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Uta Burghard
Barbara Breitschopf
Katharina Wohlfarth
Fabian Müller
Julia Keil

Perception of monetary and non-monetary effects
on the energy transition – results of a mixed
method approach

Executive Summary

When paving the way for steps towards the energy transition, aspects of acceptance and perception of society are relevant and partially crucial to be considered for a successful development. In order to help designing elements that are supported by society, this paper considers monetary and non-monetary effects, from society's perspective, on the energy transition. Starting from a literature review, relevant impacts on micro (effects affecting individuals directly), meso (effects that occur at the energy system level) and macro (effects that individuals consider important for society) levels were differentiated. With these findings in mind, a broad quantitative survey with a sample of 300 participants, as well as online workshops with 55 participants, were conducted to investigate perception and judgement of participation in the energy transition. Whether individuals actively participated or not was differentiated in the analysis. The survey revealed that the dynamics of the energy transition, the environmental effects and the increasing energy costs in financial terms and additional burdens were issues for all participants, while environmental and financial aspects were addressed more often by non-participating individuals.

In parallel, workshops were held to identify perceived effects of the energy transition in an open format. Most participants had a generally positive attitude towards the energy transition or its impacts, while the majority also saw increasing burdens for society. Compared to non-participating individuals, the participating individuals were more critical of the implementation of the energy transition and of economical role players in the process. Renewable energies are seen as an important element, with active participation advocated predominantly by the participating group. Concerning personal impacts, participating individuals mostly voiced political views and were concerned that the transition was not happening fast enough. The non-participating individuals focused more on negative effects or failures of the energy transition e.g., higher energy prices or more regulations. Nevertheless, there was overall agreement on the necessity of the energy transition.

This study showed once again that participation can increase acceptance of the energy transition. Additionally, access to information can increase the willingness of individuals to participate.

Further study of personal values could assist in identifying preferences that affect individual responses to the energy transition. Such information could be used to guide design decisions around future energy transition activities.

Table of contents	page
1 Introduction	1
1.1 Background.....	1
1.2 Objective.....	1
2 Perspectives on the energy transition.....	2
2.1 The energy transition – government’s perspective	2
2.2 Alternative concept of the energy transition.....	3
3 Research approach.....	4
3.1 Literature review	5
3.2 Survey Method	8
3.3 Workshop method	9
3.4 Data analysis of survey and workshop	12
3.4.1 Survey focusing on perceived monetary and non-monetary effects of the energy transition	12
3.4.2 Analysis of workshop data (whiteboards)	13
4 Results	14
4.1 Results of the literature review on perceived effects of the energy transition	14
4.2 Results of the survey.....	16
4.3 Results of the workshops	19
5 Discussion and conclusion	25
5.1 Summary and discussion	25
5.2 Discussion on methodology	26
5.3 Outlook to further research.....	27
5.4 Conclusion	28

6	Literature	30
7	Acknowledgements.....	32
8	Annex	33
8.1	Questionnaire.....	33
8.2	Pre-questionnaire for the recruitment	38
8.3	Workshop guideline.....	47
8.4	Survey results	59

List of Figures

Figure 1: Research approach.....	5
Figure 2: ClickMeeting tool.....	11
Figure 3: Example whiteboard from the workshops (“What do you associate with the energy transition?”)	13
Figure 4: Agreement to the energy transition.....	17
Figure 5: Features and effects of the energy transition.....	19
Figure 6: Participants' associations regarding the energy transition	21
Figure 7: Perception of the effects of the energy transition on a personal level	24

List of Tables

Table 1: Top-down and bottom-up energy transition	4
Table 2: Description of the sample	9
Table 3: Description of the workshop databases	12
Table 4: Overview of answers by categories and sub-categories	59

1 Introduction

1.1 Background

The aim of the energy transition in Germany is the transformation of the nation's energy system into a secure, stable, environmentally-friendly and economically-viable energy supply (BMW 2021b; BMBF 2021). A highly ambitious programme, its goal is to decarbonise the entire energy system by 2045 (BMW 2021a) and it encompasses the phasing out of nuclear energy and fossil fuels, the expansion of renewable energies and the optimisation of energy efficiency.

The origin of the term “energy transition” is not easily traced, and understanding of the term has gone through several revisions. In 1980, the Öko-Institut published a study and applied the term “*Energiewende*”, which then covered many aspects of the energy transition we have today, for example, the phasing out of fossil fuels and nuclear energy (Maubach 2014).

Moreover, scientific discussion on energy transition is not new either (Tyner 1980), and was taking place long before the German government initiated the energy transition. When the term “energy transition” appeared on the political agenda and was coined with the introduction of the EEG in 2000, acceptance and participation in the energy transition was not a political issue (Radtke und Renn 2019, S. 284). However, it soon became clear that energy transition would entail benefits as well as costs for different role players and stakeholders, leading to disputes between various groups (Radtke und Renn 2019, S. 284).

1.2 Objective

The energy transition and the associated costs in the electricity sector have so far been accepted by a broad sector of society (Setton 2019). For a complete transformation of the energy system, however, further investments are needed, which could lead to increasing cost burdens. This, in turn, could jeopardise the broad social acceptance of the energy transition. However, the absolute cost burden is not the only issue of importance. The distribution of that burden, as well as other financial and non-financial (e.g., self-sufficiency) aspects of the energy transition, are also key (Evensen et al. 2018).

It is not only the monetary effects which play a role in acceptance and social (in)equality, however. Other positive and negative factors of the energy transition on societal and individual well-being (Petschow et al. 2018), as well as their distribution between individuals (Evensen et al. 2018; Spiess et al. 2019), are also involved.

Examples include individual effects such as self-sufficiency aspirations, or societal benefits like climate change mitigation. Also featured are factors which impact on public (sustainable energy supply, landscape), and social (social interactions, influence, sense of justice, resilience, health) areas. Which monetary and non-monetary cost-benefit effects are perceived

and which preferences exist for these effects, have not been significantly investigated thus far.

In this paper the perceived monetary and non-monetary effects of the energy transition are elicited analytically and empirically from selected groups of the population. These insights can contribute to an energy transition that receives broad support by society.

The paper is structured as follows: firstly, different perspectives on the energy transition are presented. This is followed by an outline of the research process – a mixed methods approach comprising a literature review, a survey and a workshop study. Results are then detailed and the paper closes with a discussion and conclusion section.

2 Perspectives on the energy transition

Today the term *Energiewende* is used to describe any government measure related to the transition from fossil fuels and nuclear energy, to sustainable energy based on renewables and energy efficiency. However, from a societal perspective, the term could have implications which go beyond government's understanding of the term.

2.1 The energy transition – government's perspective

In 1979 and 1980 two Bundestag Enquete Commissions focussed on climate issues along with secure and sustainable energy supply, introducing this topic to the political domain (Quitow et al. 2016). In this context, the energy transition was understood as the abandonment of nuclear energy and oil as energy sources (Unnerstall 2017). It was to be some time, however, before the federal government took any action that could be construed as the kick-off of the energy transition.

One of the first actions was the approval of the earlier version of the Renewable Energy Feed-in Act in 1990 (Becker 2011). But it wasn't until 2000 that the federal government showed much stronger support of renewable energies through the adoption of the Renewable Energy Sources Act (EEG) and their commitment to the phasing out of nuclear power (Quitow et al. 2016; Becker 2011).

Since then, the federal government has pursued an ambitious course based on energy efficiency first principles: use of renewable energies and sector coupling to leverage flexibility options in the electricity, heat and transport sectors. This entails huge investment in generation, infrastructure, building and industry. The target structure of the energy transition is designed to ensure sustainable, secure and affordable energy supply. Cost-effective solutions are thus favoured, which provide the best levels for integrating renewables into the energy system (BMW 2021b).

To achieve these goals more than 100 documents encompassing strategies, directives, regulations, acts and ordinances have been approved at European and national level. The main instrument in the power sector is the EEG which has undergone multiple revisions. When targeting renewables, the focus has shifted from pure deployment to system integration.

Currently, the federal government pursues low-cost solutions regarding electricity supply and optimal system integration of renewables. To achieve this, it has set up auctions of large wind and solar generation plants, plans the extension of the transmission grid, and promotes flexibility options such as heat pumps, smart meters and buildings, and electric vehicle charging.

2.2 Alternative concept of the energy transition

A great body of scientific literature and research has been conducted to advise policy makers in planning the energy transition, while little attention has been given to proposals of grassroots initiatives and cooperatives (Pellicer-Sifres 2020). Krauz (2016) describes two approaches to energy transition, one directed in a top-down manner and encompassing institutional changes (energy transition from the perspective of the government, see section 2.1), and a bottom-up approach relying on local or grassroots initiatives.

Reinsberger et al. (2015) refers to bottom-up initiatives as social innovations, "which entail civil engagement in energy transition at a local or regional level, and are expected to play a growing role in the governance of local energy systems in Europe." This is in line with other scientific research that states that bottom-up initiatives have gained significance as they have supported and enhanced the top-down, state-based initiatives. Their aim is to further integrate renewable energies into the system and support a democratic decision-making process. Moreover, it considers the energy transition not only as a shift to renewables, but also as a social shift in the energy management and consumption system, which is needed to complement the current top-down strategies (Akizu et al. 2018).

In our study, we account for both perspectives and differentiate between the energy transition perceived from a bottom-up and top-down perspective. Bottom-up and top-down perspectives are understood as depicted in Table 1.

Table 1: Top-down and bottom-up energy transition

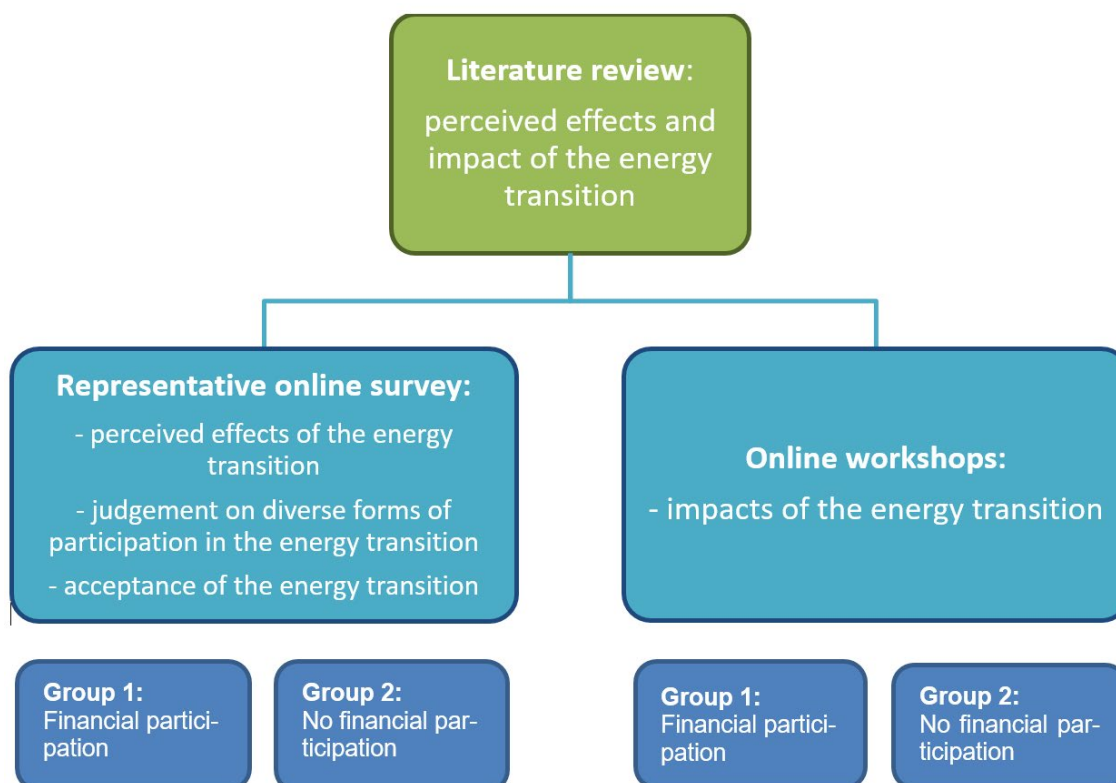
	Top-down	Bottom-up
Initiating / proactive role players	Policy makers and governments at all levels	Individuals and collective initiatives, grassroots initiatives
Roles, functions, and activities	<ul style="list-style-type: none"> • Deciding on strategies and roadmaps • Establishing support instruments (financial incentives) and regulatory frameworks • Providing information and transparency • Conducting monitoring and evaluations 	<ul style="list-style-type: none"> • Demonstration • Early adopters • Innovations (social and technical) • Energy initiatives • Individual or collective participation through investments, memberships, engagements
Level and outreach	European, national, regional	Local and regional

3 Research approach

To get insights into monetary and non-monetary effects that individuals associate with the energy transition, we apply a mixed methods approach (Figure 1): First, we conducted a literature review with respect to perceived effects and impacts of the energy transition. Second, we conducted a survey on perceived effects of the energy transition, evaluation of diverse forms of participation in the energy transition and acceptance of the energy transition. Third, we carried out workshops, in which participants discussed their perception of how the energy transition impacted on them directly, and on society in general.

The two empirical studies were implemented in parallel and contain different participants. In the analysis of the empirical studies, a distinction was made between people who participate financially in the energy transition and those who do not. The approaches are outlined further in the next section.

Figure 1: Research approach



3.1 Literature review

Biresselioglu et al. (2017) conducted a literature review on perceptions and factors driving energy choices and behaviour. They conclude that there is a lack of comprehensive analysis which integrates different perspectives, and is aimed at explaining perceptions and decisions for sustainable energy use, especially in the context of the energy transition. We therefore developed a framework to better depict the results of our literature review on effects of the energy transition.

We conducted a literature review using Google Scholar, Scopus and publications of the European Commission¹. There is a rich body of studies on the impacts of the energy transition, that i) use a certain systematic of impacts and ii) look into various different effects of the energy transition. These studies comprise scientific papers as well as impact assessments of the energy transition commissioned by the European Commission.

¹ For the search we applied the following key words: perception, effect, impact, drivers and "energy transition". The search was conducted in 2020. We collected scientific papers as well as research papers and reports (grey literature). We benefitted from a simultaneously conducted literature review focusing on influencing factors, governing aspects, perception and energy transition.

Systematics of impacts resulting from the energy transition

Regarding the systematics of impacts, economically oriented studies generally distinguish between impacts at the macro level, such as impacts on gross domestic product (GDP) and health and society, and impacts at the energy system level, such as additional costs related to the energy transition. Breitschopf et al. (2016) differentiate effects at three levels: macro, meso and micro.

The micro level encompasses monetary costs and benefits of the energy transition for individuals, i.e., individuals, small and large firms and the public sector, while they consider impacts on the energy system as system or meso-level effects. Impacts on entities at the micro-level comprise aspects of the energy transition that directly affect them. For example, additional financial burdens and expenditures, but also energy and cost savings, secure and reliable energy supply, as well as transaction costs due to the adoption of measures and technologies.

Broad view on effects of the energy transition

Going beyond economic approaches and including additional disciplines, e.g., psychology, sociology, sustainable transitions, management and political science, we broaden our understanding of effects of the energy transition and include non-monetary effects and preferences. Some of these approaches are outlined in the following:

- Steg et al. (2018) distinguish between individual and contextual factors, the latter representing macro- and meso-level effects.
- Burger et al. (2015) bring in a psychological perspective and differentiate the perceived effects of the energy transition into self-centred and altruistic interests.
- Wüstenhagen et al. (2007) differentiate between individual self-centred impacts and societal impacts related to socio-political acceptance², which implies a positive relationship to individual impacts in the presence of an altruistic orientation.
- Selvakkumaran and Ahlgren (2019), coming from sustainability transition research, look at a large variety of factors affecting household energy transitions. They classify these factors into economic, environmental, personal, social, market and policy factors.
- Krikser et al. (2020) look into preferences of households that encompass environmental and economic concerns;

² Differentiation according to Wüstenhagen et al (2007): Socio-political acceptance: acceptance of technologies and policies on a general level; local acceptance: acceptance of local renewable projects; market acceptance: acceptance of investment in renewables or adoption of renewable technologies.

- Karytsas et al. (2019) and Correia et al. (2019) use a classification based on empirics and distinguish socio-economic aspects, environmental and technical aspects, personal well-being but also energy system-related aspects that corresponds to our meso-level classification.
- Sovacool et al. (2020) split effects into four groups that are based on different value bases (altruistic, biospheric, hedonic and egoistic aspects).

Based on these different approaches we have elaborated our research framework, using it to collect and sort the diverse effects of the energy transition discussed in literature.

Research framework

First we use the framework that relies on the macro-, meso- and micro-level approaches (Breitschopf et al. 2016), but we integrate additional research approaches. In doing so, the focus is broadened from the predominantly economic to include non-monetary implications of the energy transition. According to this broad view, we group the micro-level into an "effect spectrum", encompassing all aspects that have an impact on the individual well-being, i.e., factors beyond financial aspects.

The framework for our literature review comprises:

- macro-level: encompasses impacts of the energy transition on society and the economy as a whole. These effects are not directly energy related, but induced or indirectly caused through the energy transition³. They are perceived by individuals as impacts on society, economy and environment, and include socio-economic, social, societal and environmental aspects, without a direct and immediate effect on the individual's own everyday life.
- meso-level: impacts on the energy system, i.e., impacts that are perceived by individuals as impacts on the energy system or their energy-related environment, and not perceived as impacts that directly affect the individual's well-being. Examples are energy security issues, impacts of energy infrastructure, energy services and information and energy culture of the close environment or peers, for example with respect to energy consumption.
- micro-level: aspects that have an impact on individual well-being, comprising personal impacts like comfort and pleasure, feeling needed, social status, energy autonomy, fair burden-sharing, concerns for other people, as well as economic and financial aspects.

³ Induced or indirect: for example: energy savings reduce emissions and thus have an impact on the air and climate, on health and on biodiversity; higher energy prices reduce available income so that consumption declines; high costs of mobility cause personal interactions to decline.

3.2 Survey Method

A survey approach was selected to collect a large body of quantitative data as well as some qualitative data via open questions. The aim was threefold:

1. To understand what effects and features of the energy transition individuals perceive or connect to (e.g., financial benefits, justice, gender inequality).
2. To establish whether there is a correlation between different forms of financial participation in the energy transition and its acceptance.
3. To ascertain whether communication around and discussion of the energy transition has an impact on its acceptance.

The first question – on perceived effects – is addressed in this paper. The other questions will be discussed in forthcoming papers.

Recruitment of the target group

For the recruitment of the survey participants, we commissioned a market research institute. The brief requested a representative pool of individuals with respect to age, gender and education. Located in Baden-Württemberg, about 50% are tenants and 50% property owners. Regarding their financial involvement in the energy transition, 5% are members of an energy cooperative, 16% own small PV or solar modules and 9% hold shares in PV or wind power projects.

These individuals were excluded from participation in the workshops (section 3.3).

Questionnaire and implementation

The questionnaire comprised 12 questions that included sub-questions or statements. The questions covered acceptance issues of the energy transition, different forms of participation in the energy transition as well as potential motivations, perceived impacts of the energy transition and socio-demographic data. The participants were able to use a free text field to state which effects of the energy transition they perceived. The questionnaire is attached in Annex 7.1.

The questionnaire was accessible through an online link from January 20 to February 28 2021. The participants were invited by the market research institute and received an appropriate compensation for their participation.

Survey data base

The survey consisted of 300 participants. To reduce heterogeneity of the sample, the geographic area was restricted to the state of Baden-Württemberg. The sample is representative with respect to age (between 18 and 65), gender, home ownership (residents living in

own dwelling) and income of individuals. The socio-demographic characteristics of the sample and population are outlined in Table 2.

Table 2: Description of the sample

Characteristic	Category	Sample, N=300 (share in %)	Population (share in %)
Gender	Female	49.7	50.3
Age	18-24	12.0	13.0
	25-39	27.8	31.4
	40-65	60.2	55.5
Income (monthly net household)	Up to 2000 €	30.3	32.6
	More than 2000 €	69.7	66.1
Home ownership	Residents in own dwelling	50.0	52.6

Source: own illustration; population data: age – year 2019, distribution of the three age groups among the population between 18 and 65 (Statistisches Landesamt Baden-Württemberg 2019a); gender – year 2019 (Statistisches Landesamt Baden-Württemberg 2019b); income – year 2019 (Statista 2021); home ownership, year 2018, proportion of owner-occupied dwellings in residential buildings (Statistisches Bundesamt 2020)

3.3 Workshop method

A focus group or workshop format – i.e., a qualitative approach consisting of a structured group discussion, which is usually recorded, transcribed and later analysed – was selected. This approach is particularly suitable when many different opinions are sought on a particular topic, with the group process helping participants to form opinions and give each other ideas (Marshall und Rossman 1990; Morgan 2009). Another advantage is that the researchers have the option of reacting flexibly to feedback and can expand explanations if issues are not well understood.

Due to the measures taken to contain the corona pandemic, all workshops were conducted digitally with the tool ClickMeeting. The next sections of this chapter provide more detail about how the workshops were conducted.

Recruitment of the target group

We were interested in how consumers perceive monetary and non-monetary effects of the energy transition, and what role their own engagement in the energy transition plays in this regard. Therefore, the following target groups for the consumer workshops were determined:

1. *Individuals who actively participate in the energy transition* (so-called financial participation, e.g., ownership of a PV system; member of an energy initiative or network;

member of an energy cooperative, such as individual wind or individual solar systems or neighbourhood heating networks): this first group of individuals was recruited through the networks of the project partners in the Accept project (Bündnis Bürgerenergie e.V.). For the recruitment stage, a pre-questionnaire (see Annex 7.2) was used to collect initial information about the level and form of engagement in the energy transition as well as socio-demographic information. In addition, organisational questions were asked, e.g., about the availability of technical equipment and possible workshop dates. Based on this information, the groups were put together and the participants were invited to the workshops.

2. *Individuals who are not (yet) actively involved in the energy transition*: for this second group, finding suitable participants was outsourced to a market research institute, which recruited participants using the screening questionnaire from their contact directory to ensure heterogeneity. The participants of group 2 received an appropriate compensation for their participation in the workshops.

These two groups will be treated separately in the workshops, as it is assumed that they have different levels of knowledge and understanding regarding forms of participation in the energy transition.

Workshop material: discussion guideline

The main aim of the workshops was to collect viewpoints from the participants regarding monetary and non-monetary effects of the energy transition and what role their own engagement in the energy transition plays in this regard. This was done by using whiteboards (i.e., digital boards on which participants can write) and asking closed questions. The whiteboards served as an open format in which participants could freely exchange and develop views, by interacting with each other. In this section, only the whiteboards were analysed.

For the discussion part of the workshop, a standardised guideline (see Annex 7.3) was developed including guiding questions and a list of relevant topics to ensure comparability between the workshops. Firstly, the moderators and the project were introduced and information on procedures and data protection provided.

The first part of the workshop was about *knowledge* and *general perception* of the energy transition. Afterwards, a short introduction to the energy transition in Germany (and how we understand it in the project) was given by the moderators. In the next part of the workshop *perception of the energy transition from individual and societal perspectives* was discussed.

Subsequently, different forms of *participation in the energy transition* were presented to the participants and afterwards discussed. Finally, more closed questions were asked on the overall acceptance of the energy transition, the perception of the justice of the energy transition as well as the willingness to pay. In order to match the survey and workshop questionnaires, each participant was issued a personal code.

In this section, only the results of the first two parts of the workshop, *knowledge* and *general perception* of the energy transition and *perception of the energy transition from individual and societal perspectives* are presented. Additional findings of the workshops are presented in separate papers

Workshop implementation and data preparation

All workshops were conducted digitally using ClickMeeting software, which enables: discussion with participants, delivery of presentations, use of whiteboards and recording of short surveys (Figure 2). All of these functions were utilised in the workshops. The workshops were moderated by one member of the project team. She was supported by two team members who took care of the technical functionality and who moderated the whiteboards and the chats.

Figure 2: ClickMeeting tool



In sum, nine workshops were conducted; six in Group 1, three in Group 2. The workshops took place between December 2 2020 and February 15 2021. Each workshop ran for 1 hour 45 minutes, including 15 minutes of technical checking. However, some workshops lasted up to 30 minutes longer. In each workshop, four to 12 participants took part.

Workshop database

The pre-questionnaire was also used to gather information on the socio-demographic data of the final group. A description of the final sample is given below. In total, 55 individuals participated in the workshops (30 from Group 1, 25 from Group 2). The workshop sample is described in Table 2.

Table 3: Description of the workshop databases

	Group 1	Group 2
Number of participants	30	25
Age	<ul style="list-style-type: none"> • > 60 years: 50% • 40 - 60 years: 47% • 30 - 40 years: 0% • < 30 years: 3% 	<ul style="list-style-type: none"> • > 60 years: 9% • 40 - 60 years: 32% • 30 - 40 years: 18% • < 30 years: 41%
Gender	37% women	45% women
Education	<ul style="list-style-type: none"> • academic education: 77% • secondary school: 11% 	<ul style="list-style-type: none"> • academic education: 41% • vocational training: 23% • secondary school: 36%
Location	Across Germany	Southern Germany
Membership in an energy cooperative/network	83% are members of a civic energy union/network / cooperative	5% are members of a civic energy union/network/ cooperative

Ages in the groups ranged from 19-86 years, women accounted for around a third in Group 1 and nearly half of the participants in Group 2. The majority of participants in Group 1 had university degrees, while in Group 2 a third had completed secondary school and a quarter vocational training, i.e., the level of education was higher in the first group.

3.4 Data analysis of survey and workshop

3.4.1 Survey focusing on perceived monetary and non-monetary effects of the energy transition

To better illustrate the general attitude of the questionnaire participants towards the energy transition, we include in this paper reactions of the interviewees to the statement: "Overall, I think the energy transition initiated by the German government is positive for society."

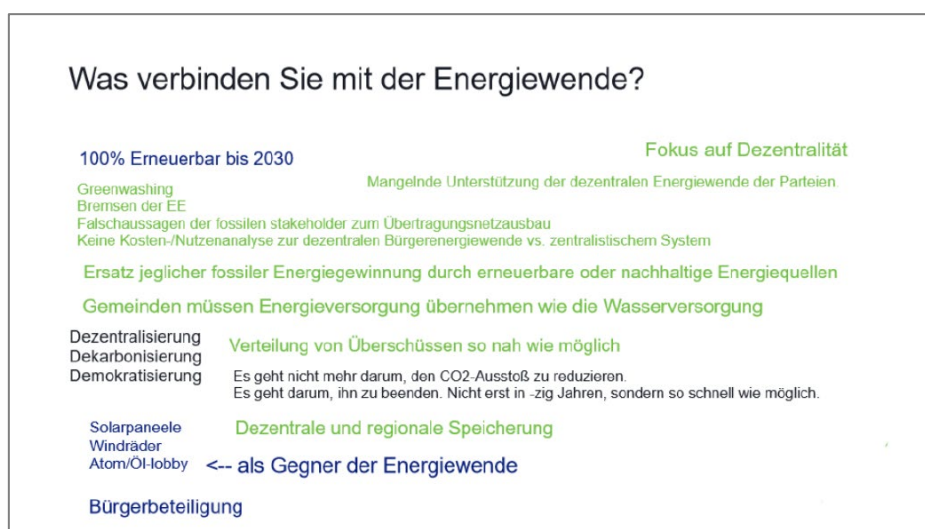
However, the purpose of this paper is to gauge perceptions of the energy transition: what effects or aspects, not yet discussed in literature, are perceived by individuals. For this purpose, we also analysed a question with open answers. This offered the opportunity to gain additional insights into how individuals perceived the energy transition, i.e., what were the effects and impacts they perceived as linked with the energy transition. The question we asked was: when you think about the energy transition, how do you perceive it, what do you think is good and what is not so good?

For the analysis we classify the answers by categories based on the framework outlined in section 3.1 and explained in section 4.2.

3.4.2 Analysis of workshop data (whiteboards)

The whiteboards (see Figure 3 for an example) from the workshops were downloaded from ClickMeeting and all inputs transferred to an Excel spreadsheet. An input is defined as a single word or short sentence contributed by a single participant. Video recordings of the workshops were used to complement the inputs on the basis of participant's oral statements, if necessary. However, the comments or entries have not been assigned to individuals, because our interest is in the opinions of the group and their opinion-forming process, and less so in individual opinions.

Figure 3: Example whiteboard from the workshops (“What do you associate with the energy transition?”)



These inputs were then sorted according to the date of the respective workshop, the respective group, as well as the workshop questions from the guideline. Subsequently, the Excel files were imported into a MAXQDA file and coded. The code system was developed with the help of the workshop guideline.

The respective code frequencies were then analysed, evaluated and presented graphically, with special attention paid to the differences between the two groups.

4 Results

4.1 Results of the literature review on perceived effects of the energy transition

Our research concept aims at identifying potential positive and negative impacts of the energy transition that individuals perceive. As outlined in section 3.1, we apply our framework that differentiates impacts into different levels: effects affecting individuals directly (micro level), and effects that individuals consider important for society (macro level) and accept, as long as there is no significant negative impact on their individual well-being.

Furthermore, we include effects that occur at the energy system level (meso level), which might be positively or negatively perceived by individuals – for example, changes in suppliers, technologies and services. The latter may affect market acceptance, while we understand that the individual level is closely related to local acceptance (individual impacts through local projects) and the macro level to socio-political acceptance (impacts on society, but not directly on own wellbeing). In the following, we give an overview on effects or perceived characteristics of the energy transition discussed in literature (Box 1).

Box 1: Literature review: monetary and non-monetary effects of the energy transition

• micro level

- energy autonomy, decentralised energy supply and thus less dependent e.g., on large suppliers (Knoefel et al. 2018; Aretz et al. 2016; Schumacher et al. 2019; Quénéhervé et al. 2018; Sonnberger und Ruddat 2016)
- comfort provided by energy, atmosphere through heating source or technology (McCollum et al. 2018; Spiess et al. 2019)(Sovacool et al. 2020; Pigliautile et al. 2020)
- status of individuals in society; be part of social environment/societal group (Groh und Möllendorff 2020; Aretz et al. 2016)
- participation-feeling, part of an initiative, a special climate friendly group; feeling needed or important when engaging for change or improvement (Knoefel et al. 2018; Sonnberger und Ruddat 2016; Steg et al. 2015; Mühlemeier und Knöpfle 2016; Setton 2019)
- economic/financial (costs, returns, savings) (Sonnberger und Ruddat 2016; Fraune 2014; Neuhoff et al. 2013 (Andor et al. 2018; Breitschopf et al. 2016; Diekmann et al. 2016a; Diekmann et al. 2016b; Frondel et al. 2015; Knoefel et al. 2018; Mühlemeier und Knöpfle 2016; Neuhoff et al. 2013; Spiess et al. 2019; Setton 2019; McCollum et al. 2018; Local Energy Consulting 2020))
- warm glow – feeling good about environmentally friendly behaviour (Andor et al. 2018; Groh und Möllendorff 2020b; Steg et al. 2015)
- risks (aversion) regarding use of new technologies or investments (McCollum et al. 2018; Setton 2019)
- free-riding vs fair burden-sharing (Groh und Möllendorff 2020a)
- local environment e.g., visual emissions, noise, air pollutants, well-being (Mühlemeier und Knöpfle 2016; Setton 2019; Spiess et al. 2019; Fraune und Knodt 2017; Steg et al. 2015; Sonnberger und Ruddat 2016; Local Energy Consulting

• macro level

- collaboration, participation, collective activity for sustainable transition (Knoefel et al. 2018; Setton 2019; Sonnberger und Ruddat 2016; Groh und Möllendorff 2020; Steg et al. 2015; Mühlemeier und Knöpfle 2016)
- social justice, distribution of costs and benefits of transition (Groh und Möllendorff 2020; Groh und Ziegler 2018; Sonnberger und Ruddat 2016; Steg et al. 2015; Fraune 2014; Neuhoff et al. 2013; International Energy Agency (IEA) 2014; Diekmann et al. 2016b; Frondel et al. 2015; Setton 2019; Spiess et al. 2019)
- human health and well-being (International Energy Agency (IEA) 2014; Sonnberger und Ruddat 2016)
- economic growth, jobs, investments (Lutz et al. 2018; Diekmann et al. 2016b; Petschow et al. 2018; Löckener et al. 2016; Groh und Möllendorff 2020; Sonnberger und Ruddat 2016; Breitschopf et al. 2016; Lutz und Breitschopf 2016; Setton 2019; Fraune 2014)
- environmental aspects: GHG, air pollution, landscape/use, noise, shadows, environmental risks (Setton 2019; Local Energy Consulting 2020; Breitschopf et al. 2016; Diekmann et al. 2016b)
- resource efficiency/savings (Spiess et al. 2019; Sonnberger und Ruddat 2016)

• meso level

- affordable, efficient, competitive energy supply (Steg et al. 2015; Breitschopf et al. 2016; Diekmann et al. 2016a; Diekmann et al. 2016b; Spiess et al. 2019; Lutz et al. 2018a; Lutz et al. 2018b; Sonnberger und Ruddat 2016; Frondel et al. 2015; Setton 2019; Petschow et al. 2018; Lutz und Breitschopf 2016)
- secure, reliable, independent energy supply (Groh und Möllendorff 2020; Breitschopf et al. 2016; Diekmann et al. 2016b; Lutz et al. 2018a; Sonnberger und Ruddat 2016; Steg et al. 2015)
- sustainable energy supply (Breitschopf et al. 2016; Diekmann et al. 2016b; Petschow et al. 2018; Setton 2019; Spiess et al. 2019; Steg et al. 2015; Lutz und Breitschopf 2016; Groh und Möllendorff 2020)

Overall, there is a large variety of effects covered by the literature, and a clear delineation between the levels is challenging, as the context in which the effects are discussed is important. Nevertheless, we see clear effects that can be assigned to the different energy system levels, for example, impacts of the energy transition on infrastructure, suppliers and technologies.

These impacts could entail changes in the security, reliability, independence and efficiency of the energy system, which in turn bring changes in competitiveness and affordability of certain services. The latter may directly affect individuals' self-interest (micro level). Impacts on the macro level such as environmental or distributional effects, however, may also directly impact individuals' well-being if these effects are part of their utility. However, for this study, we only include environmental impacts at the micro-level, if the perceived environmental effect is clearly local.

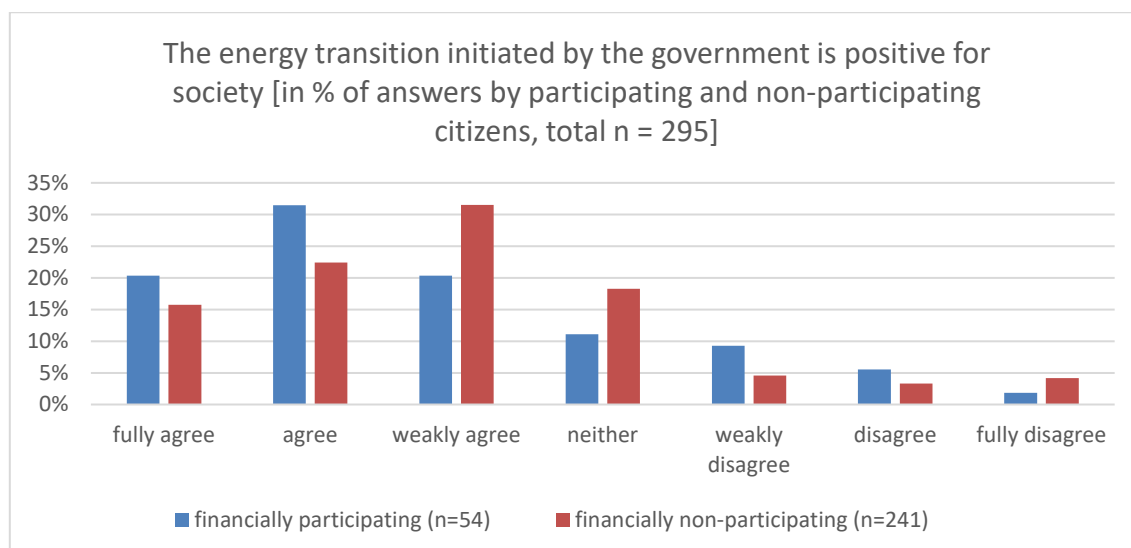
4.2 Results of the survey

For the purpose of analysis, the participants of the survey have been divided into two groups, those that financially participate and those that do not participate in the energy transition (non-participating). We define financial participation as either having a small PV plant, wind power plant or solar module, and/or holding shares in a wind or solar-PV park or energy cooperative (participating), while those not financially participating have none of the above.

To get a better understanding of the group's perception regarding the energy transition, we asked them how they perceived the energy transition initiated by the German government.⁴ The question and results are depicted in Figure 4. In general, the energy transition is perceived as positive for society by most of the respondents. We do, however, see stronger agreement with the energy transition for those financially participating.

⁴ The exact question was: "Do you agree that the energy transition initiated by the government is positive for society?"

Figure 4: Agreement to the energy transition



Regarding the main purpose of this study, we analyse the free text given by the participants in the following open question: 'When you think about the energy transition, how do you perceive it, what do you think is good and what is not so good?' The answers regarding the perceived effects of the energy transition are clustered in four main categories and in 16 sub-categories (see Annex 7.1, Table 3).

The first category 'general perception of the energy transition' comprises the general attitude of the interviewees towards the energy transition or towards renewable technologies. The second category summarises all statements referring to the implementation of the energy transition. The third comprises impacts perceived by interviewees at the macro and meso levels and the last category displays the financial impacts perceived at the micro level.

Figure 5 illustrates the perceptions by sub-categories. The actual evaluation of these perceptions, i.e., whether they are considered as positive, negative etc., is displayed in Annex 7.4, Table 4. Of 300 questionnaire participants, 182 answered this question, of which 19% are classified as financially participating in the energy transition.

In general, the majority of the participants address the dynamics of the energy transition, the environmental effects and the increasing energy costs in terms of finance and in terms of additional burdens (probably including non-monetary aspects⁵) that individuals relate with the energy transition.

When differentiating between individuals financially participating and individuals not participating (see Figure 5), we find that environmental issues are more often addressed by non-participating individuals. In addition, it seems that the financial aspects (costs or additional

⁵ Burdens are not further specified or explained in the text fields; we thus keep this differentiation and understand the term in a broader sense.

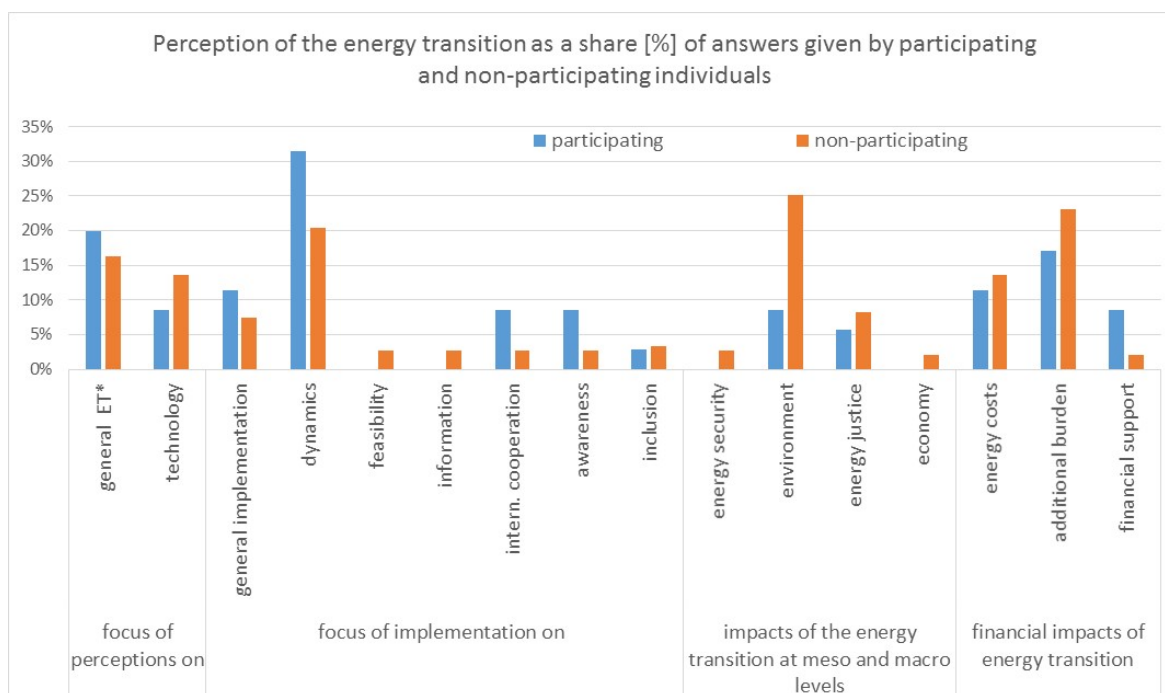
burdens) are primarily perceived by non-participating individuals as well. In contrast, the dynamics of the energy transition are mentioned more often by those that financially participate, however, this topic is also seen as rather important by those not financially participating.

When looking at the individual evaluations, i.e., their positive or negative perception of the energy transition, its implementation and its impacts (Annex 7.4, Table 4), we see that out of 182 persons who answered this question:

- 23 displayed a positive attitude towards the energy transition.
- 13 considered the technologies (e.g., wind onshore) deployed in the context of the energy transition as critical, while 10 considered them as supportive for the energy transition.
- 38 considered the implementation of the energy transition as too slow, and only three as too fast.
- 35 perceived a positive impact of the energy transition on the environment, while 5 perceived negative impact.
- 40 perceived increasing burdens for individuals, and 21 increasing energy costs for all.

Few respondents even addressed the impacts of renewable energies on energy security issues (meso level) or the economy (macro level).

Figure 5: Features and effects of the energy transition



Note: financially participating = persons that are financially engaged in energy transition projects, i.e., persons having a small PV plant, wind power plant or solar module or holding shares in a wind or solar PV park or energy cooperative; financially non-participating = persons that are not financially engaged, i.e., not holding a share or having a small plant. * ET= energy transition

4.3 Results of the workshops

In this section, the whiteboard inputs for the following workshop guideline questions are analysed to survey perceived effects of the energy transition:

1. What do you associate with the energy transition?
2. How do you perceive the energy transition with respect to personal impacts? What does the energy transition mean for you personally?

1. Associations with the energy transition

For the first question (Figure 6), a general advocacy or positive perception of the energy transition (macro level) was found in Group 1 only – individuals who actively participate in the energy transition (14% of the expressed associations in Group 1 were coded as supporting statements). Examples of such favourable associations are “sensible investment”, “opportunities for people and the economy”, “urgently needed” and “essential for climate protection”.

At the same time, critical perspectives on the implementation of the energy transition (macro level) were also raised almost exclusively in Group 1 (11% in Group 1 vs. 2% in Group 2).

Examples of such statements are: “takes a long time”; “is blocked far too much”, “policy without vision”, “Altmeier/EEG2021 must go”.

Furthermore, criticism of economic entities and their handling of the energy transition was also expressed in Group 1 only. This criticism was expressed within the category as “Economic entities are viewed as obstacles”. Examples of such statements are: “Large corporations shouldn’t interfere in politics”, “Energy transition without corporations” and “Nuclear/Oil Lobby as opponents of the energy transition”.

Group 2 – individuals who are not actively participating in the energy transition. This group expressed less, to no criticism of the implementation of the energy transition, but more general concerns caused by their worries about a possible increase of energy prices (meso and micro level). These whiteboard entries, however, constituted a minor category within this group (1% of the whiteboard entries in Group 1 vs 5% in Group 2). These statements were collected with the category: “Concerns due to rising costs”, “Fear of rising energy prices”, “High costs”, “Energy price increase”.

Besides this category, no associations with general implications of the energy transitions were given in Group 2. These associations were stated at high levels in Group 1, e.g., “Energy transition as a societal challenge” (2% in Group 1 vs 0% in Group 2) and “Examples of energy transitional policies” (14% vs 5%) (this category consisted of both desired and already existing policy measures).

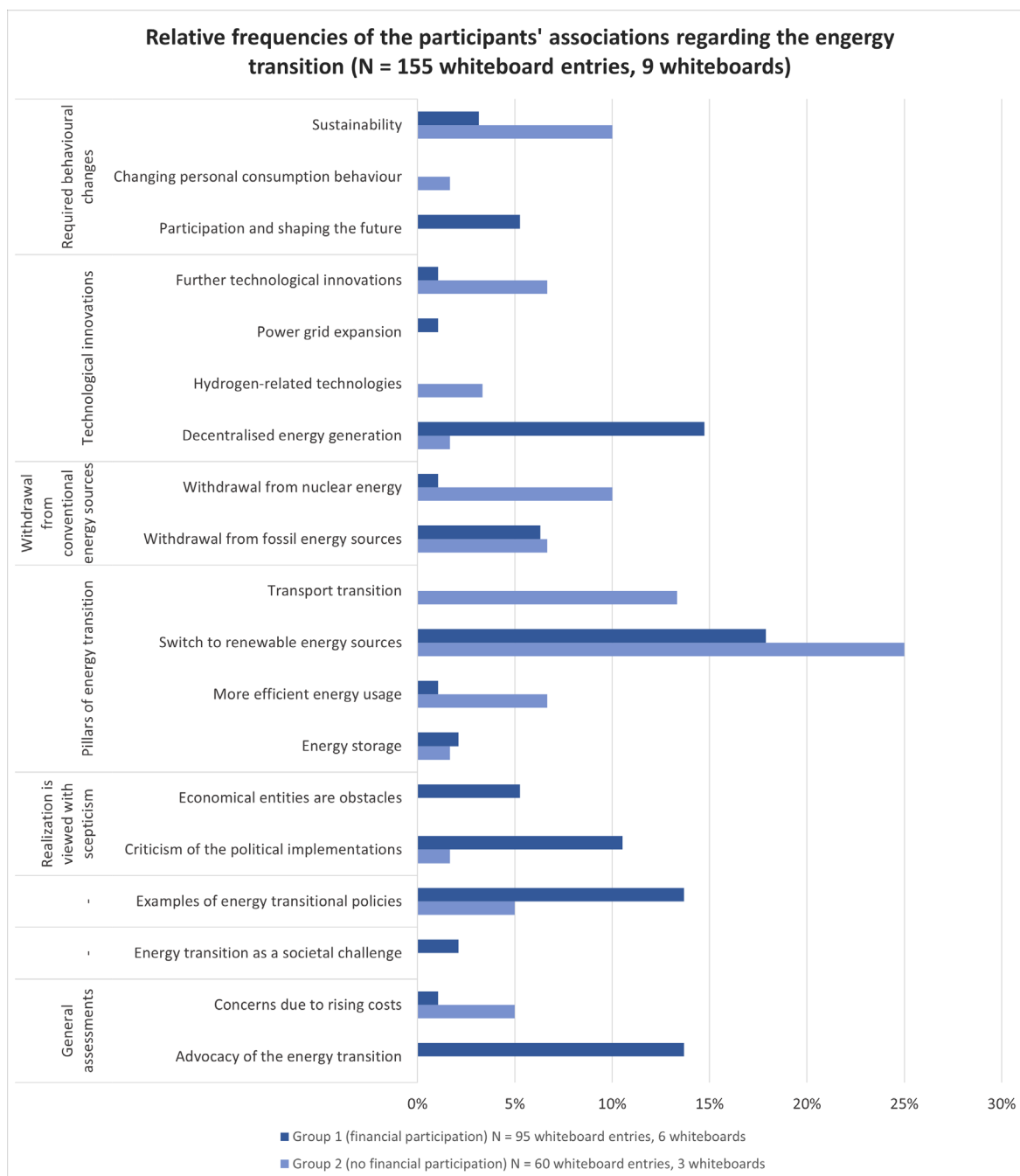
On the first whiteboard, both groups gave numerous examples of implementation possibilities for the energy transition and of their suggested requirements: “Renewable energy” was the category with the largest relative frequency in both groups (18% of the whiteboard entries in Group 1 and 25% in Group 2). The other three “pillars of the energy transition” were unequally spread between the groups. Surprisingly, no member of Group 1 expressed any associations which included the transport transition as a significant part of the energy transition, whereas 13% of the associations of Group 2 related to it.

The “Withdrawal from conventional energy sources”, i.e., fossil fuel and nuclear, played a major role within both groups. A cumulative 7% of the associations in Group 1 and 10% of Group 2 were collected within this category.

Further “Technological innovations” were listed in both groups. Interestingly, associations with the concept of a decentralised or bottom-up energy transition were recorded almost exclusively in Group 1 (15% vs 2%). These associations can moreover be linked to the already mentioned criticism of the current energy transition implementations, as they follow a top-down approach and therefore an opposed concept of energy supply (“Lack of support for the decentralised energy transition by the political parties”, “We need a massive expansion of wind, solar, biomass ... (renewables) and electricity storage – with decentralised distribution. No new transmission lines, but a decentralised minimum distribution network”).

Associations regarding the “Required behavioural changes” (micro level) for a successful energy transition were also spread unequally between the two groups (8% in Group 1 vs 7% in Group 2). Not surprisingly, Group 1 stated the possibilities of “Participation and shaping the future” (5% vs 0%) the most. Associations regarding a more sustainable lifestyle (i.e., “also using energy more sensibly privately”) were given in both groups, but with a major frequency in Group 2 (3% vs 10%).

Figure 6: Participants' associations regarding the energy transition



Note: N = number of whiteboard entries

2. Perception of the energy transition with respect to personal impacts (micro level)

Whiteboard results for the second question are presented below. The majority of both groups' participants, especially those of Group 1 (individuals who actively participate in the energy transition), gave statements which expressed their political views (46% of the whiteboard entries in Group 1 vs 11% in Group 2).

In accordance with their previously stated associations, Group 1 expressed personal views that mainly gave "Criticism of the political implementations". This category was by far the most expressed personal view in Group 1 (25% vs 0%). Examples for these statements are: "often frustrating, because of political blocks", "Federal Government ONLY BLOCKS", "Idea is very good, but lobbies for fossil energies and gas still too strong", "Lobbyism urgently needs to be put in its place".

On the contrary, Group 2's (individuals who are not actively participating in the energy transition) most popular personal view, which is also subordinated within "Political views", expresses a "Negative assessment of the energy transition due to its restricting impacts" (0% of the whiteboard entries in Group 1 vs 17% in Group 2), i.e., "high energy prices", "higher costs", "many new regulations", "restrictions due to ban of certain diesel cars in Stuttgart".

The frequency of Group 2's statements expressing positive assessments of the energy transition was much lower than in Group 1 ("Energy transition comes with benefits for all": 14% vs 6%). However, both groups shared a general scepticism and indecisiveness on the successful implications of the energy transition, as the category "Successful implementations of the energy transition uncertain" is shared equally within both groups (7% vs 8%).

These views are founded in the complexity of the energy transition ("Large topic with many details, therefore many different opinions/feelings, this cannot be generalised", "very ambiguous") and its challenging character ("personal and political challenge", "I see the personal room for action as limited", "Motivation to continue participating often difficult").

"Technical issues" are mentioned at high levels by Group 1, which can be explained by their broader knowledge (15% in Group 1 vs 2% in Group 2). The repeatedly expressed desire for a "Decentralised energy supply" by Group 1 can be observed again (7% vs 0%) ("Distribution of renewable energies on earth is decentralised, therefore consumption should also be").

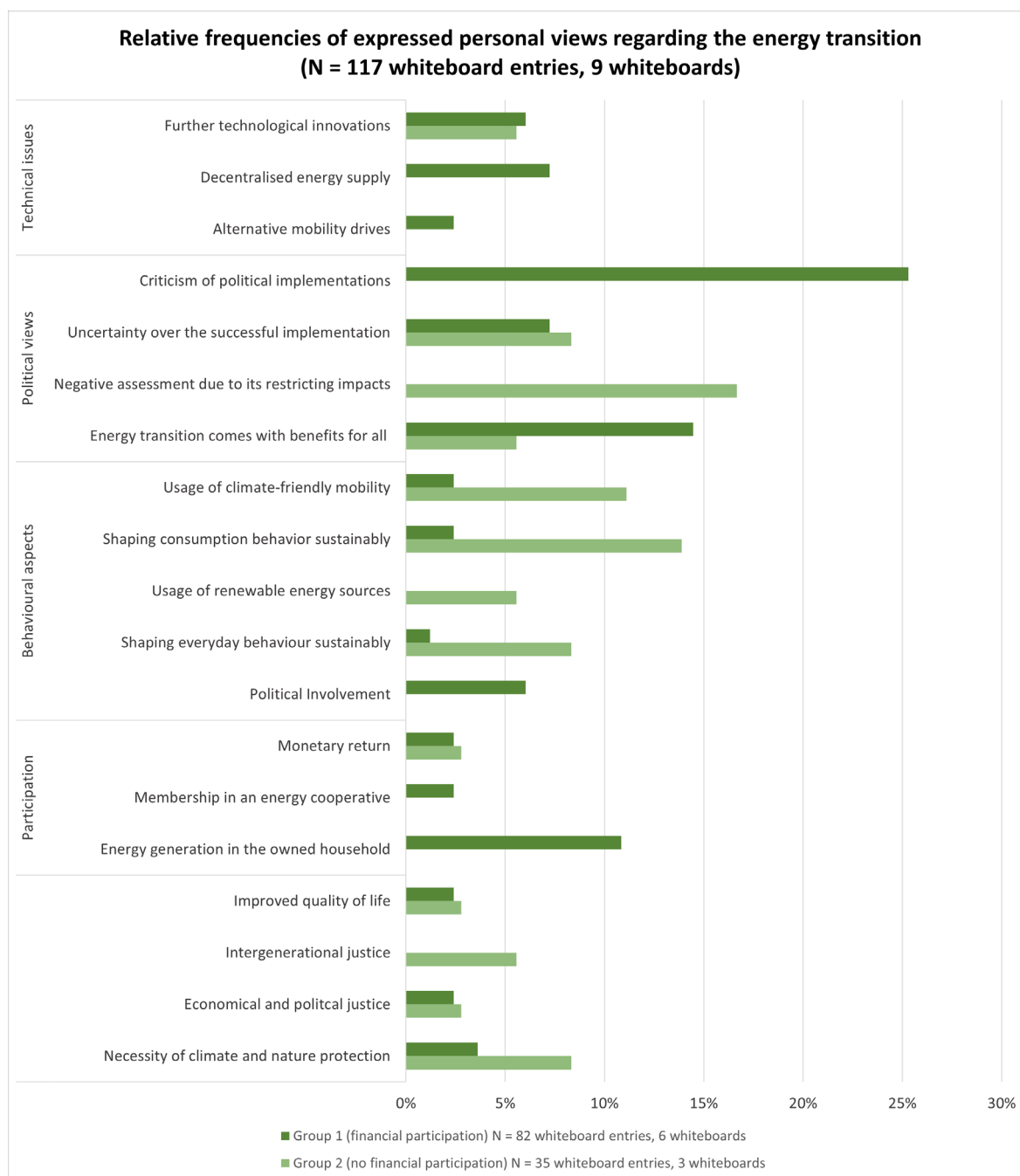
Another worthy insight is the high number of personal views provided regarding "behavioural aspects" in Group 2 (11% in Group 1 vs 39% in Group 2). These concerned for instance the "Usage of climate-friendly mobility" (2% vs 11%) or the willingness to "Shape consumption behaviour sustainably" (2% vs 14%). The low frequency of these statements in Group 1 can be firstly explained by the already existing behavioural differences between

the groups and secondly by an overall agreement on the necessity of the energy transition within both groups. Further interpretations are discussed below (see 5.2).

The overall agreement on the necessity of the energy transition can be further proven with the category “Necessity of climate and nature protection” (4% vs 8%) which is distributed within both groups relatively equally. Example statements in this category are: “avoid high consequential costs of the fossil economy”, “preserve biodiversity”, “stabilise the climate, stop climate change”. Furthermore, statements in the categories “Economical and political justice” (2% vs 3%), “Intergenerational justice” (0% vs 6%) and “Improved quality of life” (2% vs 3%) all show a general approval of the energy transition, as it is linked with different concepts of morality and justice. Example statements in these categories are: “Saving the climate for younger generations”, “Only benefit is the improvement of quality of life (Deceleration, health)”.

Lastly, “Participation” represents the last group of expressed personal views. These statements feature: “Monetary return” (2% vs 1%), “Membership in an energy cooperative” (2% vs 0%) and “Energy generation in the owned household” (11% vs 0%). Unsurprisingly, Group 1 dominates this category, as financial participation is its constituting characteristic (Figure 7).

Figure 7: Perception of the effects of the energy transition on a personal level



Note: N = number of answers on the whiteboard

5 Discussion and conclusion

5.1 Summary and discussion

The aim of this paper is to get a broader understanding of how the effects of the energy transition are perceived by individuals. For this reason, we conducted a survey and workshops with different target groups and selection processes. One focus of the workshops and survey was how individuals perceive the energy transition, i.e., which effect or features do they notice. Before beginning with the empirical work, we conducted a literature review on papers dealing with impacts, preferences and perceptions of individuals with regard to the energy transition.

We grouped the effects of the energy transition discussed in literature into three categories (micro, meso and macro level) and used this classification as a framework for further analysis. The results of the empirical studies (survey and workshop) support the insights delivered by the literature review regarding perceived effects. In general, the energy transition is perceived positively – especially among those who participate financially.

Furthermore, the empirical studies showed that individuals have a broad, system-based perception of the energy transition. They comprehend energy transition in a broader context including technological aspects, use of natural resources for renewable energy, integration of sectors (heat, mobility, electricity) and international cooperation.

Overall, the findings of the survey underline that the impact of the energy transition on the environment is perceived as a relatively dominant effect, while other macro- or meso-level issues are mentioned less frequently.

Financial aspects with respect to personal impact were mentioned frequently, while impacts on society less frequently. The implementation of the energy transition is a positively perceived topic; for many – in particular those who participate in the energy transition – the process is too slow. This was found in the survey as well as in the workshops.

Furthermore, the survey results reveal that those who are not yet financially participating in the energy transition tend to align the energy transition more with environmental issues than participating individuals. This is surprising, because we assumed that individuals who financially participate in the energy transition would have a stronger awareness and understanding and, thus, might share more environmentally-oriented values than non-participants.

This assumption on understanding of the energy transition is supported by the high number of criticisms regarding its dynamics by participating individuals. The observed replies of non-participating individuals regarding environmental issues could be explained by their tendency to give answers that comply with “socially desirability” (DeMaio 1985).

Regarding the workshops, most of the participants associate the energy transition with a switch to renewable energy sources. Group 1 – those who participate in the energy transition – perceived societal benefits of energy transition more often than Group 2. This was also found in the survey.

However, it is also apparent that the term, energy transition, can be understood in different ways. Energy transition can be understood on the one hand as the *Energiewende* pursued by the German government. On the other hand, energy transition can also mean the concept of a strong decentralised energy supply (bottom-up). We noticed that those who are already engaged in the energy transition distinguish between these concepts, and are in favour of a decentralised energy transition. In addition, these participants have a critical view on the current implementation of the energy transition by the German government.

The workshops and the survey also revealed that those individuals who are not actively participating in the energy transition are more critical towards potential negative impacts of the energy transition, e.g., high energy prices or car bans in cities. This does not apply or applies less often for those who participate in the energy transition.

Rising costs is a common narrative around the energy transition in the media and workshop participants who are not involved in the energy transition try to behave more sustainably in their everyday lives and consumption. This is less of an issue for those who are already involved in the energy transition. It may be that this group takes it for granted and therefore don't mention it or rebound its effects, or moral licensing might play a role (Dütschke et al. 2018).

5.2 Discussion on methodology

The two groups in the survey – individuals financially participating and those not participating in the energy transition – are very different in size. That is, group comparisons are to be interpreted with reservation. Furthermore, one participant's answers might be assigned to several categories, as these are open answers, i.e., the categories are not selective.

Finally, the survey design does not focus not on collecting a wide range of perceived features of the energy transition, but on understanding the link between financial participation and support of the energy transition by individuals. As a result, we look at one question of the survey that explicitly picks up the monetary and non-monetary effects, but the main analysis in this paper comprises the literature review and workshops.

Due to the measures taken to contain the corona pandemic, all workshops were conducted digitally. This has some implications when compared to face-to-face workshops: the advantage of such an approach is greater independence of opinion. Fewer group opinions, but rather individual, broad and controversial opinions are collected, and no classic group dynamics are observed.

Individual statements are weighted more uniformly (Lamnek und Krell 2016). On the other hand, there are also disadvantages of such formats: more fragmentary content, disruptive influences in the discussions, high absenteeism rate and a lack of nonverbal communication. In addition, a familiarity with online communication and certain hardware equipment is a prerequisite for participating in such formats.

5.3 Outlook to further research

To better understand the reasons behind the acceptance or refusal of the energy transition, we suggest further investigation into individual preferences that are triggered by values and beliefs. Applying Sovacool et al. (2020)'s approach on barriers, we expanded the micro level by four value bases.

Each individual assigns different weights to these value bases and perception of the energy transition can be connected with some of these values. Therefore, the perceived effects of the energy transition will impact the wellbeing of individuals in relation to their weighting of values, and finally drive individuals' preferences for the way the energy transition should take place. The value bases (see Burger et al. (2015), Sovacool et al. (2020)) are:

- Self-centred interests
 - egoistic values make you better off:
 - personal benefits: social power, autarchy/autonomy, authority and influence on others
 - financial aspects: monetary return, cost savings, risk exposure, increase in wealth
 - hedonic values give one comfort or happiness:
 - the pleasure of joining or belonging to a group, the enjoyment of comfortable space and atmosphere, showing-off a new technology, being part of a new initiative or movement
 - enjoy life, avoid personal efforts, low transactions needed for energy transition, avoid changes in routines or habits, avoid local environmental impacts affecting individual's wellbeing directly such as noise, air or light pollution
 - self-gratification, taking part in social events, getting social recognition
- Society-centred interests
 - Altruistic values, like striving for peace, justice and helpfulness that are rooted in helping others:
 - economic effects for others such as income or employment,
 - social aspects such as fair energy prices or fair burden sharing of the energy transition

- intergenerational issues,
- Biospheric orientation is focused on respecting and helping the earth: all effects of the energy transition on nature have an impact on the individual's wellbeing, for example the death of birds due to wind parks, impact of climate change

These value bases can serve as a structure for identifying different, individual preference sets for the design of the energy transition. This will be a topic for upcoming studies.

Group 1 from the workshops is a special group in that many are not only financially but also politically committed to the energy transition. This is mainly due to the fact that this group was recruited from the networks of the project partners (Bündnis Bürgerenergie).

In addition, the objective of the workshops may have particularly appealed to people who are also interested in discussing the political implementation of the energy transition. Furthermore, this group is also more homogeneous than Group 2 from a socio-demographic point of view: mostly male, high level of education, older.

5.4 Conclusion

This study addresses the question of perceived effects and impacts of the energy transition. Although the energy transition is still strongly associated by many with the electricity transition, some think beyond this. These individuals would include the heating and mobility sectors, as well as self-supply and imports – they understand the need for sector coupling as well as recognising the associated challenges.

This shows that some people already have a systemic understanding of the energy transition and can connect different facets of energy consumption with it, such as the need for international partnerships to ensure supply of “green” energy. This broader or systemic understanding of the energy transition is important for the acceptance of different transformations within the energy sector.

But there are also differences between non-participants and participants: Participants perceive the benefits of an energy transition more strongly, while non-participants perceive the presumed burdens more strongly. This illustrates that, as studies also show, participation can increase acceptance for the energy transition. Here, however, it is not always clear what is cause and what is effect.

But before it comes to participation, knowledge must be shared: our results show that non-participants hardly associate financial participation with the energy transition. Thus, it is important to educate society as a whole regarding the possibilities of participation in the energy transition.

The question of how decentralised energy transition will develop in the future is also open to debate. Those workshop participants already financially involved, strongly support the idea of a bottom-up energy transition. In contrast, non-financially involved participants have

a different or less clear picture of a decentralised energy transition. And it remains unclear whether the support of this group for the energy transition would increase, if it was more of a “bottom-up” process. Finally, the question here is also whether this concept will be promoted more strongly in the future politically, as if not, acceptance among this group for the energy transition will be at risk.

6 Literature

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8 Annex

8.1 Questionnaire

Dear Respondent,

The German government launched the Energiewende (energy transition) in the course of its climate protection efforts. This encompasses the long-term transformation to 100% renewable energies (such as solar energy, wind energy and biomass), the phase-out of fossil energy and nuclear power, saving energy and increasing energy efficiency. People have different perceptions and opinions of the energy transition that we are interested in collecting.

The survey takes about 15-20 minutes

[Data privacy declaration: here]

All semi-mandatory except No. 10

1. Do you agree with the following statements?

	Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree completely
We need to switch to renewable energies (e.g., use of solar energy, wind energy, biomass).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I think the energy transition initiated by the German government is positive for society.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Assume that electricity prices increase due to the energy transition and that you currently pay around 6 euros per month for your fridge's electricity consumption. Would you be prepared to pay more than these 6 euros per month to support the expansion of renewable energies initiated by the German government?

No

Yes, I would be prepared to pay ___ euros in total.

3. What distance to your home (in meters) would be just acceptable to you for the construction ...

...of a wind farm in which you cannot participate financially (legally stipulated distance varies, but is at least 400 meters) / open question, answer in meters

...of a wind farm in which you can participate financially (legally stipulated distance varies, but is at least 400 meters) / open question, answer in meters

...a solar park in which you cannot participate financially (no legally stipulated distance) /open question, answer in meters

...a solar park in which you can participate financially (no legally stipulated distance) /open question, answer in meters

...an ultra-high voltage power line (overhead line, legally stipulated distance varies, but is at least 200 meters) / open question, answer in meters

4. There are different ways to get actively involved in the energy transition. Please select those that apply to you.

	Yes, applies.	No, does not apply.	No, but I would like to in the future.	
4a) I am part of a working group on the energy transition on a voluntary basis (e.g., in an energy cooperative, an energy alliance or an initiative supporting the energy transition).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4b) I am financially involved in an energy cooperative or a wind farm or a solar park (photovoltaic or solar thermal).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	*If yes, roughly how much have you invested? – in euro
4c) I own a photovoltaic system or a micro wind turbine or a balcony solar module and/or a battery for storing power.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	*If yes, roughly how much have you invested? – in euro
4d) I own a solar thermal system, or a CHP system or a heat pump or a pellet/wood-burner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	* If yes, roughly how much have you invested? – in euro
4e) I use green electricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4f) I try to save energy in my daily routines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4g) When buying new household and electric appliances, it is important to me that these have low electricity consumption.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

5. Are there any reasons for you not being actively involved in the energy transition?

No

Yes, that... (multiple answers possible)

- ... I am not interested in it.
- ... I don't have the time.
- ... I don't feel supported by the legal framework conditions.
- ... I don't think this is important.
- ... I don't have the money for it.
- ... I don't have any information about what I could do.

FILTER: Only display the following two questions (6 and 7) if at least one of the questions 4b), 4c), 4d) was answered with YES (i.e., the person has invested in renewable energy)

6. There are many different reasons for investing your own capital or a loan in renewable energies or energy transition technologies. Which of the following applies to you?

	Does not apply at all	Does not apply	Does not really apply	Neither nor	Applies to some extent	Does apply	Applies completely
I wanted to be more independent in terms of my energy supply.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My personal environment (family, friends, acquaintances) approved.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I wanted to contribute to the success of the energy transition	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I assumed it would be worth it financially	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I wanted to do my bit to protect the environment and the climate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Do you agree with the following statements?

By investing in renewable energy ...

	Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree completely
...I feel I can profit from the energy transition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...has not changed my perception/attitude towards the energy transition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...I feel part of the energy transition, or that I am participating in it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...my knowledge about the energy transition has increased.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FILTER END: from here on, the questions address everyone again

8. Do you agree with the following statements (regarding "Energy transition initiated by the German government")?

	Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree completely
Overall, the energy transition has more positive than negative impacts on me personally.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, the advantages and disadvantages of the energy transition are distributed fairly across individual individuals.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I feel insufficiently informed about the benefits and drawbacks of the energy transition.

I think it positive that people have the chance to participate financially in the energy transition, e.g., through their own solar panels or by investing in a wind farm.

I think it unfair that only some people can participate financially in the energy transition and others can't.

9. In your opinion, should the energy transition be structured differently than planned by the German government?

Yes*/ No/ Don't know

*If yes, can you briefly outline what you think should be different? *Open question*

10. When you think about the energy transition, how do you perceive it, what do you think is good and what is not so good? --> *voluntary question*

Open question

11. Now there are a few questions about you as a person.

Your gender male female other

Your age _____

What is your highest completed level of education?

No school-leaving qualification

Primary or secondary school

Secondary education certificate

General qualification for university entrance or UAS

Completed vocational training

University

Academic degree

Other:

What mainly applies to you?

I am employed (incl. trainees, those on parental leave or semi-retired)

I am at school

I am a student

I am retired

I am a housewife /houseman/or a carer for children and/or other dependants

I am unemployed

None of the options mentioned

What is your current housing situation?	Own house <input type="checkbox"/>	Own apartment <input type="checkbox"/>	Rented house <input type="checkbox"/>	Rented apartment <input type="checkbox"/>	Other _____	
How large is your household?	Single person household <input type="checkbox"/>	With partner <input type="checkbox"/>	With partner and child/ren <input type="checkbox"/>	Single with child/ren <input type="checkbox"/>	Shared housing <input type="checkbox"/>	Other _____
How high was your household's total net income last month?	No information <input type="checkbox"/>	Less than/equal to 1,000 euro <input type="checkbox"/>	1,001 to 2,000 euro <input type="checkbox"/>	2,001 to 3,000 euro <input type="checkbox"/>	3,001 to 4000 euro <input type="checkbox"/>	4,001 to 7,000 euro <input type="checkbox"/>
In the area where you live (within a radius of about 5km), is there	yes		no		don't know	
....						
...a wind farm?	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
...a solar park?	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
...an ultra-high voltage overhead line?	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	

Thanks for taking part!

2. I feel that the way the energy transition's impacts are distributed across individual individuals is...

Very fair	Fair	Rather fair	Neither nor	Rather un- fair	Unfair	Very un- fair
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.

3a) FILTER QUESTION: Can you imagine personal impacts of the energy transition that you don't think are so good? YES/NO

3b) *FILTER: IF yes to 3a): Would you be willing to accept personal impacts that you don't think are so good?

Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree com- pletely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.

4a The energy transition can lead to cheaper or more expensive electricity prices. Which electricity price development do you expect in the next 5 to 10 years?

Much more ex- pensive	More expen- sive	Rather expen- sive	Neither nor	Rather cheaper	Cheaper	Much cheaper
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4b Assume that electricity prices increase due to the energy transition and that you currently pay around 6 euros per month for your fridge's electricity consumption. Would you be prepared to pay more than these 6 euros per month to support the energy transition (expansion of renewable energies)? – answer in euros

5. Which distance to your home (in meters) would be just acceptable to you for the construction ...

... of a wind farm in which you cannot participate financially (legally stipulated distance varies, but is at least 400 meters) / open question, answer in meters

... of a wind farm in which you can participate financially (legally stipulated distance varies, but is at least 400 meters) / open question, answer in meters

... a solar park in which you cannot participate financially (no legally stipulated distance) /open question, answer in meters

... a solar park in which you can participate financially (no legally stipulated distance) /open question, answer in meters

... an ultra-high voltage power line (overhead line, legally stipulated distance varies, but is at least 200 meters) / open question, answer in meters

7b) I cannot imagine getting actively involved in the energy transition, because ... (multiple answers possible)

- ... I am not interested
- ... I don't have time
- ... I don't feel supported by the legal framework conditions
- ... I don't think it's important
- ... I don't have the money to do so
- ... I don't have any information about what I could do.
- ... my acquaintances, friends, neighbors don't support the energy transition

8. There are many different ways to get involved in the energy transition. Some examples are listed below. We would like to know which apply to you.

Block A	Yes	No	Don't know
Are you regularly active in a working group on the energy transition (e.g., an energy cooperative, an energy alliance or an initiative supporting the energy transition)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you ever taken part in a demo for the energy transition or for climate protection?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Don't know <input type="checkbox"/>
 Block B			
	Yes	No	Don't know
Do you have shares in a wind farm, a photovoltaic plant or in renewable energy companies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have shares in an energy cooperative?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do you have a plug-in solar panel/balcony solar panel at home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 Block C			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>FILTER QUESTION: Do you own property?*</i> Block C1; *If yes, do you have:			
PV panels on the roof or facade, a private micro wind turbine and/or a battery for power storage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• A solar thermal system for hot water or space heating?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- A combined heat&power system or a heat pump, pellet/wood-burner for space heating or a connection to a district heating network with heat from renewable energies?

Block C2; *If no:

Yes No Don't know

- Do you have landlord-to-tenant electricity supply from the roof or façade of the house in which you live?

- Do you have a car-charging point in the garage/carport?

Block D

Block D

Do you have a green electricity supply?

Yes No Don't know

Have you ever taken part in a planning process in the context of the energy transition, e.g., for the construction of wind turbines?

Yes No Don't know

Do you use an electric vehicle (e-car, e-scooter, e-bike, etc.)?

Yes No Don't know

Do you live in a particularly energy-efficient house/particularly energy-efficient apartment (higher than stipulated standard)?

Yes No Don't know

Have you or a co-resident used your/their own know-how and creativity to improve your household energy consumption?

Yes No Don't know

– If yes,
how?

Do you try to save energy in your daily life?

Yes No Don't know

Are you involved in the energy transition in any way we haven't mentioned? If yes, please describe this in a few words.

!!From here all questions for EVERYONE!!

8. Now, a few questions about you as a person.

	male	female	other
Your gender	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Your age

	Yes	No	Don't know
Were you born in Germany?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were both your parents born in Germany?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What is your highest level of education?

No school certificate	<input type="checkbox"/>
Primary or secondary school	<input type="checkbox"/>
Secondary education certificate	<input type="checkbox"/>
General qualification for university entrance or UAS	<input type="checkbox"/>
Vocational training	<input type="checkbox"/>
University	<input type="checkbox"/>
Academic degree	<input type="checkbox"/>
Other:	<input type="checkbox"/>

What mainly applies to you?

	<input type="checkbox"/>
I am a school pupil	<input type="checkbox"/>
I am a student	<input type="checkbox"/>
I am retired	<input type="checkbox"/>
I am a housewife/househusband or a carer for children/other dependants	<input type="checkbox"/>
I am unemployed	<input type="checkbox"/>
None of the options cited	<input type="checkbox"/>

In which fields are/were you employed? (Multiple answers possible)

- I am/ was not employed
- Technical, natural sciences
- Business
- Administrative
- Social incl. education, health
- Societal incl. industry, politics
- In the energy sector
- Other _____

What is your current housing situation?

	Own house	Own apartment	Rented house	Rented apartment	Other
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

How large is your household?

	Single person household	With partner	With partner and child/ren	Single with child/ren	Shared housing	Other
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

In the area where you live (within a radius of about 5km), is there

	Yes	No	Don't know
...a wind farm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...a solar park?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...a high voltage power line?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. We would be delighted if you took part in a workshop on the energy transition. We have listed a few dates below. If you are interested in taking part, you can let us know when you are available (multiple answers possible):

- Saturday 28.11.2020, 10:00-11:45
- Saturday 28.11.2020, 16:00-17:45
- Wednesday, 02.12.2020, 12:00-13:45
- Wednesday, 02.12.2020, 14:30-16:15
- Thursday 03.12.2020, 19:00-20:45
- Wednesday, 16.12.2020, 8:00-9:45
- Wednesday, 16.12.2020, 10:30-12:15
- Wednesday, 16.12.2020, 14:30-16:15

Please tell us which of the following devices you will be using for taking part in the workshop (technical requirement for participation is a device with access to the internet)

Laptop,

Desktop PC,

Tablet,

Smartphone

11. Please enter your email address for the workshop invitation here:

Thank you

8.3 Workshop guideline

Topic / Procedure	Tool	Duration (minutes) / Start time	
Knowledge and general acceptance of energy transition			
<p>We'll start with the first question. This will now be displayed and you can select your answer.</p> <p>1. Question 1 How much do you know about the energy transition?</p> <ul style="list-style-type: none"> • Not much – I have heard about it • Average – I have a rough idea of what it means • Quite a lot – I could explain it in detail <p>Thanks for your answer. Do you have anything to add or to ask?</p>	Survey	05	10
<p>Now we will move on to the next question. Please write your answer on the whiteboard. We have 5 minutes for this. Afterwards we would like to discuss this for about 10 minutes.</p> <p>2. W 1 What do you connect with the energy transition?</p> <p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • Possible answers from a general perspective could be: renewable energies, solar rooftop panels, joint task, social transformation, cultural change, more power lines, more wind turbines, decommissioning nuclear power plants, electric cars, climate protection etc. • Possible answers from a more personal perspective could be: positive or negative, I can generate my own electricity, my electricity will be more expensive, my electricity will be cleaner, interference with nature, the air will be cleaner, fear of power outages, climate protection, energy autonomy etc. <p>→ <i>Back to ppt</i></p>	Whiteboard	10	25

Short introduction to the energy transition in Germany (and how we understand this in the project)			
<p>And now we want to give you some information about the energy transition as pursued by the German government:</p> <p>The term energy transition describes the change in energy supply from fossil and nuclear fuels to renewable energies – the first pillar of the energy transition.</p> <p>→ The energy transition initiated by the German government aims at obtaining energy mainly from renewable sources like wind and hydropower, solar, geothermal or renewable raw materials by 2050.</p> <p>This goal is regarded as insufficient by other organizations to achieve the 1.5 degree target in the Paris Climate Agreement. They call for 100% renewable energy supply by 2030.</p> <p>The second pillar of the energy transition is a reduction of energy consumption by using energy economically and efficiently. Target in 2050: to decrease primary energy consumption by 50%</p> <p>In the autumn of 2010 the German government had already decided to reduce greenhouse gas emissions by 2050 (by up to 95%) – in other words to gradually phase out coal, oil and gas.</p> <p>After the nuclear disaster at the Fukushima nuclear plant in Japan, it was clear that the majority of individuals rejected this high-risk technology and it was decided to completely phase-out nuclear power use by 2022. The decision to implement the energy transition was made.</p> <p>The definitions and goals of the energy transition were laid out in the Energy Concept of September 2010 and the decisions in the summer of 2011 to accelerate the energy transition. These mainly comprise measures to expand renewable energies, the electricity grids and energy efficiency.</p> <p>The entire energy system has to be transformed for Germany to be able to increasingly supply itself with renewable energies. In line with the German government's Energy Concept, new power stations must be constructed, interconnected in a sensible way, and adapted to the respective energy demand, and our electricity demand should be oriented towards the availability of renewable power. New power grids and storage technologies have to be developed and deployed.</p> <ul style="list-style-type: none"> • Phase-out nuclear power by end of 2022 • Increase the proportion of renewable energies in gross final energy consumption to 18 percent up to 2020, to 30 percent by 2030, to 45 percent by 2040 and to 60 percent by 2050. 	Presentation	25	30

<ul style="list-style-type: none">• Increase the share of renewable energies in gross electricity consumption to 35 percent by 2020, to 50 percent by 2030, to 65 percent by 2040, and to 80 percent by 2050. The most important basis for this is the Amended German Renewable Energy Sources Act, which has been in force since January 2012 (EEG).• Reduction of greenhouse gas emissions by 40 percent by 2020, by 55 percent by 2030, by 70 percent by 2040, and by 80 to 95 percent by 2050 (compared to the reference year 1990).• Reduction of primary energy consumption by 20 percent by 2020 and by 50 percent by 2050.• Increase energy productivity to 2.1 percent per year in relation to the final energy consumption.• Reduction of electricity consumption by 10 percent by 2020 and by 25 percent by 2050 (compared to 2008).• Reduction of heating demand in buildings by 20 percent by 2020 and reduction of the primary energy demand by 80 percent by 2050. The aim is to double the renovation rate for buildings from one to two percent.			
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Die Energiewende

Alle Ziele auf einen Blick

Treibhausgasemissionen

95%*

weniger Treibhausgasemissionen bis 2050

* Alle Zahlen sind Vergleichswert gegenüber 1990
Quelle: Umweltbundesamt

Effizienz

50%*

Primärenergieverbrauch bis 2050

-25%*

Brutto-Stromverbrauch bis 2050

* Vergleichswert gegenüber 2008

Verkehrsbereich

6.000.000

Elektrofahrzeuge

Die Anzahl der Elektrofahrzeuge soll bis 2030 auf 6 Mio. ansteigen

Jahr	Anzahl
09/2018	162.015
2020	1.000.000
2030	6.000.000

Quelle: VDA

Gebäudebestand

-20%

Wärmebedarf bis 2020

-80%*

Primärenergiebedarf bis 2050

* Wert beschreibt die ungefähre Größenordnung

Erneuerbare Energien

80%

Mindestanteil Erneuerbarer Energien am Bruttostromverbrauch bis 2050

Jahr	Anteil
2017	36%
2020	35%*
2030	50%*
2040	65%*
2050	80%*

60%

Anteil Erneuerbarer Energien am Bruttoendenergieverbrauch bis 2050

Jahr	Anteil
2016	12,3%
2020	18%
2030	30%
2040	45%
2050	60%

* Mindestanteil am Bruttostromverbrauch
Quelle: BMW, Umwelt

Do you have any questions about this?

If all the questions are answered, we will move on to the next topic.

➔ *Back to whiteboard 2*

Acceptance of the energy transition from the perspective of individuals and society			
<p>And now we want to talk about your own individual situation.</p> <p>Please write your answers on the whiteboard. Again, we have 5 minutes for this and would like to discuss the answers with you afterwards.</p> <p>3. W 2 What is your own personal view of the energy transition? <i>What does it mean to you personally?</i></p> <p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • What opportunities and advantages do you yourself have or expect to have personally from the energy transition pursued by the German government? • What restrictions or burdens do you have or expect to have from the energy transition pursued by the German government? • <i>Examples of possible answers:</i> democratic participation, autonomy, chance for personal participation, social inclusivity, positive feeling, financial impacts (positive + negative), perceived risks, planning uncertainty, local pollution/ emissions • How do you evaluate these possibilities/opportunities and restrictions and why? <p>[Discussion]: Who wrote xy? Why did you put this? Can you explain it briefly please?</p> <p>In addition to the German government’s energy transition, there is another broader understanding of the energy transition. We talk about a decentralized energy sector. Decentralized means that electricity is generated by renewable energies at a specific location, mainly to cover the energy demand (electricity, including mobility and heat) at this location/in this region. Selling power to other areas is only possible as a secondary use. The generation locations are to be widely distributed, although generation focal points should be developed close to consumption centers. This means that proximity to consumption plays an important role.</p> <ul style="list-style-type: none"> • If you based your understanding of the energy transition on this, would you answer this question differently? 	Whiteboard	30	45

<p>GESTERN</p> <p>PRODUKTION WENIGE GROSSE KRAFTWERKE</p> <p>MARKT ZENTRALISTISCH, MEIST NATIONAL</p> <p>ÜBERTRAGUNG GROSSE STROMLEITUNGEN UND PIPELINES</p> <p>VERTEILUNG VON OBEN NACH UNTEN</p> <p>VERBRAUCHER PASSIV, NUR ZAHLEND</p> <p>MORGEN</p> <p>PRODUKTION VIELE KLEINE ENERGIEERZEUGER</p> <p>MARKT DEZENTRAL, GRENZÜBERGREIFEND</p> <p>ÜBERTRAGUNG KLEINERE ÜBERTRAGUNGSNETZE UND REGIONALE VERSORGUNG</p> <p>VERTEILUNG IN BEIDE RICHTUNGEN</p> <p>VERBRAUCHER AKTIV, AM SYSTEM TEILHABEND</p> <p>© ENERGY ATLAS 2018/CE Delft</p>			
<p>And now we come to the next question. Please write your answers on the whiteboard. Again, we have 5 minutes for this and would then like to discuss the answers with you.</p> <p>4. W 3 What opportunities or restrictions do you see in the German government's energy transition for women compared to men or for people from minority groups (e.g., disabled people)?</p>	<p>Whiteboard</p>	<p>45</p>	<p>60</p>

<p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • What opportunities and benefits do you think other people, women or minority groups have due to the energy transition? • What restrictions or burdens do you think other people, women or minority groups have due to the energy transition? <i>Examples of possible answers:</i> democratic participation, autonomy, possibility for personal involvement, social inclusivity, positive feeling, financial impacts (positive + negative), perceived risks, planning uncertainty, local pollution/emissions • How do you evaluate these possibilities/opportunities and restrictions and why? <p>[Discussion]: Who wrote xy? Why did you put this? Can you explain it briefly please?</p> <ul style="list-style-type: none"> • If you based your understanding of an energy transition on our broader definition, i.e., a decentralized energy sector, would you answer this question differently? 			
<p>Now we'd like to give you a short presentation on the topic of gender equality.</p> <p><i>Marika / Katharina: Input on gender equality</i></p> <p>Any questions?</p>	Presentation	60	65
<p>Participation in the energy transition</p>			
<p>Individuals have the opportunity to participate financially in the energy transition. This includes, e.g., the supply of green power, membership in an energy cooperative or owning a PV system. We want to talk about these financial opportunities now.</p> <p>In addition to these, there are many other ways of participating that do not have a financial dimension, such as active or passive participation in climate initiatives, individual initiatives, participating in and organizing demonstrations, participation in planning procedures or referendums.</p> <p>As we said, today's discussion focuses on financial participation.</p>			

<p>GROUP 2: Now we would like to know what the opportunity to participate financially in the energy transition means to you personally.</p> <p>Please write your answers on the whiteboard.</p> <p>5. ONLY GROUP 2: W 4 How do you evaluate these financial forms of participation for yourself personally?</p> <p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • What forms of (financial) participation could you imagine for yourself? • If you cannot imagine any (financial) participation for yourself, what are the reasons for this? • <i>Possible answer examples:</i> no supporting laws, no desire, no time, no personal possibility, no money, no information, no network, no awareness, no self-efficacy/no visible impacts of my individual behavior, no monetary gains 	Whiteboard	65	75
<p>GROUP 1+3: Now we want to talk about your motivation for getting involved in the energy transition.</p> <p>Please write your answers on the whiteboard.</p> <p>6. ONLY GROUPS 1+3: You are all already involved in the energy transition in some way. What was your motivation (at that time) for getting involved?</p> <p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • <i>Examples of possible answers:</i> I think it is important in spite of obstructive law, make the impacts of my behavior visible, exercise democratic power, personal interest, personal benefits, increased political and societal interest, increased (personal) environmental awareness, pressure from social environment 	Whiteboard	65	75

<p>ONLY GROUPS 1 + 3 and also Group 2 as possible PV owners: Now there are a few brief questions about your motivation with regard to financial participation. You can select from the following answers. If anything is unclear, please mention this and write us a short note in the chat.</p> <p>7. 2. Question GROUPS 1+3: There are very different reasons for investing your own capital or a loan in renewable energies. Which of the following reasons applies to you?</p> <table border="1"> <thead> <tr> <th></th> <th>Does not apply at all</th> <th>Does not apply</th> <th>Does not really apply</th> <th>Neither nor</th> <th>Applies to some extent</th> <th>Does apply</th> <th>Applies completely</th> </tr> </thead> <tbody> <tr> <td>I wanted to be more independent in terms of my energy supply</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>My personal environment (family, friends, acquaintances) approved</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>I wanted to contribute to the success of the energy transition</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>I assumed it would be worth it financially</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>I wanted to do my bit to protect the environment and the climate.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>		Does not apply at all	Does not apply	Does not really apply	Neither nor	Applies to some extent	Does apply	Applies completely	I wanted to be more independent in terms of my energy supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	My personal environment (family, friends, acquaintances) approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I wanted to contribute to the success of the energy transition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I assumed it would be worth it financially	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I wanted to do my bit to protect the environment and the climate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Survey</p>		
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<p>And now we would like your opinion on participating in the energy transition and what you think this means for women and for men.</p> <p>Please put your answers on the W 5 whiteboard.</p> <p>8. How do you think the opportunities to participate in the energy transition are distributed between men and women?</p> <p><i>[Ask an open question – only ask again if not mentioned themselves:]</i></p> <ul style="list-style-type: none"> • Do you think both genders have the same opportunities to participate? • Or do you think one gender has more opportunities to participate? If so, which one and why? <p><i>[Discussion]: Who put xy? Why? Can you explain this briefly?</i></p>	<p>Whiteboard</p>	<p>75</p>	<p>85</p>																																																

<ul style="list-style-type: none"> If you based your understanding of the energy transition on our broader definition, i.e., a decentralized energy sector, would you answer this question differently? 										
<p>And now we would like to ask you a few short questions. You can select your answers from those shown. If anything is unclear, please mention this and write us a short note in the chat.</p>								Survey	85	90
<p>9. 3 Question Do you agree with the following statements about the energy transition initiated by the German government?</p>										
	Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree completely			
I think I will benefit more from the energy transition than other individuals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
The advantages and disadvantages of the energy transition are distributed fairly across individuals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
I feel insufficiently informed about the benefits and drawbacks of the energy transition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
I think it positive that people have the chance to participate financially in the energy transition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
I think it is unfair that only some households can participate financially in the energy transition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
My personal perception is that the opportunities to benefit from the energy transition are unequally distributed										
My personal perception is that the opportunities to benefit from										

the energy transition are equally distributed										
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[Closing:]

Thank you very much for participating in today’s discussion! Finally, we’d like you to answer a few short questions. This will take 5 minutes. The questions will appear here.

Short concluding survey:

10. Question 4 Do you agree with the following statements?

	Disagree completely	Do not agree	Rather disagree	Neither nor	Rather agree	Agree	Agree completely
Overall, I think the energy transition initiated by the German government is positive for society.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I think the decentralized energy transition is positive for society.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Question 5 Assuming that the electricity price increased due to the energy transition and that you currently pay around 6 euros per month for your fridge’s electricity consumption. Would you be prepared to pay more than these 6 euros per month to support the expansion of renewable energies initiated by the German government?

- No
- Yes, I would be prepared to pay a total of ... euros

12. Question 6 In your general perception, the energy transition initiated by the German government is/offers...

	Com- pletely dis- agree	Do not agree	Rather not agree	Neither nor	Rather agree	Agree	Com- pletely agree
... generally just?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... equal opportunities and risks for men and women?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... equal opportunities and risks for all age groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... equal opportunities and risks for all income groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... equal opportunities and risks for all education groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Concluding remark: Once again, thank you very much for participating!

8.4 Survey results

Table 4: Overview of answers by categories and sub-categories

categories	sub-categories	answers	participating	non participating
			number of answers	
general perception of the energy transition	in general, the energy transition is seen as...	positive	4	19
		negative	3	3
		neutral	0	2
	some renewable generation technologies are considered as	positive	1	9
		inappropriate	2	11
implementation of the energy transition	implementation is in general perceived as	inappropriate	4	11
	dynamics is considered as	too slow	11	27
		too quick	0	3
	feasibility is considered as	questioned	0	4
	information, transparency and understanding is considered as	sufficient	0	1
		unclear	0	3
	international cooperation is considered as	insufficient	3	4
	peoples' awareness for a transition is	existing or positive	2	1
		indifferent or not existing	1	3
	inclusion of individuals in energy transition is considered as	positive	0	2
not good		1	3	
impacts of the energy transition at the meso- and macro-level	impact on energy security is	positive	0	2
		inappropriate	0	2
	ecological impacts are	positive	3	32
		not only positive	0	5
	impact on energy justice & poverty is considered as	positive	0	0
		inappropriate	2	12
	impacts on economy are considered as	positive	0	1
negative		0	2	
financial impacts of energy transition (micro-level)	energy costs	energy cost savings	1	2
		increasing energy costs for all	3	18
	additional burden	increasing burdens of individuals	6	34
	financial support considered as	positive	1	1
		inappropriate	2	2

Note: 132 participants out of 300 have not answered this question



Authors' affiliations

Uta Burghard, Barbara Breitschopf, Katharina Wohlfarth, Fabian Müller, Julia Keil

Fraunhofer Institute for Systems and Innovation Research (Fraunhofer ISI)
Competence Center Energy Technology and Energy Systems

Contact: Dr. Uta Burghard

Fraunhofer Institute for Systems
and Innovation Research (Fraunhofer ISI)
Breslauer Strasse 48
76139 Karlsruhe
Germany
E-Mail: uta.burghard@isi.fraunhofer.de
www.isi.fraunhofer.de

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