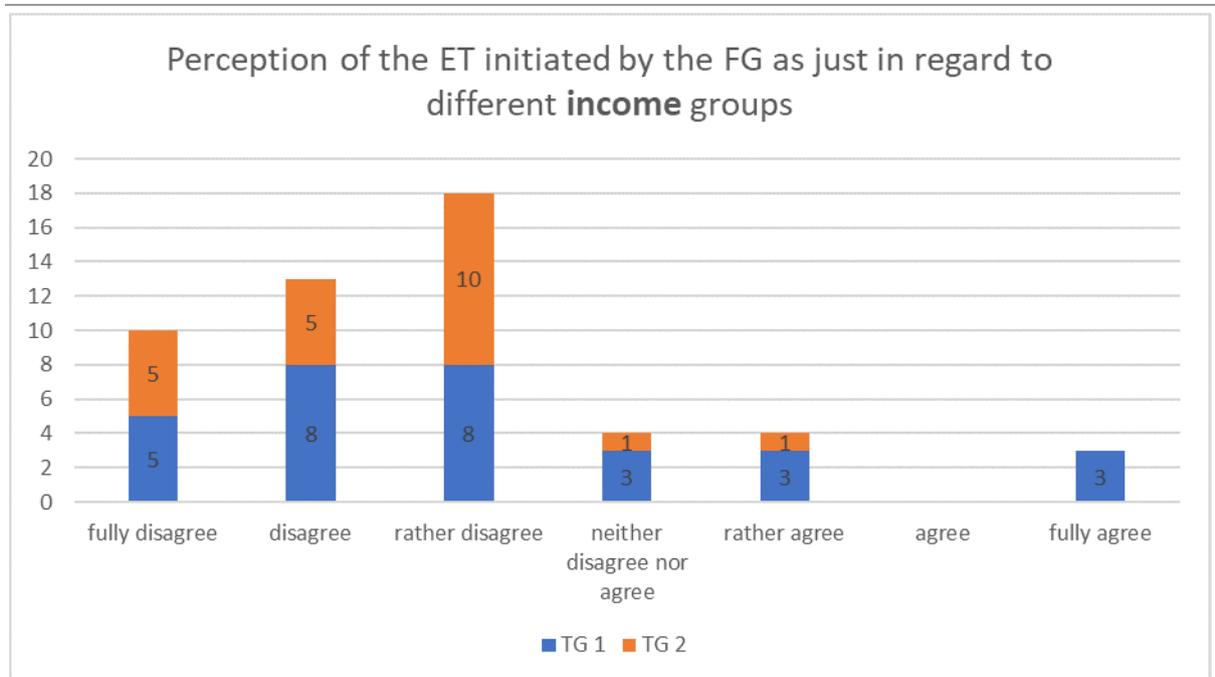
The most common answer given overall (18 votes) and by both TGs, TG 1 (8 votes) and TG 2 (10 votes), was “rather disagree”.

The least given answer overall was “agree” with just 1 vote from a participant of TG 2. For TG 1, the least given answers were quite dispersed, with 4 votes each for “fully disagree”, “neither disagree nor agree” and “fully agree”.

In conclusion, the whole group of participants clearly “rather disagrees” with the statement that the energy transition is equal for all age groups regardless of their level of involvement in the energy transition.

iv) The energy transition initiated by the federal government provides equal opportunities and risks for all income groups.

Figure 5: Perception of the ET initiated by the FG as just regarding different income groups



The fourth statement of the survey asked the participants to rate if the energy transition initiated by the federal government provides equal opportunities and risks for all income groups. Figure 5 strikingly shows that most of the answers are on the disagreement spectrum.

Overall, the average answer was between “disagree” and “rather disagree” (2.8). TG 1, on average, answered with “rather disagree” (3.1), and the answers from TG 2 ranged between “disagree” and “rather disagree” (2.5).

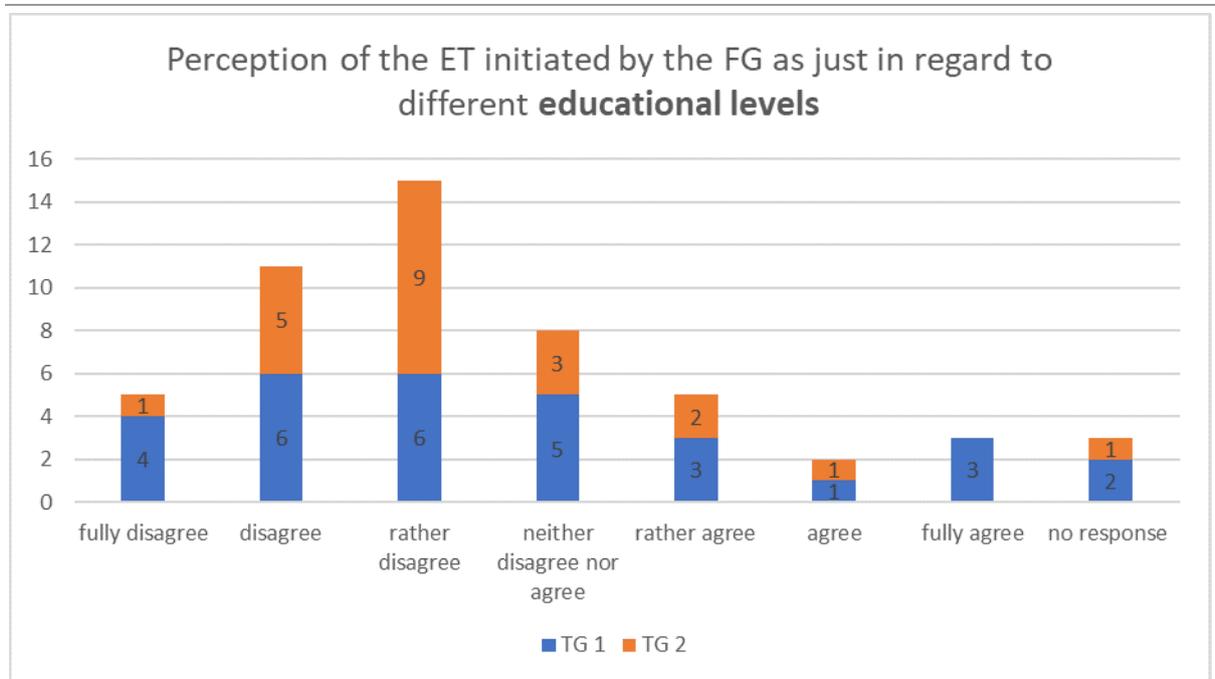
The most prominent answer overall was “rather disagree” with 18 votes. In TG 1, the most frequent answers were “disagree” and “rather disagree”, with 8 votes each. “Rather disagree” was also the most common answer in TG 2 with 10 votes.

The least given answer overall was “agree” with no votes at all, followed by “fully agree” with 3 votes. All 3 votes were from TG 1, which makes “fully agree” together with “rather agree” and “neither disagree nor agree” the least given answers for this group with 3 votes each. In TG 2, the least given answers were “neither disagree nor agree” and “rather agree” with 1 vote each.

It can be concluded that a clear majority of participants, regardless of their level of involvement in the energy transition, perceive inequalities among different income groups in the energy transition initiated by the federal government.

v) The energy transition initiated by the federal government provides equal opportunities and risks for all educational levels.

Figure 6: Perception of the ET initiated by the FG as just regarding different educational levels



In the final part, participants were asked to rate the statement that the energy transition initiated by the federal government provides equal opportunities and risks for all educational levels. The answers are shown in Figure 6. Three participants did not respond to this statement.

Overall, the average answer given was between “rather disagree” and “neither disagree nor agree” (3.3). This was similar to the average answer of TG 1 (3.2), whereas the average answer of TG 2 was “rather disagree” (3.0).

The most common answer overall was “rather disagree” with 15 votes in total, followed by “disagree” with 11 votes. For TG 1, the most given answer was “disagree” and “rather disagree” with 6 votes each. “Rather disagree” was also the most given answer by TG 2 with 9 votes.

The least given answer overall, as well as by TG 1 and TG 2, was “agree” with 2 votes, 1 vote from each target group.

It can be concluded that a clear majority of participants, regardless of their level of involvement in the energy transition, do not believe that the energy transition initiated by the federal government provides equal opportunities and risks for all educational levels.

4.2 Whiteboard

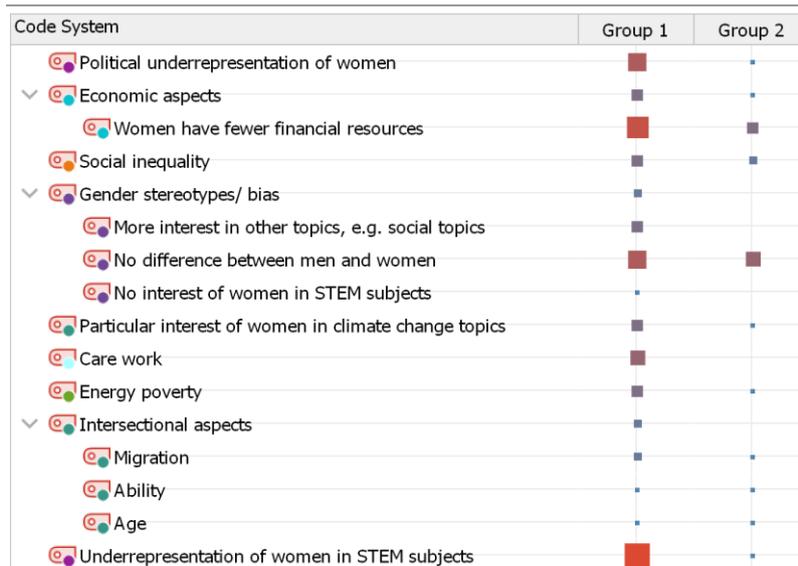
In line with the research focus and research questions, the whiteboards were used as an open format for participants to answer the following two questions:

- 1) In your opinion, which chances do women or other minority groups have regarding the energy transition and which barriers do they face compared to men?
- 2) Which possibilities do women have to participate in the energy transition compared to men?

In total, 158 whiteboard inputs were analysed. The first question resulted in 94 whiteboard inputs, 76 from TG 1 and 18 from TG 2. For the second question, 64 whiteboard inputs were given, 51 by TG 1 and 13 by TG 2. The answers were analysed using the software MAXQDA. Key aspects that overlap both questions were identified as codes: The underrepresentation of women in political decision-making processes as well as in the subjects of science, technology, engineering, and mathematics (STEM) was mentioned. Besides economic aspects, gender stereotypes, energy poverty and social inequality were addressed in the answers. In this study, social inequality refers to unequal opportunities for different social groups, not only according to gender but also socio-economic factors, e.g. that low-income groups cannot afford to change their energy supply to renewable options. Care work also emerged as a key aspect. Care work refers to the work of caring for other people, including paid care, e.g. as nurses, and unpaid care for children or elderly people. Additional structural categories such as migration, age and ability were clustered as 'intersectional' aspects. 'Intersectionality' is a term introduced by Kimberlé Crenshaw indicating that structural categories such as gender, ethnicity, or age must be put in relation to each other to detect power relations and hierarchies (Lenz, 2010).

The answers to both questions were analysed and are discussed jointly. The following matrix gives an overview of the key aspects and the frequency distribution:

Figure 7: Own matrix created with MAXQDA



In general, more responses by TG 1 were collected during the workshops, which is reflected in the different sizes of the squares⁴ in Figure 7. The economic difference between men and women was highlighted as one barrier to women participating in the energy transition. Women with the same qualifications or in the same position as men tend to earn less money, also known as the gender pay gap (destatis, 2021). In Germany, for example, women earned 18 % less than men in 2021 (ibid). Limited access to financial resources might result in women not investing in renewable energy projects, as one workshop participant pointed out. In contrast, men often have more capital and tend to invest in shares, as at least five participants of TG 1 and three participants of TG 2 mentioned. Additionally, the responses reflected that the participants were aware of energy poverty. For example, they pointed out that women are more vulnerable to energy poverty because of their lack of

⁴ Instead of using the absolute number of answers given by the participants or the number of codes assigned during the MAXQDA analysis, an approximate frequency of key aspects is illustrated by the blue and red squares.

financial resources as well as that rising electricity prices will exacerbate energy poverty among women.

Many of these aspects are interconnected, but especially economic aspects, political underrepresentation, and care work. Responding to the first question, one participant from TG 1 summarized: "Frauen haben weniger Geld und Zeit und Ressourcen und weniger Zugang zu Gestaltungsmacht" (*Engl.: Women have less money and time and resources and less access to political power*). Many participants of TG 1 highlighted that care work is one reason for women, especially for single mothers, to engage less in voluntary work for the energy transition. Not only are women less represented in citizen energy projects, such as energy cooperatives, but also in political leadership positions that could influence energy policies. One participant commented that the participation of women is generally missing when it comes to important decision-making procedures, especially those dealing with technical issues.

Another important aspect mentioned was the underrepresentation of women in STEM subjects. On the one hand, many responses were linked to the fact that the energy sector is highly male dominated. On the other hand, some answers reflected a gender bias or rather certain stereotypes regarding the interests of women and men. For example, three participants (all from TG 1) pointed out that men are genuinely interested in technical issues: "Es sind wohl technikinteressierte Männer, die sich primär mit erneuerbaren Energien beschäftigen" (*Engl.: Those primarily dealing with renewable energies are probably men interested in technology*); "Es gibt geschlechtsspezifische Unterschiede – Technikinteresse/-prägung" (*There are gender-specific differences – regarding technical interest/conditioning*); "Technisches Wissen bei Frauen ist weniger vorhanden – mit dem eAuto wird das aber kommen" (*Women have less technical knowledge – but the eCar will change this*). These opinions were in conflict with some other participants' opinions from both TGs regarding the engagement of women in climate protection: These argued that women engage more often than men in climate justice movements such as Fridays For Future, and that they care more about a sustainable future and hence take on more responsibility to ensuring this.

Regarding (other) minorities or intersectional aspects, participants from TG 1 and TG 2 emphasized that people with a migration background, people with impairments, and young people have less access to information about the energy transition and face more barriers. Language or bureaucratic issues might constitute such barriers, as a participant from TG 2 mentioned: "Möglicherweise fühlen sich Flüchtlinge mit Regelungen, zusätzlichen Abgaben, Steuern, Dokumenten überfordert, je nachdem, was im Zuge der Energiewende von der Regierung auf uns zukommt" (*Engl.: Refugees might feel overwhelmed by regulations, additional fees, taxes, documents, depending on what we have to deal with in the course of the energy transition initiated by the government*). Another participant from TG 1 suggested broadening the scope of action to include people in shelters: "Warum sind Handlungsoptionen bei Flüchtlingsheimen begrenzt? Warum leiten wir nicht zum Mitbauen an? Haben in einer BEG eine Mitmach-AG." (*Engl.: Why is the scope of action limited in refugee homes? Why don't we encourage participation? In one citizen energy cooperative, we have a working group which is open to everyone*). Furthermore, the needs of different minorities should be considered in energy transition projects, and access to information must be provided.

Communication was identified as key to tackle the above-mentioned barriers. For example, women should be specifically addressed in political statements or in general assemblies of energy cooperatives, as one participant highlighted in their contribution to the whiteboard. Using gender-inclusive language would certainly support the goal of having more female representatives, too. On the other hand, women can function as role models – as soon as they hold a leading position in the energy sector, they could encourage other women to participate.

When analysing the whiteboard inputs, one general observation was that some of the participants seem to have already learned about the gender-energy nexus, whereas others questioned the inequality between women and men. 16 responses of both groups stressed that the barriers and benefits of the energy transition are the same for women and men, three of those responses described the energy transition using the term 'gender-neutral'. A direct comparison between the inputs of TG 1 and TG 2 was not possible as TG 1 was responsible for the vast majority of whiteboard inputs. In sum, the whiteboards reflected a broad range of opinions and thoughts about the chances and barriers for different social groups to participate in the energy transition. Nevertheless, the participants touched upon several important aspects of the gender-energy nexus, as demonstrated in the paragraphs above.

5 Discussion

5.1 Discussion of results

The results of the questionnaires show that most of the workshop participants perceive the energy transition initiated by the federal government as unjust regarding one or more categories. In general, this perception is reflected in both target groups as well as in the average ratings of all five statements. However, some distinctions could be identified.

Regarding the first statement, more participants of TG 1 than of TG 2 perceive the energy transition as generally unjust. This could lead to the assumption that members of TG 1 are more aware of the injustices and challenges accompanying the energy transition initiated by the federal government. This assumption cannot be confirmed, however, by the ratings of the other four statements. For example, more members of TG 2 seem to be aware of gender-specific injustices than members of TG 1. It is striking that especially statement 2 about gender shows no clear trend. As already pointed out, out of all the answers to this statement, 24 participants responded on the disagreement spectrum and 24 on the agreement spectrum. This indicates that participants' perceptions of the opportunities and risks associated with gender are widely dispersed. This might be caused by selective perception and unconscious bias shaped by gendered experiences and interests. In addition, the whiteboard contributions dealing with gender equality demonstrated that both groups tend to give similar answers. In both groups, gender expertise seems to vary broadly among participants. Whereas some participants (of both TG 1 and TG 2) identified several challenges and chances for women with regard to their participation in the energy transition, others seemed to be unaware of gender aspects or even echoed gender stereotypes. In fact, most TG 1 participants seem to perceive the energy transition as gender-just or gender-neutral. One possible explanation for this observation is that TG 1 is predominantly made up of men, while the gender ratio in TG 2 is more balanced. Men may be less aware of gender inequalities than women. Energy communities are still a mirror of the wider society – a patriarchal, male-dominated one. Members and agents of energy communities are usually older than 50, cis male and with access to financial and educational resources (Fraune, 2015). In Germany for example, these criteria apply to 80 % of the members of citizen energy projects (Radke, 2016).

Some of the whiteboard contributions – those reflecting the gender knowledge of the participants – correspond to theoretical assumptions made in chapter 2.1. For example, the participants highlighted that women have less access than men to decision-making positions in politics as well as in economics. Also, the underrepresentation of women in STEM subjects, as highlighted especially by TG 1 participants, could explain the high underrepresentation of women in management positions within the energy sector [see again chapter 2.1., section Ib)]. Furthermore, women in the energy industry work mainly in the administrative positions. Some of the whiteboard contributions pointed out that limited financial resources and energy poverty are key barriers that prevent women from actively participating in the energy transition. This is also an aspect mentioned in chapter 2.1., particularly section II). Often women have less access to public infrastructure, or they do not even have the option to choose their energy supply. Hence, they are exposed to centralised and extractivist energy providers and dependent on their offers.

Another striking observation was that the inequalities between different age groups, income groups as well as different educational groups were perceived as more severe than the inequality between women and men. As mentioned before, economic factors were also identified as one of the key aspects in the whiteboard analysis. Besides interlinking economic status to women or gender as one of the structural categories, TG 1 and TG 2 also named other social groups which they fear

could be excluded from energy transition projects. These included people with a migration background or people with impairments. This complies with the results of a recent quantitative study by Karl & Bode (2021), in which 29 participants belonging to an energy community in North Rhine-Westphalia (Germany) were asked in a questionnaire which social groups seem to be underrepresented in their energy community. 23 participants answered that the social groups strongly perceived as underrepresented are people with a migration background (87 %), younger people (65 %), people with physical and mental impairments (61 %), and people with low income (61 %) (Karl & Bode, 2021).

One interpretation of the ratings for statements 3 to 5 is that both TG 1 and TG 2 do not accept the condition of the energy transition initiated by the federal government so far. The planned institutional measures, policies and projects do not seem to address social justice in a sufficient manner. Hence, socio-political acceptance (see chapter 2.3.) has not yet been achieved. At least not in the sense that the general public supports the policies and projects provided by the federal government. According to TG 1 and TG 2 participants, the government would need to take into account the specific needs of low-income households, younger people, as well as people with a migration background.

Although the analysis of the survey or rather the ratings of the five statements focused on the energy transition initiated by the government, hence on a top-down approach, some whiteboard contributions also give an insight into the citizens' perception of bottom-up approaches (see also chapter 2.2.). For example, one participant shared a best-practice example of an energy community by declaring that it has a working group that is open to everyone. Such a working group can be regarded as an example for democratizing citizen energy projects and including distinct social groups. Nevertheless, most citizen energy projects are also not yet fully democratic or gender – or socially – inclusive. A key solution to address these issues, which is applicable to top-down and bottom-up approaches, is strengthening communication as well as education about renewable and sustainable energy projects. Obviously, material and financial barriers need to be reduced as well, but education would lead to knowledge sharing, and empower local citizens to take action with regard to their own energy supply and would consequently lead to democratization of the energy sector. Clear communication about the planned policies of the federal government as well as about the opportunities/access for marginalised groups to actively take part in the energy transition might increase the acceptance of energy transition projects.

5.2 Discussion of methodology

As already mentioned, TG 1 and TG 2 have rather small sample sizes and did not have the same number of participants during the workshops. Therefore, comparisons between the two groups should be interpreted with caution. This applies to the survey results and the whiteboard inputs, for which the number of inputs from each group differed greatly. The open format of the whiteboards allowed for interaction with the participants. With the help of detailed questions, it was possible to make some participants aware of the lack of justice in the energy transition. Additionally, due to the COVID-19 pandemic, all workshops were conducted digitally. This has implications compared to in-person workshops. On the one hand, one advantage of an online workshop is the greater independence of opinions. There are fewer group opinions; instead, individual, broad and controversial opinions are collected, and no classic group dynamics are observed. On the other hand, there are also disadvantages of online formats, such as more fragmentary content, disruptive influences in the discussions, a high absenteeism rate and the lack of nonverbal communication. In addition, familiarity with online communication and certain hardware equipment are prerequisites for participating in such formats.

6 Conclusion

The aim of this paper was to investigate citizens' perceptions of the energy transition initiated by the federal government through the lens of gender and social justice. For this purpose, data were collected in surveys and workshops with two target groups – TG 1 comprising persons already actively participating in the energy transition, and TG 2 made up of persons who have not been active in the energy transition so far.

As already elaborated, there are no crucial differences in the perceptions of these two target groups. One main result was that the energy transition planned by the German government, i.e. in a top-down approach is perceived as generally unjust by both groups. It is noteworthy that gender aspects were not seen as the main drivers of this injustice. Instead, the participants pointed out that specific social groups are not yet considered enough when it comes to energy transition projects. Practical recommendations for the federal government can be derived from the results of this study: The federal government should include an intersectional perspective in their energy policies as well as in acceptance policies and measures. This should increase the approval of energy transition projects by German citizens in terms of accessibility, use of energy services, investments or decision-making processes. To ensure a gender-just and socially-just energy transition, different perspectives must be included, since all social groups influence the energy value chain (in households, local communities, and energy markets).

The participation and representation of different social groups must be encouraged and planned, not only from the governmental side, but also from the civil society side. As mentioned in the discussion, citizen energy projects in Europe are still dominated by white men with financial resources. Diversifying and democratizing citizen energy projects requires acceptance at local level, i.e. at community level, as a precondition. Once citizens are convinced about the potential of such energy projects and mobilised to take part, such citizen energy projects have huge potential to influence energy policies from the bottom up.

Recent developments, such as the war in Ukraine, can be regarded as an additional driver to increase the acceptance of renewable energy projects. The resulting rising prices and predicted shortages for fossil fuel-based energy could lead to a stronger shift towards renewable energies. Furthermore, the war has enhanced the awareness in society of the dangers of dependency on energy/fossil fuels from abroad. This could act as another driver towards locally produced renewable energies and their increased acceptance by society.

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