



Energy Justice for Whom?

A case study of the energy transition in Germany

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Abstract

The energy transition is upon us. Germany, considered a pioneering country in the energy transition has deployed. Immense efforts to shift energy production and consumption away from fossil fuels towards renewable energies. The key drivers for these efforts have been the increasing fossil fuels prices as well as rising environmental concerns.

And yet, the energy transition needs to be just, both for the people, and the planet. Low-income households and marginalized people are prone to suffer from a rise in energy prices and the unequal distribution of energy between industries and households. Since laws and regulations tend to favour the affluent population and prioritise industrial activities, ethical and moral concerns around justice in energy debates and transition plans need to be addressed. This thesis responds to this need by examining energy justice in the process of the energy transition in Germany. It explores related to the distribution of the costs and benefits in the process of transitioning towards renewable energy, as well as participation, procedural justice, and power relations emerging in this process.

The study asks:

Who is involved in the energy transition in Germany and with which roles?;

How do different actors involved in the energy transition in Germany perceive energy justice?;

What are the consequences of different understandings of energy justice on the involved actors in the energy transition in Germany?;, and ultimately;

What are the energy justice-related challenges of the German energy transition?

Semi-structured interviews with activists, political parties, and industry representatives taken together with the analysis of German energy policies and observations made at COP28 illustrate empirically different understandings of energy justice. They show that the cost of the energy transition is passed on to consumers. Financially struggling households are often forced to think short-term while energy-efficient and renewable housing usually pays off long-term, which is something that only the wealthiest households can afford. Funding and subsidy programmes are gratefully accepted amongst the population and industry. Laws are perceived as a bureaucratic burden. The transition has been overwhelming people and companies: they are seen as difficult to keep up with, understand and act upon. The actors who benefit most from the current energy policies related to the energy transition are the middle class and rising-income households, as well as energy industries and large corporations because of subventions and available financial possibilities. Even though all involved stakeholders are present in roundtables when new laws are discussed, the general population is often not aware of these exchanges and the possibility to participate. There is a lack of inclusion of social aspects such as the lack of integration of all financial conditions of households and industries in the energy transition legislation. In addition, there is a lack of knowledge and awareness about aspects such as the population's ability to participate in decision-making processes or the government's awareness of the population's financial situation when making policy, leading to policies that do not recognise social issues. However, the imperative of the energy transition is increasingly acknowledged in debates.

The path to greater energy justice in Germany requires continued efforts at various levels to tackle the existing injustices and find fairer solutions. Germany should not only strive to become a pioneer of the energy transition but also to be a trailblazer in energy justice.

Keywords: Energy justice, Energy transition, Germany, Distribution, Participation, Power relations, Procedural justice

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Abbreviations

CHP	Combined Heat and Power
EEG	Erneuerbare Energien Gesetz (Renewable Energies Act)
GHG	Greenhouse Gas
RE	Renewable Energy
SDG	Sustainable Development Goals
UN	United Nations

1. Introduction

Energy usage is a daily integral part of life across a variety of sectors including transportation, industry, commercial and residential users (Dawson 2015). Rising energy prices, which particularly affect low-income households, can lead to energy shortages which can in turn result in people being forced to inadequately heat their homes or lack other basic necessities. A just energy policy is therefore essential to ensure not only climate protection but also social justice, a fair distribution of benefits and political stability.

Since fossil fuels produce environmentally harmful carbon emissions, a shift towards renewable energies (RE) is crucial (Qadir *et al.* 2021:3591). The transformation of energy systems by increasing renewable energy sources is embedded within the United Nations Sustainable Development Goals (SDG) that have been adopted by all member states in 2015. SDG seven “Affordable and clean energy” addresses the access and affordability to energy supplies and transformation systems, energy efficiency, and the increased use of renewable energies to contribute to climate change mitigation (UNEP 2023). The Montreal Protocol from 1987 as well as the Kyoto Protocol from 1997 also address the necessity of investment in green energy technologies (Qadir *et al.* 2021:3591).

To increase the production and consumption of renewable energy and shift away from fossil fuels, an energy transition is necessary. Energy transition describes a change from energy production and consumption based on fossil fuels towards a state of decarbonization that is reached through the use of natural resources that generate renewable energy (S&P Global 2020).

Germany has been at the forefront of the global energy transition. With the Renewable Energy Sources Act (Erneuerbare Energien Gesetz (EEG)) in 2000, Germany became the first country with a governmental law aiming to promote and consume renewable energies (Morris and Jungjohann 2016). Key drivers for the energy transition are increasing prices of fossil fuels and environmental concerns caused by the general population, activists, the economy and the government (Gründinger 2017). With import shortages and connected increased electricity prices in Europe caused by the Russian-Ukrainian war that started in early 2022, the concerns regarding energy security and access have increased and added to the already existing energy concerns and challenges of Germany (World Economic Forum 2023). At first glance, one might assume that developed and relatively wealthy

countries in the Global North, such as Germany, are considered to have secure energy infrastructures and resources, and citizens do not need to worry about access and affordability. However, recent research has shown that low-income households in Germany face challenges accessing affordable and clean energy as well as the countries themselves are not protected from energy shortages either (Sovacool and Dworkin 2015). Research has proven that there are inequalities in access and affordability of energy in Germany. Additionally, Germany is dependent on importing energy. The recent conflict with Russia has shown, that it is unreliable to rely too much on one country (in this case Russia) when it comes to imports, as it has caused uncertainty and anxiety among the German population about whether enough energy is available (Berger *et al.* 2022).

1.1 Problem Formulation

The access, affordability and distribution of energy majorly determine the well-being of a state, its population and its society (Van Der Kroon *et al.* 2013; Dawson 2015; Sovacool and Dworkin 2015; Qadir *et al.* 2021:3595f).

Studies have shown that the socioeconomic conditions of a society majorly influence the progress in RE (Van Der Kroon *et al.* 2013). On the other hand, technologies influence economic stability and income equality and thereby have a direct impact on social inequalities (*ibid*). Concerns regarding energy availability, affordability and distribution have increased in developed democracies around the world since the 1970s (Duffield 2012). Especially low-income households and marginalized people are prone to suffer from a rise in energy prices and the distribution of energy between industries and households. Since laws and regulations tend to favour the affluent population and selected industries, ethical and moral concerns around justice in the energy debates and transition plans need to be addressed (Sovacool and Dworkin 2015; Qadir *et al.* 2021:3595f).

Even though Germany is mentioned as a positive case study regarding energy transition across the literature (Schiffer and Trüby 2018), the country is facing socio-economic challenges with the energy transition. However, there is less knowledge on energy justice perceptions of different involved actors in the transition in Germany, the consequences of different understandings and the main justice-related challenges (Qadir *et al.* 2021:3592).

Therefore, this study explores how different actors involved in the energy transition perceive energy justice in Germany and what the energy justice-related challenges are.

1.2 Aim and Research Questions

This study aims to investigate the challenges of the German energy transition related to energy justice. It identifies, analyses and discusses the advantages and obstacles that identified stakeholders encounter, how they perceive energy justice, and examines how they interact over challenges and potential solutions.

In this study, the following main research question will therefore be addressed:

- *What are the energy justice-related challenges of the German energy transition?*

To answer the main question, the following sub-questions are supporting the study:

- *Who is involved in the energy transition in Germany and with which roles?*
- *How do different actors involved in the energy transition in Germany perceive energy justice?*
- *What are the consequences of different understandings of energy justice on the involved actors in the energy transition in Germany?*

2. Previous Research and Theoretical Background

This chapter presents previous research on general energy justice and provides the theoretical background and to contextualise the aim and the research questions of the thesis.

The section begins with a section about previous research on energy transition. Afterwards comes a literature review of different understandings of energy justice, following along with various aspects of energy transition to embed the research question into the literature. Then, energy justice is presented as the theory for the thesis, delivering four key aspects that are used to analyse and discuss the research questions in the following chapters of this study.

Furthermore, this chapter addresses the theoretical gap within the available literature and highlights the relevance of this study.

2.1 Previous Research on Energy Transition

The need for strategic energy transitions is widely recognised (S&P Global 2020). With the industrial revolution in the 19th century, the energy demand accelerated. Firewood, coal and oil became the main energy sources used for burning processes. The energy demand furthermore increased drastically in the 20th century, which can be explained by a growing population and economic growth. With fossil fuels being the main energy sources, severe environmental damage and health problems were caused because of the emissions and release of gases. Atmospheric gases, especially CO₂, accelerate climate warming, leading to negative consequences for the ecosystems and thereby the human habitat. To combat climate change and the environmental harm that impacts human well-being, as well as address concerns about resource scarcity and energy security, it is essential to transition from fossil fuels to sustainable and biogenic energy resources (Everett 2012; S&P Global 2020).

With the recognition of the need for an energy transition by the United Nations (UN), “Affordable and clean energy” was adopted as one of the SDGs. The goal is to secure access and affordability to energy supplies and transformation systems,

energy efficiency, and increase the use of renewable energies to contribute to climate change adaptation and mitigation (UNEP 2023).

Energy transition aims to abandon energy production and consumption based on fossil fuels and shift to a state of decarbonization via energy generation based on renewable natural resources (S&P Global 2020). The objective is most importantly the reduction of unsustainable and environmentally damaging pressures on ecosystems and further exploiting finite resources (Leach 1992:121; Qadir *et al.* 2021:3592).

The drivers of the energy transition have historically been socioeconomic changes rather than a desire for renewable energy sources. The push came from policymakers, not necessarily from private households (Leach 1992:118). Nowadays, however, with activist global movements such as Fridays for Future, citizens have raised their voices for changing from fossil fuels to renewable energy sources therefore pushing the transition in a more human- and environment-centered direction.

Taking a closer look at the energy lifecycle, the complexity of energy systems becomes apparent (Figure 2). Within the five main processes in the lifecycle, a variety of actors is included. There are policymakers, fossil fuel companies, renewable energy companies, scientists and researchers, producers, consumers, activists, and the private sector.

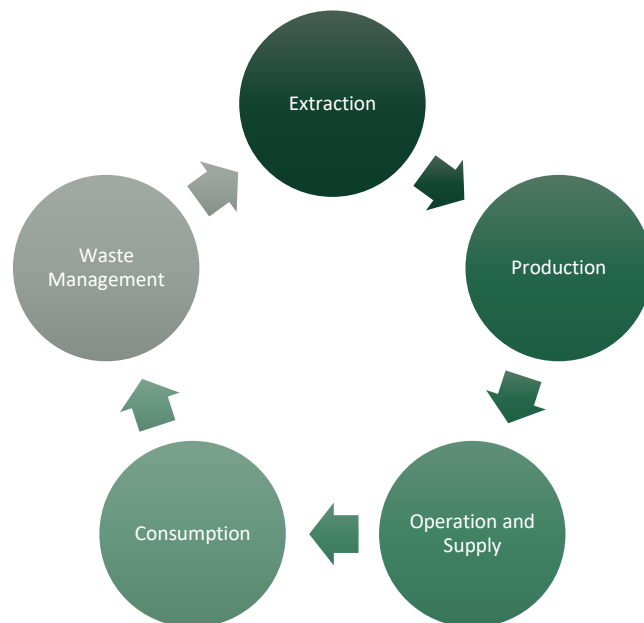


Figure 1. The energy lifecycle (Own illustration based on Droubi *et al.* 2022).

With multiple actors from various fields within the economy, politics, environment, social and (activistic) movements representing different interests and levels of involvement in the renewable energy transition, barriers to the achievement of the renewable energy transition appear (Qadir *et al.* 2021:3592).

First, a global tendency of governments has been to subsidise fossil fuels to establish industrial zones to accelerate economic growth and also tackle income inequality (Al-Badi and AlMubarak 2019; Alshehry and Belloumi 2015; Howarth *et al.* 2017). These fossil fuel energy subsidies continue to constitute a barrier to implementing renewable energy projects as the demand for fossil fuels increases and the production of renewable energies is limited (Erickson *et al.* 2017). Conversely, to promote renewable energies within the energy transition, these incentives must be removed (Geels *et al.* 2017).

Second, the general assumption that renewable energies cannot provide financial benefits and are not affordable (Zakaria *et al.* 2019) leads to increased fossil fuel extraction to meet the energy demand (Diesendorf and Elliston 2018; Qadir *et al.* 2021:3595). Additionally, in Germany, the large coal reserves have led to a strong focus on fossil fuels (Diesendorf and Elliston 2018).

Third, an unequal distribution of the impacts and benefits of renewable energy leads to social injustices and political instability. This is particular to RE because they are not only controlled by the state or industry but can also be obtained by private individuals through their home systems. Different financial circumstances have an impact on the purchase of RE and the possibilities of self-development that do not occur for coal etc. (Qadir *et al.* 2021:3595).

Fourth, the unawareness of citizens, industries and the government of market changes in the RE sector can lead to unreasonable decisions by the mentioned actors. Often decisions are based on outdated knowledge, particularly on past prices, leading to delayed provision of RE (Sgouridis *et al.* 2016; UNESCAP 2021). Research in the improvement of technology can significantly lower the costs of RE which ultimately increases the investments in the sector. Consequently, the success of RE is directly related to the research and development support received from governmental institutions (Qadir *et al.* 2021:3592).

Fifth, oil companies can represent a barrier when investing in RE. Due to regulations from the EU and rising social pressure from consumers, European oil companies are shifting towards increased investments in the RE sector (Hartmann *et al.* 2020).

Sixth, the socio-economic conditions of society majorly influence the progress in RE. Inequalities are a barrier to advancements in RE technologies, as economic stability and income equality must first be tackled to reach investments from private people in the RE sector (Van Der Kroon *et al.* 2013). Whenever a variety of actors is included, different interests and needs become evident leading to potential conflicts. Struggles have risen within the transition regarding, energy availability, affordability, distribution and more. These processes are caused, for instance, by a rise in energy prices, especially for marginalized and financially vulnerable population groups, and laws and regulations that favour the more affluent population as well as selected lobbies within the private sector. Taking a closer look at the moral

implications of global energy decisions, threats and issues reveal. Ethical concerns are rising as current energy debates and policies provoke questions around equity and morality (Sovacool and Dworkin 2015; Qadir *et al.* 2021:3595f).

Across the literature, Germany is mentioned as a pioneer in energy transition (Schiffer and Trüby 2018). A study by Schiffer and Trüby (2018) analysed the outcomes of the energy transition framework in Germany, also known as “Energiewende”. The main goal was to reduce greenhouse gas (GHG) emissions. The target could not be achieved as energy usage patterns in industry and transportation had not improved. Germany encouraged small power companies and households to invest in RE and German policies involved all stakeholders and gave Germany the status of an example for other countries to follow. However, the country faces struggles with the energy transition (Qadir *et al.* 2021:3592) which are further explored in the thesis in the context of energy justice.

Given that there is consensus on the importance of energy justice and the need to address conflicts within energy systems, the question remains as to how these aspects can be achieved on the ground. The next chapter follows up on the research relevance and theoretical gap.

2.2 Theoretical Background: Energy Justice

There are different understandings of energy justice in the literature. The main ones are discussed below. The understandings of energy justice found in the policies and narratives of the different German actors are analysed in the face of these definitions.

2.2.1 Main theoretical concept: Energy Justice

Energy justice is an analytical and conceptual tool to examine and understand how values are embedded in energy systems or as a tool that can assist in solving energy problems (Sovacool and Dworkin 2015; Droubi *et al.* 2022). Energy justice addresses equity within social and economic participation in energy systems while incorporating social and economic burdens. The concept describes the necessity of making energy accessible, affordable, cleaner, and democratically managed. Concerns from marginalized communities are especially considered. The term combines questions around energy with ethical conundrums involving equity, morality, and philosophy (Sovacool and Dworkin 2015).

Looking at the Greeks, Libertarians, Christians, and European philosophers such as Thomas Hobbes or John Locke, the term can be defined in a variety of ways that adjust throughout history (Sovacool and Dworkin 2015). In this conceptual context,

justice is linked to the concept of fairness creating a foundation for equity and a fair social structure which then fairly distributes goods and services. Justice involves a balance of “rights and liberties, powers and opportunities, and income and wealth” (*ibid*).

Another important aspect that must be addressed when talking about justice is the question of guilt. Sovacool and Dworkin (2015) argue that it is a fundamental human characteristic to dislike feeling guilty and therefore avoid sentiments of responsibility for being the reason for an issue. Regarding energy justice, this means that even though certain injustices might possibly be known already by different actors, the acknowledgement, responsibility and, in the best case, elimination do not take place as a result (*ibid*).

2.2.2 Building the Analytical Framework

In the context of this study, both the key characteristics by Sovacool and Dworkin (2015) and the JUST Framework by Droubi *et al.* (2022) are applied as the two frameworks complement each other and are useful tools for the analysis and the discussion. Four key aspects for this study emerge from the frameworks: distribution of costs and benefits, participation, procedural justice, and power relations. The empirical findings are put in relation to these four identified key aspects of energy justice by comparing the empirical findings to these key characteristics of a just energy transition. With the results, differences between an energy-just and –injust transition can be defined and further discussed.

The following section presents the frameworks by Sovacool and Dworkin (2015) and the JUST Framework by Droubi *et al.* (2022) that when taken together lead to the four key analytical aspects that are used in this study.

Energy justice serves as a concept that incorporates values into energy systems. The central principles of energy justice are “availability, affordability, due process, good governance, prudence, intergenerational equity, intragenerational equity and responsibility” (Sovacool and Dworkin 2015).

Who people see as responsible actors for energy-related problems and what they perceive as (un)just, directly influences individual decisions, behaviours, and trust in institutions. Psychological research by Shippee (1980) found that who the research’s respondent blames for a specific energy problem helps change energy-related lifecycles and decisions. For instance, people are more likely to take responsibility and change personal attitudes and actions when they believe their individual consumption is wasteful. On the other side, when people blame politics, companies, countries, or fellow human beings, their willingness to change decreases drastically (*ibid*).

In the political context, where energy laws and rules are made, energy justice deals with the distribution of (material) outcomes, public goods (including

resources and wealth) and public bads (pollution and poverty) (Sovacool and Dworkin 2015). The outcome of justice decisions is mainly influenced by the decision makers (who have access, the bias of decision makers, education of decision-makers) and the access to information. For Sovacool and Dworkin (2015), energy justice can be defined by three characteristics: cost, benefit, and procedures (Figure 1).

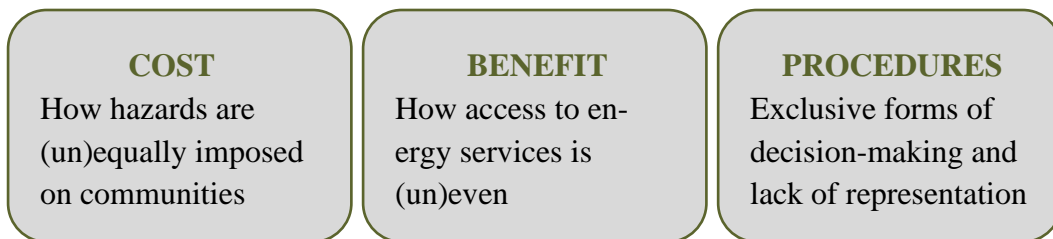


Figure 2. Key characteristics of energy justice (Own illustration based on Sovacool and Dworkin 2015).

Sovacool and Dworkin (2015) have created an energy justice decision-making framework to ensure decent outcomes for affected people. The framework argues that the following aspects must be promoted when making energy-just decisions:

- Availability to ensure people have sufficient energy resources.
- Affordability to ensure all people shall not pay more than 10% of their income for energy services.
- Due process: to ensure stakeholder participation and that countries respect human rights in energy production and use.
- Good governance: to ensure all people have access to transparent high-quality information.
- Sustainability: to ensure energy resources are not depleted too fast
- Intragenerational equity: to ensure all people can fairly access energy services.
- Intergenerational equity: to ensure future generations are not negatively impacted by today’s energy system.
- Responsibility: to ensure the protection of nature and minimize energy-related environmental threats.

An energy-just world would thereby be a world “that shares both the benefits and burdens involved in the production and consumption of energy services, as well as one that is fair in how it treats people and communities in energy decision-making” (Sovacool and Dworkin 2015).

Droubi *et al.* (2022) use another approach towards energy justice, the *JUST Framework*. The framework consists of four interconnected dimensions (Justice, Universal, Space, and Time) to reach a just transition (Table 1). It thereby combines energy justice with climate justice and environmental justice. Within the four dimensions, the framework addresses five forms of universal justice:

1. **Distribution** of positive and negative benefits from the energy sector
2. **Procedure** of legal process
3. **Recognition** of rights in various groups in society
4. Promoting **cosmopolitanism** by considering all citizens in a global context
5. **Restoration** by focusing on the enforcement of laws when injustice is caused by the energy sector.

Table 1. The JUST Transition (Own table based on Droubi et al. 2022).

Justice	TRANSITION	<ul style="list-style-type: none"> • Distributive • Procedural • Restorative
Universal		<ul style="list-style-type: none"> • Recognition • Cosmopolitanism
Space		Where is it happening (location)?
Time		Transition timelines (speed of the energy transition)

The JUST Framework illustrates that all dimensions are equally crucial and interconnected and support each other (Droubi *et al.* 2022) (Table 1).

2.3 Key Analytical Entry-points

After providing an overview of different concepts and examining the frameworks by Sovacool and Dworkin (2015) and Droubi *et al.* (2022) it emerges that energy justice can have different understandings and characteristics and offers scope for definition. Therefore, four key aspects have been identified to narrow down the concept and set the structure for the analysis. Environmental and labour aspects are not part of this thesis and open room for further research. The aspects are elaborated on in this study about energy justice in Germany to set the theoretical background and link the literature findings to the theory. The aspects further guide the structure of the thesis to answer the research questions. The aspects further guide the structure of the thesis to answer the research questions.

The identified key aspects are:

1. Distribution of costs and benefits
2. Participation
3. Procedural justice
4. Power relations and cross-scalar interaction

2.3.1 Distribution of Costs and Benefits

The first analytical entry point in this study is the distribution of costs and benefits. The distribution of costs and benefits in energy justice looks at how hazards, as well as benefits, are (un)equally shared and imposed on involved actors. The concept is linked to the idea of fairness, meaning the creation of a foundation for equity and a fair social structure which then fairly distributes goods and services (Sovacool and Dworkin 2015). The JUST framework by Droubi *et al.* (2022) highlights that energy benefits need to be distributed in a way that accordingly all involved stakeholders and actors get a similar amount of the negative and positive aspects within the steps of the energy lifecycle (extraction, production, operation & supply, consumption, waste management) (Figure 2). If there is an injustice, part of the distribution of costs and benefits is the compensation to people who bear the cost of energy justice.

In the context of Germany, this means taking a closer look at how the production and consumption of energy services is benefitting or costing different actors. In this case, the costs and benefits are mainly analysed and discussed from a financial side because of the available data. However, ecological aspects are also briefly taken into consideration.

In the German context, the stakeholders under consideration are people in politics, the industry, activists and the general population. When exploring the topic of energy justice with a focus on involved actors, resilience thinking is a subject that emerges within literature (Garcia *et al.* 2022; Gonda *et al.* 2023) in a way that supports the analysis and discussion around costs and benefits. Resilience originally describes the resistance and tolerance of a system to shocks and has gotten various understandings across different disciplines (Holling 1973; Garcia *et al.* 2022; Gonda *et al.* 2023). Since the named stakeholders participate with different interests and prerequisites in the energy transition, the effects of changes in energy policies can have big differences on the involved parties, leading to potential (un)equalities in the distribution of costs and benefits of the transition.

2.3.2 Participation

The second analytical entry point in this study is participation. One aspect of energy justice that is central to this research is energy democracy which is in direct relation with people's participation in decision-making as well as knowledge exchange making the concepts of energy justice and energy democracy closely inter-related (Droubi *et al.* 2022).

Energy democracy is a “novel approach to sustainability questions” (Alarcón Ferrari and Chartier 2018) and gives a normative view on “how economic activities and their energy foundations should be re-organised to face both social and ecological problems and crises rooted in the economic logics of capitalism” (Alarcón Ferrari and Chartier 2018). It is in essence about the right to participate (Droubi *et al.*

2022). Sweeney (2013) defines energy democracy as a “shift in power towards workers, communities and the public” and implies that resources, capital, and infrastructure are transferred from private hands to the public sector. Szulecki (2017) argues that energy democracy is rather a political buzzword than a concept. To end energy insecurities globally, the aim of energy democracy is a new energy system where workers’ rights are protected and stable jobs are provided, the needs of communities are acknowledged, energy is extracted and provided through sustainable methods, and emissions are reduced (Alarcón Ferrari and Chartier 2018).

Thus, energy justice can be seen as an objective of energy democracy and energy democracy is rather a condition for an energy-just transition (Thombs 2019:163, 166; Droubi *et al.* 2022) which is closely linked to participation. In difference to energy justice, energy democracy focuses on the transition from fossil fuels and nuclear fuels towards renewable energy sources and where the energy is obtained at the location where it is consumed. It aims for a change where not a few large energy companies hand energy to consumers but where consumers can produce as well with e.g. photovoltaic panels (REScoop, 2015, p. 35; Alarcón Ferrari and Chartier 2018). The prerequisite is the active participation of the citizens in taking political action. An important aspect of energy democracy therefore is increased participation in energy policy and that citizens can articulate their needs and ideas into a political agenda around energy (Szulecki 2017; Alarcón Ferrari and Chartier 2018). Energy democracy promotes participation in decision-making and -implementing processes as well as is used as a motive for demanding increased participation. Energy democracy appears at this point as a rather vague concept because participation is a factor that is often not recognised and utilised to its full potential and becomes more an ideal than an effective practice. Additionally, it can be argued that justice is not necessarily delivered by democracy or participation (Droubi *et al.* 2022). When looking at Western countries' democracy, the assumption that democracy always leads to justice can be rejected as it can be observed that these countries do experience injustice and inequality besides the prevailing democracy and liberal ideas (*ibid*).

In the context of this study, a challenge to be addressed is the complexity of the interests of involved actors as well as technical advancements. One of the main policy objectives in global energy transitions is addressing global climate change by shifting from fossil fuels towards renewable energy resources (S&P Global 2020). A successful energy-just transition depends on the inclusion of consumers (especially financially low-income households and vulnerable groups) and producers into policies, the research and development of RE technologies, and the accessibility to energy sources (import and own production). More knowledge in this area can help to ensure that energy justice is not only considered but also respected in energy transformation, the transformation is resilient, and people’s needs according to their vulnerabilities and individual challenges are met. Particularly relevant

for this thesis about Germany are the different stakeholders and how they perceive the energy transition as well as how they exchange interests with each other to achieve an energy-just state. The thesis explores what possibilities of participation are offered, how they are used, as well as how active exchange is sought.

2.3.3 Procedural Justice

The third analytical entry point in this study is procedural justice. Procedural justice looks at the recognition of the procedure of legal processes, and fundamental rights in all groups within society. When it comes to injustices caused by the energy sector, restoration by shifting the focus to the enforcement of laws is necessary. The dimensions must be seen in the aspect of time and space, adapting constantly to progress, and taking into account the need for speed in the energy transition (Droubi *et al.* 2022). In essence, energy justice involves a shift in the inclusion and respect of cross-scale involved actors when making decisions, setting targets, or addressing present or future challenges.

From the perspective of Germany, this means taking a closer look at the laws and regulations and analysing and discussing the recognition and representation of mentioned stakeholders.

2.3.4 Power Relations and Cross-scalar Interaction

The fourth analytical entry point in this study is power relations and cross-scalar interactions.

Sovacool and Dworkin (2015) have described energy justice as a concept that addresses equity within social and economic participation in energy systems while incorporating social and economic burdens. The concept aims to make energy accessible, affordable, cleaner, and democratically managed.

Individual and small-scale action is not enough to address a just energy transformation. The challenge needs a cross-scalar approach which includes not only economic and political strategies but also considers social challenges. There is a need for more consideration for scalar politics that includes understanding energy justice on a local, regional and national level *and* across these scales. Responsibilities for challenges within these social inequalities get disconnected and cannot be handled most effectively (Fernandes-Jesus *et al.* 2017; Holland 2017). Where radical change is possible on local scales, larger scales lack effective and just transformation (Nightingale *et al.* 2021:5). Negotiating the complexities of adaptation and achieving an energy-just transition, a cross-scalar debate including representatives of all involved stakeholders can serve as a solution and exchange of knowledge (Nightingale *et al.* 2021:6). Nightingale *et al.* (2021) argue that transformation must operate from the scale of the body to the scale of politics if it is to succeed in changing not only relationships between people and the environment but also in producing

more equitable social relations in the face of climatic change. As an energy transformative state, this is an important point to consider as it would mean that all actors included in the energy transition must be included and heard to understand cross-scalar challenges of energy justice and then tackle and address them in the next step.

In the context of this study, energy transition can be described as a “socio-natural process that requires constant negotiation between a range of actors and institutions” (Garcia *et al.* 2022:1) leaving behind the assumption that it is an outcome. Rather, it is understood here as a process through which different aspects of energy justice are constantly negotiated, contested and struggled upon by different actors (de Abreu-Mota *et al.* 2018). This process of understanding energy justice requires the acknowledgement of power and politics within the energy sector. Privileged individuals and communities tend to be more protected by efforts towards resilience (Rice *et al.* 2021). Power and politics concerning the economy, society and culture constantly influence resilience and vulnerability highlighting the links between resilience and power inequities. Resilience must be understood as a fluid and shifting process where uneven power relations can shift because power is not necessarily owned by a specific actor who has power over a group or system but rather defined as a (cross-scalar) relationship that is not unmutable: unequal power relations can change and not only hinder resilience but also can build it (Garcia *et al.* 2022).

Besides power relations across actors, power relations amongst policies, laws and regulations are considered by looking at the integration of concerns and action between scales as well as addressing the impact on ecosystems e.g. through manufacturing batteries or building wind parks.

Since there is little information on how these power relations look in Germany, the thesis explores the German energy transition process as emerging within socio-environmental conflicts that emerge in the energy transition process driven by the German state (politics) and its population. In this sense, it builds on a resilience approach that sees it as a process of “building commons, affective democratic, equitable and just relations with humans” (Gonda *et al.* 2023) highlighting the need for the energy transition to link social, political and biophysical changes within the concept of energy justice. This way of thinking will ultimately support putting forward anti-capitalist climate change approaches (*ibid*).

In summary, the theoretical approach builds on energy justice scholarship. Within the latter, the study is built on four analytical entry points that were identified as particularly relevant in the case of Germany: distribution of costs and benefits; participation; procedural justice, and; power relations and cross-scalar interactions. In the following sub-section, the background for this research is explained and justified through an overview of previous research on energy transition.

2.4 Research Relevance and Contributions to the Research Gap

The previous chapter has argued that the research around energy justice not only on a global scale but also in the case study country Germany, barely addresses how the variety of actors involved in the energy transition understand the latter. Current research around energy justice serves rather as an accumulation of understanding of how values are built into energy systems and resolve common energy problems (Sovacool and Dworkin 2015).

Literature is abundant about the concept of energy justice itself. Additionally, energy justice as an analytical application, decision-making principles and an intersection can be found. Frameworks describe how energy harms when not distributed fairly, equitable, and sustainable. Concepts have been made including criteria for an energy-just world. However, what is missing is a common concept that merges the different frameworks. Because of differences within values, economies, cultures, countries and communities, building a general global concept can be seen as a complex and likely impossible task. What is right and wrong can hardly be defined in a global context, and neither can recommendations for action as countries globally have different prerequisites (Sovacool and Dworkin 2015). A first step that could help fill in the gap can be a look at how specific countries handle these issues regarding energy systems. This is why this study focuses on one case study, Germany.

Even though developed and relatively wealthy countries in the Global North are considered to have secure energy infrastructures and resources and citizens do not need to worry about access and affordability, recent research has shown that low-income households face challenges accessing affordable and clean energy as well as the countries themselves are not protected from energy shortages either (Sovacool and Dworkin 2015).

Since the German energy transition has been widely promoted across the literature as a successful showcase in decarbonising the national energy system, the country represents an important case for research around energy justice. By increasing electricity generation from wind and solar photovoltaics and supporting the RE expansion for private households, the transition brought challenges along. Thereunder the economically efficient deployments of renewable energies, the introduction to the market, promotion and availability for the general population, and the preparation of the ground for a transformation of energy use in transport, industry, and buildings (Schiffer and Trüby 2018).

Studies that link the German actors of the energy transition, how they exchange knowledge and practices on energy justice and how they benefit (if at all) from

energy policies are however scarce. This research contributes to filling in these gaps. A particular focus is put on how energy justice is conceptualised in the energy transition plan in Germany, how the stakeholders are engaged in the energy transition, how they perceive energy justice in Germany and what the consequences of different perceptions are to find out the main justice-related challenges of the German energy transition.

To understand the current energy situation in Germany, the next chapter provides an overview of the German energy transition.

3. Study Context

This chapter provides background information on the case country Germany to understand the processes historically and to describe the current situation. Together with the theoretical background, it sets the foundation for the analysis and discussion.

3.1 The German Energy Transition: Energiewende

In the 1970s, protests against nuclear energy in Germany triggered political attention for rethinking the country's energy system and have become the cradle of the energy transition. Scientists at the Öko-Institut (eco-institute) at the time separated growth from electricity and other energy consumption for the first time. According to them, economic development should also be possible without constantly increasing consumption of coal, oil, natural gas, and uranium.

Since the 1990s, the Institute has been advising the German Federal Ministry for the Environment and the European Commission on various aspects of international climate negotiations. In the late 1990s, a study was carried out on the subject of phasing out nuclear power and starting to protect the climate. The early and mid-2000s were characterised by the topic of finding solutions for a sustainable energy supply (Energiewende 2023).

Energy efficiency became the solution model for the long-term reduction of energy demand. The energy is still required to be generated using so-called renewable primary energy sources. In addition to the national realisations and impulses to redesign the energy system, international developments have also contributed to driving the transformation (Energiewende 2023).

One of the central drivers became the Paris Agreement in 2015 where 196 parties signed a legally binding treaty on climate change to limit the global temperature increase to 1.5°C (UNFCCC 2023a) which translated to a climate strategy which has a coal phase-out and reformation of the energy system in Germany as a central element (Schiffer and Trüby 2018; Energiewende 2023).

The German term Energiewende was coined by the Öko-Institut in 1980 and can be translated to energy transition and refers to an alternative, clean, affordable, and safe way of generating and utilising energy. This means moving away from

traditional electricity and heat generation, primarily from coal and nuclear power towards renewable energies and energy efficiency (Energiewende 2023).

Central goals have been the reduction of greenhouse gas emissions by 95% by 2050 in comparison to 1990 (Energiewende 2023). This includes a significant increase in energy efficiency in all areas and completely CO₂-free electricity production. The accelerated phase-out of coal-fired power generation is a key element in meeting climate protection targets. German lignite and hard coal-fired power plants are currently responsible for 80% of the country's CO₂ emissions in the electricity sector. Phasing out fossil-fuelled power generation will therefore make a significant contribution to reducing CO₂ emissions (Energiewende 2023). Figure 3 shows the current electricity mix in Germany. 44% of the energy comes from renewable sources and is meant to increase to at least 80% in 2030 (Bundesministerium der Justiz 2023; BMWK 2023).

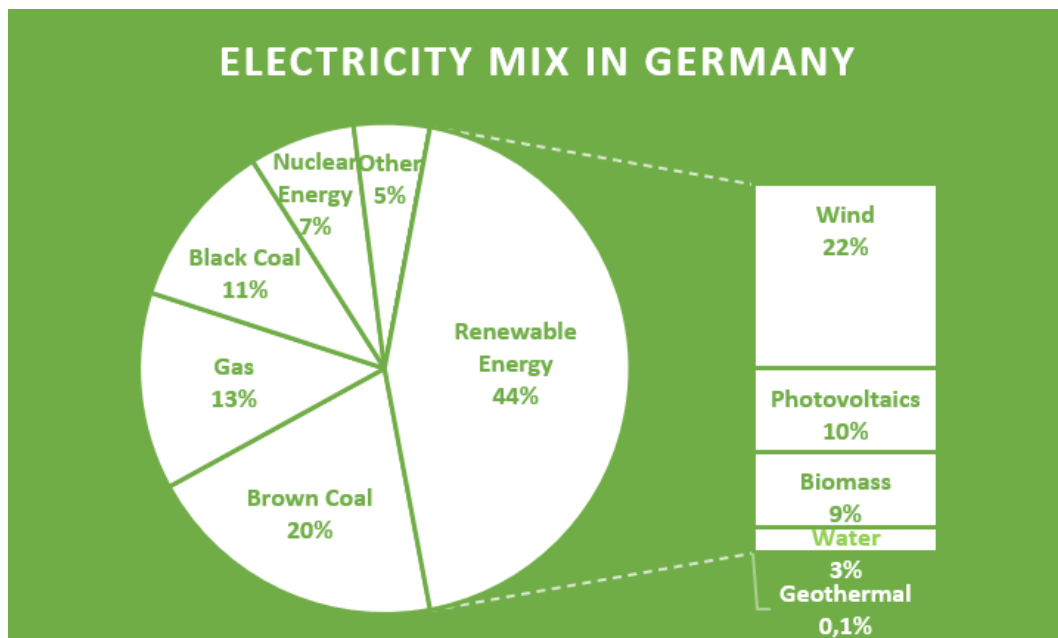


Figure 3. Electricity mix in Germany (Own illustration based on Bundesnetzagentur 2023).

Despite the clear goal, implementation is proving difficult (Energiewende 2023). As a consequence of the general sense of transition and impulse to rethink the energy system in Germany as well as to reach the targets, a variety of federal laws and regulations were initiated since the 1990s and introduced mandatory payments for citizens and companies for renewably produced electricity to increase the use of renewable energy sources. The regulations and laws have been adjusted with the course of time and the course of change in politics as well as global crises such as wars and trade shortages and provide an essential part of this study's analysis.

3.2 Impact on Actors and Stakeholders

The Consumer Advice Centre of Germany conducted a study that concluded that the number of consumers who are financially worried about rising energy prices is growing significantly. More than three-quarters (76%) stated that they were worried that the energy price crisis would be a financial burden for them in the future (Verbraucherzentrale Bundesverband 2022). The German energy prices are one of the highest energy prices in the world that continued to rise due to difficulties in importing gas from Russia with the outbreak of war between Russia and Ukraine (Schiffer and Trüby 2018; World Economic Forum 2023). The Federal Ministry for Economic Affairs and Energy estimates that an average household incurs additional costs of 2,000€ per year for heating with gas in comparison to the costs of 2022. Comparable additional costs also have to be paid for heating oil. For electricity, the current additional costs are a good 100€ per year (Verbraucherzentrale Bundesverband 2022). Over one-fifth of Germany's population is at risk of poverty, among them, women are more affected by poverty than men (Statistisches Bundesamt 2023). The additional energy costs can be a threat to financially struggling households that can possibly lead to energy shortages without governmental support.

Taking a closer look at the funding and subsidy programmes it is striking that the subsidies primarily support people who own a house and can therefore consider e.g. a solar collector system or change of heating technology. However, only about 48% of the German population owns property (Statistisches Bundesamt 2024). Additionally, the measure grants cover a cost amount that requires a huge investment on the other side from the private households, making the subsidies only applicable for higher middle-class and up households (bpb 2022; Verbraucherzentrale Bundesverband 2022; Bundesministerium für Wirtschaft und Klimaschutz 2023b).

A similar development can be observed in the industry, where strong middle-class companies or higher can even the rising energy prices and/or afford new technologies with the help of subsidies whereas small companies struggle or have to declare insolvency (Tagesschau 2022).

Besides the division into actors and stakeholders, Germany can be looked at through geographical sections. Even though the federal government regulates the energy supply transition centrally, the federal states have different prerequisites for producing energy. In the northern parts, wind energy is an efficient way to generate renewable energy in off- and on-shore wind parks. In the middle, south and east, the sun exposure is relatively high which makes photovoltaics more efficient. However, the diffuse sunlight is intense enough all over Germany to generate power. It only takes longer in regions with less direct sunlight to produce the same amount as in regions with more direct sun exposure. In the west, in North Rhine Westphalia are the most fossil power plants due to large coal deposits. All households and

industries can choose a provider and form of energy (renewable or fossil) for their consumption. The prices are set by the electricity providers and can therefore vary (NDR 2023). However, the government regulates a range of prices to avoid unaffordability through policies (Appendix 1).

This chapter outlined the current state of research on the topic of energy justice in Germany and showed that there are research gaps. The following chapter looks at the methods used in this study to find answers to the research questions.

4. Methods and Data

This chapter presents the research strategy, data collection, documentation, and analysis strategy. The data quality and reflections on the positionality of the researcher as well as limitations are also addressed.

4.1 Research Design

A qualitative research approach was chosen to examine how energy justice is perceived in the case study country of Germany and to discuss the social and economic challenges of the German energy transition. The research approach lies within the theoretical concept of energy justice. The strategy consists of three components: semi-structured interviews, a review of laws and regulations, and observations made at COP28 combined with published documents. The analysis and discussion focus on how energy justice is engaged in the three components and how selected actors perceive it. The methods were chosen based on the resources and capabilities of the researcher. The three methods combine individual perspectives of different actors with global phenomena through participation in the COP28, which can be transferred to a national level in Germany. The interviews and findings from the COP28 can then be contextualised in the legal framework of Germany. Connecting the findings from the three methods additionally helps reinforce or question the latter. The combination thus offers an insight, both globally, individually and legally, into the challenges of the energy transition in Germany through the lens of energy justice.

A case study aims to gain empirically detailed and intensive knowledge about a specific case or several smaller linked cases, using multiple data collection methods (Robson and McCartan 2016, chap. 7). Semi-structured individual interviews are the main component of primary data collection for this study. To gather information about different perceptions of energy politics and how various actors are interconnected, one-to-one and face-to-face interviews were chosen. Actors from the private sector, politics, and activist movements were contacted to conduct interviews. From each sector, one to two representatives were interviewed.

The data collection was carried out in November and December 2023 in Germany in the German language to ensure the quality of the interviews was not

impacted by language barriers. All interviews were recorded with the recording function of smartphones.

Before every interview, it was assured that the participants were willing to talk and consent to the interviewer. In the introduction, it was said that the study is for research and educational purposes, that any personal information is kept confidential, and participants will remain anonymous. The respondents were additionally assured that concerns and questions can be raised at any time, the possibility to withdraw from the interview is given at any time, and questions do not have to be answered if the interviewee feels uncomfortable. Other aspects that were communicated were that all answers are valid and there are no right or wrong answers. It was highlighted that the emphasis is on the respondent's perception and perspective. The interviewees were asked for consent to be recorded and to take notes.

A systematic literature review towards the topics of energy justice and the energy transition in Germany was carried out to lay the foundation for the interview guide and to ensure the quality of the critical analysis and discussion where the interviews are linked to literature. The legislative framework of the energy transition in Germany plays a fundamental role in the analysis where several important laws and policies are dissected.

Besides the interviews and the analysis of the regulations, observations were made during a visit to COP28 in Dubai. The observations are connected to published documents around COP28 in the analysis.

4.2 Methods

Three types of qualitative data sources are used in this research: semi-structured individual interviews, participant observation and documents.

4.2.1 Semi-structured Individual Interviews

To capture subjective perceptions of individual actors in the context of the energy transition and energy justice in Germany, semi-structured individual interviews were chosen as the primary component of the underlying study. The semi-structured interview is characterised by an interview guide that is used as a checklist for subjects that are to be addressed. The guide includes predefined formulations and an order for the questions. During the interview, the questions can be flexibly adapted, and additional unprepared questions may be asked to respond and follow up on statements made by the interviewee (Robson and McCartan 2016:285). The semi-guided interviews were chosen as they allow a high level of flexibility and adaptability to the respondent in the individual situation.

The interview guide that was developed for this study contains open-ended questions to ensure that the respondents get into a speaking flow and are not forced into a direction with limited possible answers. Critical questions about energy distribution, participation, and recognition to find out how just the energy transition in Germany is and for whom have been included. Care was taken to ask the questions as openly as possible to not steer the interviewee in one direction. Some questions are suggestive and were either asked when the respondent mentioned the related argument before or were used to provoke a more specific and clear answer.

After a presentation of the objective of this study, a mutual introduction, and the certainty of anonymity, general questions about energy politics in Germany have been asked.

1. What do you think about the energy transition in Germany?
2. Where do you see issues and hurdles regarding the variety of actors the transition is made for?
3. Where do you see the benefits? For whom?
4. What kind of solution does the politics offer to the mentioned challenges?
5. What type of technical solutions are put forward?
6. What is the role of the state, the role of citizens and local communities and the industry within the energy transition?
7. Who is involved in energy (democracy) initiatives? (gender, race, ethnicity, social/financial class)
8. How are cross-scalar injustices dealt with?
9. Do you think the current energy politics is fair/just? Why? For whom?
10. Who do you think profits from this politics? (financially wealthy/poor, men, women, etc.)
11. What do you worry about when it comes to the politics regarding energy in Germany?
12. How do you think the social components are considered in policymaking? Where does it stand about the economic and ecological components?
13. Where are the barriers/hurdles to make German energy politics socially more just?
14. To what extent do you feel heard and involved in the decision-making process for the energy transition?

Additionally, questions about their organisation and role helped to answer the main question of this study.

1. What do you do regarding energy in your job/organisation/life? Where is your focus? On what scale does your involvement happen?
2. Whom are you in touch with/collaborating? Are you in conversation with other actors regarding energy (justice) in Germany?

The interviews were conducted between November 8th, 2023 and December 15th, 2023. The five interview respondents have been coded from R1 to R5. In total, two interviews were held with two different activist groups (R1 and R2), two interviews were held with two members of two major German parties (R3 and R4), and one interview was conducted with a representative of a corporate body which represents the official interests of entrepreneurs, companies and self-employed tradespeople in Germany (R5). Thereby, interviewees have been activists, representatives from the industry and politicians. Since the government, the industry and involved citizens have been identified as the main actors in energy justice concerns, these three groups were intended to be selected for interviews, according to their interests and availability. Because of anonymity reasons interviewees are not named. The interviews were between 30 and 60 minutes long. They took place in person as well as virtually. The respondents represented a diverse group of age, gender and amount of time spent in their professional field.

4.2.2 Observations during COP28

In addition, to the semi-structured interviews, observations were made during an onsite visit to COP28 in Dubai from November 30th, 2023 to December 5th, 2023. The observations were made in the blue zone (venue for the accredited party and observer delegates with country pavilions, presidency events and an abundance of panels, discussions, and round tables) and the green zone (a hub for innovation, collaboration and showcasing practices for climate-related issues which were designed to engage a wider public by less restrictions to get access), as well as in side events, especially at the side event series called Hope House. The energy summits with high-level participants and decision-makers were only followed virtually because of non-granted access. The observations therefore represent the atmosphere, attitudes and spontaneous conversations with people at the venue as well as what could be seen and followed virtually at the conferences. Besides the events at the COP28 expo venue, a panel at Hope House on December 4th, 2023 was attended and led by speakers Disha Ravi and Dr Dominic Bedner with the topic “JUST Future on Energy”. To add to the observations, documents published about COP28 are used to round up the analysis.

4.2.3 Examination of Laws and Regulations

The legislative framework in the form of laws and regulations presents a crucial part of the analysis and discussion. They present the legal framework and provide information on which stakeholders are taken into account in the energy transition, to what extent costs are passed on to consumers, what legal options are available for self-development, who can get subsidies, etc. The laws are then put in context

to the concept of energy justice to find out if, how, and for whom the concept is taken into consideration by law.

4.3 Data Documentation and Analysis

All carried out interviews were recorded with the recording function of smartphones. Notes on the main points of what was said were taken during the conversations. Later in the process, the interviews were transcribed to make sure all information was complete and retrievable. The transcript was complemented by personal notes and impressions from the interviews. Thematic blocks were then identified and used as subtitles in the analysis and empirical findings to order the respondent's answers and find commonalities as well as differences.

Likewise, the observations at COP28 were written down by hand either right away or in the evening when reflecting on the day and the experiences.

The interviews, the laws and regulations, and the observations at COP28 together with published documents from COP28 are put into the context of the four identified key characteristics of energy justice to support answering the research questions.

4.4 Data Quality and Limitations

The study is exclusively based on qualitative data and is limited to site-specific data generated by five interview respondents, observations made at COP28 and published documents from COP28. The study serves to gain insight into chosen aspects of the energy transition as defined by specific actors.

In the interviews, attention was paid to following general advice on conducting semi-structured interviews. Thereunder, listening more than speaking, asking open and clear questions, paying attention to form follow-up questions, and remaining interested. Additionally, it was important to be aware of the atmosphere and mood of the respondents and put the situation in context. Since the interviews were made in the respondent's mother tongue, the information was clear and understandable for both sides which improved the quality of the answers.

However, the number of respondents remained way under the number of people who were contacted to ask for an interview on the matter of energy justice. This leads to a small number of involved actors sharing their perspectives. Additionally, great effort was made to rephrase or revise questions to gain high-quality answers. The responses and the depth of knowledge of each interviewee however differed and has majorly influenced the quality of the empirical findings.

The observations during COP28 helped put the German energy transition into context. A focus was put on the atmosphere and conversations with visitors. Again,

the quality of the conversations differed highly because of a lack of commitment, knowledge and interest by approached people. The analysis of documents has been limited by the availability of trustworthy and objective publications. The official sources were mostly the UN and COP itself, as well as participating organisations and industries or highly critical adversaries. The data was therefore highly influenced by the intentions of the publishers which limited the objectiveness of the documents.

5. Empirical Findings and Analysis

In this chapter, the empirical findings and analysis from the conducted interviews, the policies, and observations at COP28 are presented. The four identified key aspects of energy justice, distribution of costs and benefits, participation, procedural justice, and power relations divide this chapter into four main sections where the findings are presented and analysed.

5.1 Distribution of Costs and Benefits

5.1.1 Interviews

One of the main criticisms mentioned within the interviews is that the costs of the energy transition and the promotion and funding of renewable energies are often passed on to the consumers. The costs of the transition caused by building new infrastructures as well as the import of energy can lead to rising energy prices, which are a particular burden on low-income households. R2 mentions that as a low-income household, you cannot always think long-term. Especially in the case of owning photovoltaic panels, no matter whether it is a bigger one for the roof or a smaller one for the balcony. The photovoltaic investment might pay off in the long term, however, if one struggles financially at the moment, then one has to think short-term. Photovoltaic plants take years, depending on the number of panels and the energy usage of the household to yield a profit and start to pay off. Additionally maintaining costs of the installations occur that need to be covered. It is often a question of the immediate availability of money and not always about what amount of money one saves in the long term. R2 adds that there are decisions and subsidy programmes where individuals can benefit and receive a grant, but the funding is not constantly available to everyone. One has to fulfil precise criteria and these often do not match the given circumstances of the concerned household. R3 elaborates on the cost issue with an example. Electric vehicles for private owners were under subvention in 2016 with a ten-year tax exemption and financial support of up to 6.000€ for fully electric vehicles and up to 4.500€ for hybrid vehicles. Because of funding issues, the subsidy had to be stopped because of the immense demand. R3 adds that the demand overcharged the system and also shows that there is a huge amount of people who would invest in electric vehicles if they were more affordable

with subsidies. However, the ending of the subvention showed that the economic aspect was more important than environmental concerns for the consumers: only financially wealthier households continued buying electric vehicles thus contributing to the energy transition.

R5 mentioned that the current “climate policy is like a demand, a cost burden, an obligation” not just for citizens but also for companies, especially small and medium-sized enterprises. Market power is decisive in how companies deal with high energy prices. Customers react quickly to price increases and, depending on the product, they may or may not have the choice to switch to alternative products. Most companies pass on rising prices to customers by increasing their selling prices. R5 concludes that social justice does not exist because people who can no longer afford the rising prices are excluded. On the other hand, industries that are in international competition and increase their prices are at risk of losing international customers, who then buy cheaper products from other countries instead of German ones.

In conclusion, when the companies raise the price and pass it on to the customer they may lose the latter. If they deal with the increase internally, the company may have financial issues, depending on the size and financial wealth of the business. Both scenarios do not lead to energy justice as in this case, the distribution of costs and benefits only harms one side (the less wealthy consumer) and is never equally distributed. Thus, the social distribution of the costs and benefits of the energy transition is unequal: low-income households are often unable to benefit from the support measures and bear the costs of energy-efficient refurbishment measures. This can lead to further exacerbated social inequalities.

Property appears to be an important differentiation factor. R4 considers that property owners usually have more money to change their belongings and consumption habits. They can renovate their homes and implement the heating transition and the electricity transition. This means that they either participate in the homeowners' association or, if they are individual homeowners, they have full decision-making power. In this respect, property owners will always benefit first, and these are usually those who are financially stronger.

The state could ensure that tenants benefit just as much as those who have less capital. If photovoltaic and wind power are less favourable compared to other forms of energy, then those should naturally benefit from the lower electricity prices. This would require legislative regulations or government subsidies so that even people living in social housing can benefit from the lower prices. But this is not the case so far. R4 adds that there are marginal price differences between green electricity and conventional electricity. Financially weaker households could therefore buy green electricity if they wanted to. However, when investing in electric vehicles or photovoltaic systems, financially weaker households are disadvantaged because of high investment prices.

On the other hand, less wealthy households contribute to decarbonization because they use public transport more than wealthier ones and tend to use energy more sparingly. However, the reason for this is not mandatorily environmental awareness, but a necessity for financial reasons. And whether this is fair is debatable.

While the costs of the energy transition are borne by all consumers (but not proportionally: low-income households spend a greater proportion of their income on energy supply), not everyone benefits equally from the advantages. High-income households and companies in particular can benefit more from the support measures. R2 explains that the industry is prioritized before the citizens as the industry keeps the country running through economic activities, however, citizens are required to keep the industry running, so by putting the citizens last, the industry and economic activities are also potentially negatively impacted. As R2 puts it: people “often talk about energy security but energy security does not mean that the lights are on or the PC is on, rather energy security means that the industry is running”.

5.1.2 Policies

The key messages of the interview respondents match the findings of the analysis of laws and regulations. The actors who benefit most from the current energy policies are the middle class and rising-income households, as well as energy industries and large corporations because of subventions and available financial possibilities. R3 puts this in relation by saying that the current politics around energy might not be the problem, but good social politics could prevent people from living in poverty in the first place so that questions and concerns around cost burdens and the distribution of benefits do not even rise.

There are many policies, laws and regulations in Germany that regulate different aspects of the energy transition. The Renewable Energy Sources Act and the National Action Plan Energy Efficiency can be considered as the most important ones. Besides these, this chapter takes a closer look at the Combined Heat and Power Act, the Building Energy Act, the Renewable Energies Heating Law, the Energy Industry Act, the Basic Electricity and Gas Supply Ordinance, and Carbon Pricing. The listed regulations have been identified as important additions to the two main policies in the area of energy transition in Germany. All mentioned laws are summarised and presented in the Appendix 1. In this section of the findings, the laws are analysed in context to the distribution of costs and benefits.

The aim of the Renewable Energy Sources Act is the transformation to a sustainable and greenhouse gas-neutral electricity supply based entirely on renewable energies (Bundesministerium der Justiz 2023). The EEG regulates how the costs

for the expansion of renewable energies are passed on to consumers (EEG surcharge) and under which conditions companies and prosumers are entitled to a reduced EEG surcharge. The primary instruments are feed-in tariffs and propriety regulations for electricity from renewable energy sources (Moore and Gustafson 2018; Bundesnetzagentur 2023).

Connecting the costs and benefits of the energy transition to the Renewable Energy Act, one can argue that the EEG primarily benefits operators of renewable energy systems, which are either companies or private households owning photovoltaics or similar. This offers them a guaranteed feed-in tariff for the electricity of their produce. In addition, consumers benefit from cheaper and more environmentally friendly electricity from renewable sources, as does the environment as a whole by reducing greenhouse gas emissions. The costs of the investment into renewable energies are carried by the household so the benefits are received exclusively for the household. This can be argued that just having the choice of installing photovoltaics is reserved for high-income households and owners, and financially strong companies. The option of becoming self-sufficient by installing a solar system is therefore excluding tenants and financially weaker households.

The National Action Plan Energy Efficiency describes the Federal Government's energy efficiency strategy (Bundeministerium für Wirtschaft und Klimaschutz 2014; Bundeministerium für Wirtschaft und Klimaschutz 2019; Bundesamt für Wirtschaft und Ausfuhrkontrolle 2023).

The National Action Plan on Energy Efficiency essentially defines three cross-sectoral efficiency measures.

1. promote energy efficiency in the building sector,
2. establish energy efficiency as a return on investment and business model and
3. increase personal responsibility for energy efficiency (Bundesamt für Wirtschaft und Ausfuhrkontrolle 2023).

The National Action Plan Energy Efficiency considers measures to increase energy efficiency so that consumers can save energy costs in the long term. Companies that rely on energy-efficient technologies can benefit from government funding programmes and incentives. However, companies that do not invest in energy-efficient technologies could be disadvantaged by stricter regulations and higher energy costs. A general falling energy consumption caused by more efficient technologies and consumers' awareness of saving energy can lead to a loss of revenue for companies in the energy industry sector if they do not change business models. Jobs could be lost if companies have to reduce or close their production due to efficiency measures.

Since its adoption in 2002, the Combined Heat and Power Act has regulated the promotion of the simultaneous, efficient generation of heat and electricity in

combined heat and power (CHP) plants. Similar to the EEG, the CHP Act sets different remuneration rates for different types of plants. The financing mechanism is also similar to that for renewable energies: All households and companies pay a levy per kilowatt hour of electricity (CHP levy) (Bundesministerium der Justiz 2016).

The Combined Heating and Power Act can be analysed in a similar light as the EEG. Operators of CHP plants are the main beneficiaries of the latter Act, as they receive financial support through the feed-in tariff for the electricity produced and the energy costs saved. Consumers can also benefit from lower energy prices, as CHP plants work more efficiently and therefore produce electricity and heat more cost-efficiently. The losers of the Act may be conventional energy suppliers, who could lose market share due to the increased use of CHP plants. In addition, consumers who do not have the option of operating a CHP plant themselves could also have to pay higher energy prices in the long term if conventional energy generation becomes more expensive.

The Building Energy Act contains provisions on energy requirements for buildings, heating and air conditioning technology, energy performance certificates and the use of renewable energies in the heating sector (Die Bundesregierung 2023).

The Building Energy Act primarily benefits next to the environment the society as a whole, as the requirements of the Act reduce the energy consumption of buildings. This contributes to climate protection and helps reduce CO₂ emissions. In addition, consumers can also benefit from lower energy costs in the long term, as energy-efficient buildings consume less energy. The losers of the Act could be builders and owners of older, energy-inefficient buildings, as they may have to bear higher investment costs for energy-efficient refurbishment measures. Trade businesses that do not specialize in energy-efficient renovations could also suffer a loss of revenue.

The purpose of the Renewable Energies Heating Law is to enable the sustainable development of the heating and cooling supply and to promote the further development of technologies for the use of renewable energies in the interests of climate protection, the conservation of fossil resources and the reduction of dependence on energy imports (Bundesministerium für Wirtschaft und Klimaschutz 2022).

The main beneficiaries of the Renewable Energies Heating Law are the operators of renewable energy systems, as they receive compensation for the heat fed into the grid. Thereby, consumers can also benefit from lower costs if more renewable energies are used. Operators of conventional heating systems, on the other hand, could be the losers of the Law as they may experience less demand for their services as a result of the promotion of renewable energies. The costs of expanding the infrastructure for using renewable energies could also affect consumers by raising taxes.

The Electricity and Gas Supply Act, or Energy Industry Act, regulates the functioning of the German energy market. The Act defines the primary objective as the most secure, affordable, consumer-friendly, efficient, and environmentally friendly grid-based supply of electricity, gas and hydrogen to the general public, which is increasingly based on renewable energies (Bundesministerium der Justiz 2005).

The Energy Industry Act regulates the framework conditions for the operation of energy plants and energy trading. Energy companies are the main beneficiaries of this Act, as it provides them with clear rules and guidelines for the operation of their plants, giving them planning security. Consumers can also benefit from a functioning energy market, as this can lead to fair prices and a secure energy supply. However, the losers of the Act could be small energy companies or new market participants who find it difficult to establish themselves on the market due to the regulatory requirements. Consumers could also lose out if the law does not ensure sufficient transparency and competition and this leads to higher prices which would affect low-income households more than higher-income households.

The Basic Electricity and Gas Supply Ordinance (Strom- und Gas-Grundversorgungsordnung) regulates that all customers in Germany are legally entitled to be supplied with electricity and gas by their local basic supplier (Bundesministerium der Justiz 2006).

Following on from the Energy Industry Act, consumers benefit from the Basic Electricity and Gas Supply Ordinance as they are entitled to a secure and reliable supply of energy. There are regulations on pricing to ensure that energy prices are both reasonable and transparent. On the other hand, consumers could suffer if the prices for electricity, gas or water are set too high in the regulation. Small energy companies could also be disadvantaged if they find it difficult to compete in the market due to the regulations, leaving the market exclusively to bigger dominating energy companies.

Carbon pricing for transport and heating is an energy policy instrument and the centrepiece of the climate protection programme aimed at contributing to the reduction of climate-damaging CO₂ emissions by increasing the associated costs for the polluters (emitters). Products such as combustibles and fuels whose use leads to CO₂ emissions are subject to energy taxes, which can also be explicitly labelled as CO₂ taxes (Die Bundesregierung 2019). If companies sell heating oil, liquid gas, natural gas, coal, petrol, or diesel, they need a certificate as a pollution right for every tonne of CO₂ that the substances will cause in consumption (*ibid*).

The CO₂ pricing affects actors differently. On the one hand, it reduces greenhouse gas emissions, which helps tackle climate change. Due to higher costs for fossil fuels, renewable energies become more competitive and can establish

themselves on the market more quickly. Companies that already rely on environmentally more friendly technologies can benefit from carbon pricing as well and they have a competitive advantage over companies with higher emissions. On the other hand, carbon pricing will increase the price of fossil fuels such as gasoline, heating oil and gas, resulting in higher costs for consumers who are bonded to or using these fuels. Industries that consume particularly high amounts of energy and have naturally high CO₂ emissions may be burdened by CO₂ pricing and see their (international) competitiveness impaired. Regions that are heavily dependent on the coal industry could be economically disadvantaged by the pricing if they do not switch to alternative energy sources in time.

5.1.3 COP28

At COP28, just energy transition was a major topic. On December 7th, 2023 the COP presidency and the International Energy Agency concluded on five pillars to improve and drive the global just energy transition (COP28 UAE 2023).

1. Tripling global renewable energy generation
2. Doubling annual energy efficiency improvements by 2030
3. Decline of fossil fuel use demand by 2030
4. Commitment from the oil and gas industry to align their strategies with 1.5°C
5. Financing mechanisms for a major scaling-up of clean energy investment in emerging developing countries

When looking at the five main outcomes and comparing them to the elements of energy justice covered in this thesis, a gap can be identified. In the case of the equal distribution of costs and benefits, one can see that the topic is not mentioned in the five main pillars. Taking a closer look into the last point, financing mechanisms of clean energy investment in emerging developing countries, one can argue that wealthier countries supporting developing countries are part of the equal distribution of costs and benefits and can help achieve global energy justice. However, on a national scale, the topic of a just distribution of costs and benefits has not been addressed in any manner. When scanning documents about the Just Energy transition, no specific actions were found except for monetary support. This can be seen as a starting point, but energy justice cannot be bought by wealthier nations giving money to less wealthier ones.

5.2 Participation

5.2.1 Interviews

During the interviews, bureaucratic burdens, overstrain, lack of transparency and the lack of knowledge and experience exchange were mentioned by the interviewees.

R1 explained that the energy transition overstrained the citizens. R2 adds that with an abundance of laws and subsidy programmes which are constantly being expanded, keeping the overview can be difficult not only for citizens but also for companies. R1 further mentions the importance of the government encouraging its citizens instead of fearing insufficient energy supplies. R4 elaborates that “we are living in a crisis consisting of an energy crisis, inflation, the aftermath of the COVID-19 crisis and wars at our doorstep leading to people falling back to tried and tested methods. Security instead of renewal. This is leading to a kind of return to nuclear and coal energy. New technology, large investments and renewal are being pushed back”. R4 adds that another hurdle is the lack of a change in mentality, the uncertainty that new things cost a lot in the beginning and that people think too short-term and do not look at the positive long-term successes.

Another key statement during the interviews was that citizens are often not sufficiently involved in the decision-making process in connection to the process related to the energy transition. R1 and R2 mentioned that activist groups are in exchange with municipal and state politicians but not with energy companies as they consider it as “waster energy” (R2) to talk. R2 goes on to explain that activist groups are labelled as adversaries, do not feel taken seriously and although they rely on science, science is seen as a personal opinion. They therefore prefer to focus on engaging with politicians in the hope of getting regulations and laws passed, as well as mediating interests between activist groups and corporations. R4 adds that there is no serious exchange between citizens and the industry. Politics works as the binding link, but it leans more towards the industry rather than the citizens as the economy is a financial pillar and funder of politics. There is a significant number of energy company representatives on the political supervisory boards. The dominance of the industry in politics breaks the balance and makes the voices and interests of citizens in the matter smaller. This has a direct impact on justice as the initial circumstances and representation of interests are not even.

R3, who represents a party, adds that members of the party are in direct contact with associations and companies, social organisations, ecological associations, and science and activist movements, but that there is hardly any focus on energy justice. This is because the awareness, the urgency, and sometimes also the knowledge are often not given by the members of the parties. The fact that it is not a topic in discussions is explained by R3 by the fact that the members and deputies tend to have a technical and financial perspective on the issue.

On the other side, R5 mentions that during amendments when new laws are made, consumer advocates, trade unions and social associations are present to ensure the well-being of the population. Additionally, there are big rounds with social representatives, small and medium-sized enterprises, state secretaries, environmental associations, trade unions, social associations and companies. It is more a matter of transparency, that the general population is not aware of these exchanges and the possibility to participate.

5.2.2 Policies

Democracy is based on the participation of citizens. In Germany, the participation is divided into three substantive areas. First co-determination in representative structures, e.g. through elections, second co-determination on direct issues (referendum), and third participatory forms of participation through citizen dialogues. The participation can be divided into formal and informal. Formal includes legally regulated procedures of direct democracy, such as elections, petitions and referendums. Informal refers to dialogue-oriented, consultative and freer procedures in which citizens come together to form opinions or make decisions. Representative democracy cannot and should not be replaced by citizen participation processes. Rather, participation complements the representative democracy constructively and promotes democratic awareness (Landeszentrale für politische Bildung Baden-Württemberg 2023).

In the case of energy justice, this means that citizens have the right to participate in decision-making processes through open dialogue, petitions, etc. However, having the right does not equal being aware of the possibilities. Additionally, participating in roundtables and dialogues can be an intimidating thought for citizens, so do R1 and R2 mention in the interviews. When looking at the number of laws and regulations presented in 5.1.2, keeping an overview and fully understanding the policies can be difficult. The general population is not an expert in the topic either and has their daily obligations to do. Engaging in the topic of energy justice can be an additional burden to their lives.

Besides the people who are not aware of their opportunities to get involved, those who are aware often lack the courage, time or understanding of the issues to get involved. Another group, on the other hand, does not feel that energy injustice is an issue and therefore does not get involved. A major burden is the large scope of legislation, which makes it difficult to maintain an overview.

To decrease the bureaucratic burden, the German government has introduced a new legislative package. The "Solar Package I" is an important legislative package that aims to reduce bureaucracy in the construction and operation of photovoltaic systems and further accelerate the expansion of photovoltaics in Germany. This was passed by the German government in August 2023. Solar Package I simplifies the registration of balcony power plants. These no longer have to be registered with the

grid operator. Since January 2024, the feed-in of solar power for new PV systems has been remunerated at a higher rate than before. With the adoption of the new law, access to a photovoltaic plant has opened to people who do not own a house but have a balcony. However, because of the relatively small space a balcony offers for solar panels in comparison to a roof, the outcome of energy generated is lower and the cost-benefit ratio is often so low that installation is not always worthwhile (Die Bundesregierung 2024).

5.2.3 COP28

At COP28, politicians such as presidents and ministers, civil society, business people, indigenous peoples, youth, philanthropists and international organizations were present. The prerequisite to attend was to hold an entry badge that was given to recognised organisations and parties who chose candidates to give their badges to and who were supposed to engage in climate action (UNFCCC 2023b). Looking closer at the distribution of the participants, it can be noticed that a record number of fossil fuel lobbyists attended COP28. At COP27, about 636 fossil fuel representatives were present and at COP28 around 2 456 (KBPO 2023). During discussions about new agreements in the global energy transition, mostly political representatives of countries were present and decided on new goals and regulations. However, the representatives are all individually influenced by their countries, representing their interests. It cannot be clearly stated what this influence looks like particularly. However, looking at the number of fossil fuel lobbyists and the oil industry in the United Arab Emirates, the place where COP28 was held, one could conclude that decisions were largely influenced by the fossil fuel industry.

5.3 Procedural Justice

5.3.1 Interviews

Compared to the other key aspects of energy justice, the topic of procedural justice has been rather minor in the interviews. R3 mentions that the social aspects of the energy transition have not been included in the process from the beginning on. The whole transition was more thought through on a technical level. Now, the issues and gaps between the financially wealthy and the financially struggling households occur, and it is a highly demanding job to find solutions. Energy transition should have been connected deeply to social politics early on in the process. R3 adds, that there is only a small minority who also see and consider the social side in politics. In addition, some lack knowledge about the issue of energy justice. Those who make the big decisions in politics would mostly be financially privileged people, often the stereotypical “old white men”. Since it is not from their concern and

people in their surroundings might also not suffer from energy injustices, the topic hardly makes an appearance in discussion rounds. The representation of a broad spectrum of the population is missing and leads to unjust decisions. Since it does not affect the decision-makers and perhaps no one around them, energy justice is therefore not an issue and not recognised in policy-making. Youth parties in particular, however, are concerned with marginalised groups and minorities and advocate for balanced majority voting rights. Especially the youth parties consider the marginalised people and minorities and speak up for balanced majority ratios. On a positive note, R3 adds that the topic is increasingly reflected in the decision-making process.

5.3.2 Policies

There are multiple funding and subsidy programmes recognised by the government to support households and the industry in switching to renewable energies.

The federal subsidy for energy and resource efficiency in the economy supports companies with grants and loans as well as with the creation of transformation concepts to reduce energy and resource consumption with their investments (Bundesministerium für Wirtschaft und Klimaschutz 2023a).

The federal funding for energy and resource efficiency in the economy is a central funding programme for increasing energy and resource efficiency and expanding the use of renewable process heat in industry and commerce. The programme consists of various funding elements divided into six modules.

Module 1 supports companies that use cross-sectional technologies to keep industrial productions with different processes, motors, pumps but also ventilation systems, and compressed air systems running.

Module 2 supports companies when they switch to renewable sources in production and integration into the production process.

Module 3 subsidises the purchase and installation of measurement, control and regulation technology and sensors, as well as energy audits, energy management and the use of AI software.

Module 4 promotes investments by companies that lead to greater energy and resource efficiency and reduce the consumption of fossil resources.

Module 5 supports the development of decarbonisation strategies with the help of transformation concepts.

Module 6 supports small companies that switch to electricity in new plants and use renewable energies (*ibid*).

The Federal Subsidy for Efficient Buildings subsidises measures for greater energy efficiency in residential and non-residential buildings and, among other things, the replacement of old, fossil-fuelled heating systems with heating systems based on renewable energies. The investment incentives are intended to make a decisive contribution to achieving the energy and climate targets in the building sector and

making Germany greenhouse gas-neutral by 2045 (Bundesministerium für Wirtschaft und Klimaschutz 2023b).

The following investment cost subsidies will be available for the replacement of heating systems:

1. A basic subsidy of 30% for all residential and non-residential buildings, which, as before, is open to all applicant groups;
2. an income-related bonus of 30% for owner-occupiers with a taxable household income of up to 40,000 euros per year;
3. and a climate speed bonus of 20% until 2028 for the early replacement of old fossil-fuelled heating systems for owner-occupiers.

The bonuses can be accumulated up to a maximum subsidy rate of 70%. Landlords will also receive the basic subsidy, although they will not be allowed to pass this on through the rent. Private individuals, local authorities, companies, and non-profit organisations are eligible to apply. Individual refurbishment measures, for example, the replacement of an old fossil-fuelled heating system with a renewable energy-based heating system or measures to insulate the outer shell are subsidised as part of the investment costs. These grants can be applied for from the federal office for economy and export control (Bundesministerium für Wirtschaft und Klimaschutz 2023b). Table 2 shows the individual measures of grants and subsidies.

Table 2. Federal funding for energy efficient buildings – individual measures (Own table based on Bundesministerium für Wirtschaft und Klimaschutz 2023b).

Type of measure	Individual measure grant	Heating replacement
Solar collector system	25%	10%
Biomass	10%	10%
Heat pump	25%	10%
Innovative heating technology	25%	10%
Heating network connection	30%	-
Building network connection	25%	-
Building network construction/conversion/extension (exclusive biomass)	30%	-

Building network construction/conversion/extension (inclusive up to 25% biomass)	25%	-
Building network construction/conversion/extension (inclusive up to 75% biomass)	20%	-
Building envelope	15%	-
System technology	15%	-
Heating optimisation	15%	-

Even though the state recognises the need to support households and the industry with funding programmes, a look at Table 2 helps put the subsidies into perspective. The maximum limit of eligible costs for residential buildings is a maximum of 60,000€ per residential unit and for non-residential buildings a maximum of 1,000€ m² of net floor area, totalling a maximum of 5 million €. The minimum investment amount is 2,000€, or 300€ for heating optimisation (Bundesministerium für Wirtschaft und Klimaschutz 2023b). The measured grants for households and companies to take energy efficiency measurements are between 10% and 30% of the required costs. Again, only households and companies that could cover the remaining costs can benefit from the subsidy programme.

5.3.3 COP28

Various measures were adopted and taken to promote energy justice at COP28. First, nearly 200 represented countries agreed to promote the expansion of renewable energy to improve access to clean energy for all. Second, measures were agreed to increase energy efficiency and reduce energy consumption to ensure a sustainable and equitable energy supply. Additionally, the participants agreed to provide financial support to developing countries to help them transition to clean energy sources and ensure access to energy for all. Furthermore, measures were agreed to promote capacity building in developing countries and to support technology transfer in the field of renewable energy.

These measures were made to help improve energy justice worldwide and ensure that all people have access to clean, affordable and sustainable energy. The implementation of the measures on energy justice that were agreed on depends on several factors, such as political will, financial support and cooperation between the parties involved.

It is important to note that the realisation of the measures is a major challenge, as they often compete with economic interests and political decisions. It will therefore be crucial that the parties involved collaborate consistently and with a

commitment to achieve the energy justice goals. It is also necessary that energy justice policies are implemented at local, national and international levels to ensure that all people have access to clean and affordable energy.

It is not clear how exactly and specifically the measures and the support would look like. Neither on an international level nor, in relevance for this study, for Germany. The focal point of the discussion during COP28 was mostly on how industry nations can support less economically strong nations and increase renewable energies. This reinforces the point of a lack of representation of interests and stakeholders analysed above.

5.4 Power Relations

5.4.1 Interviews

A key takeaway from the interviews is how the respondents perceive the domination of businesses in influencing politics, particularly mentioned by R4. The general population can be involved voluntarily. Businesses on the other side, financially support politicians and parties and can directly influence financial generosity. They also have representatives sitting on supervisory boards and extra-parliamentary interest representatives, or lobbyists, are likewise mostly employed by large companies in industry and business and can exert direct influence on political decisions. This puts large corporations in a special position of power, which can upset the balance of justice by making the voices of citizens and small businesses less heard. The lack of representation in decision-making processes leads to decisions that put present stakeholders in power positions while not including the interests of non-represented stakeholders, mentions R3.

5.4.2 Policies

Among other aspects, the EEG regulates how the costs of expanding renewable energies are passed on to consumers. This is primarily done through feed-in tariffs and propriety regulations (Moore and Gustafson 2018; Bundesnetzagentur 2023; Bundesministerium der Justiz 2023; BMWK 2023). The Combined Heating and Power Act similarly regulates financial support through feed-in tariffs. These tariffs particularly guarantee operators of renewable energy systems, speaking of homeowners and businesses. With that, people who do not own property or run their renewable energy plant do not have access to the tariffs which puts them in a position with less power.

When looking at the three cross-sectoral measures of the National Action Plan on Energy Efficiency it can be concluded that the main objective is to increase energy efficiency. The Plan speaks to companies that can benefit from funding when

investing in new technologies and at the same time companies that do not invest in technologies can expect higher energy costs through strict regulations. This reinforces what R5 says that the climate policy is rather a demand, a cost burden, and an obligation for companies. The plan does highlight that all social classes are involved, but comparing the investments companies would have to make to get the required technologies, only financially stronger ones can compete and withstand.

Overall, the policies acknowledge the range of social income classes for households as well as for businesses. However, the policies are made by the government that are majorly influenced by the industry. With that, an imbalance of power between the general population and the industry is generated.

5.4.3 COP28

Building on the definition of energy justice, it can be noticed that the social and financial status of citizens and the accessibility, distribution of energy access, energy costs, and energy benefits throughout the population and the industry are particularly considered and mentioned by decision-makers at COP28. However, there remain inequalities when approaching people and opening discussions around their perception of energy justice in their countries and communities.

During spontaneous and random encounters and conversations at the COP28 venue as well as the panel talk “JUST Future of Energy”, the key takeaways and findings were that people perceive the current global energy politics as not just as energy prices signify a burden for low-income households leading to energy shortages and insecurities. One respondent talked about people in his local community who were reluctant to switch on the heating even when it was freezing because of high electricity prices. It was also mentioned that there might not be one solution that works for all, as situations and circumstances are very different, thereunder not only income differences but also the sizes of living areas, the location and climatic environment of the houses or apartments. Differences between the general population and the industry in terms of energy supply and purchase were not further elaborated on.

Another observation made has been how what is happening on a smaller scale in Germany regarding energy justice issues can be seen on a global bigger scale. There are groups that struggle more, mostly financially, and encounter energy shortages and insecurities through rising prices and unequal benefits from subventions. Looking at a global scale, which has been done at COP28, a similar observation was made. Instead of groups of people, it has been countries. While some have technologies, money and resources available, others rely on external support. Even though Germany is categorized as a wealthy industry nation on a global scale, the mentioned energy justice-related challenges have been mirrored in microcosmos.

6. Discussion and Conclusion

This chapter provides answers to the research questions and connects the key findings to the theoretical background of energy justice in Germany. Finally, limitations and novel directions to investigate are presented.

6.1 Answers to the Research Questions

First, the sub-question “Who is involved in the energy transition and with which roles?” has prompted the mapping of the main stakeholders of the energy transition in Germany. They are the government/politicians, the general population/consumers/activists, and the industry.

The government primarily makes the rules and laws as well as works as the binding element of all involved actors. It gathers the different opinions and interests and then makes the regulations.

The general population consumes the energy together with the industry. The population depends on the decisions of the government and can participate in the decision-making process. The population can be divided into financially stronger and financially weaker households because regulations affect these groups differently.

The industry is a consumer but also can be a producer. The role that it plays varies a lot depending on the size and financial tools of the company, on the sector and also on the influence in politics through e.g. lobbyism.

The second sub-question asked, “How do different actors involved in the energy transition in Germany perceive energy justice?”.

The study has shown that energy justice has different understandings within the actors in the energy sector.

Overall the government attempts to balance the interests of the population and the industry by making laws and regulations. As a result of the analysis, energy justice has only been recognised after the energy transition has been introduced. Through regulations of RE in the private sector is promoted and subvented and is slowly adjusted to grant access to people without property. Energy justice is perceived as a factor that is becoming increasingly important. Subsidies and packages of measures are therefore being introduced to the market to drive forward the energy

transition. Nevertheless, a large part of the population is being neglected, as the packages primarily apply to landowners and companies.

The population is affected differently by the energy transition, majorly depending on financial means. Thereby, the understanding of energy justice varies mostly since the effects of the distribution of costs and benefits affect them differently. While some households might not even think about energy justice, others struggle to pay their energy bills or feel left out when it comes to supporting programmes in the renewable energy sector, benefitting from feed-in tariffs or becoming less independent from energy import.

The industry perceives energy justice differently as well, depending on the sector and the size of the company. Bigger businesses might have lobbyists working closely with the government, representing their specific interests. The subject of justice is, therefore, a rather subjective one that leans towards individual (selfish) interests, rather than an objective one as it should be per definition.

The third sub-question concerns “What are the consequences of different understandings of energy justice on the involved actors in the energy transition in Germany?”.

Different understandings of energy justice lead to different expectations of possibilities, policies and subsidies between the involved actors. The perceptions and opportunities differ drastically between the financial status of households and industries as well as the knowledge, time and courage to participate in political decision-making. This leads to perceived dissatisfaction, injustice, frustration, and also conflict. Different understandings impact the implementation of energy policies and subsidies. If certain groups feel that they are disproportionately affected by the consequences of the energy transition, they may resist or oppose the transition or do not even have options to actively participate and benefit from the transition, e.g. by becoming energy prosumers. When some actors prioritize economic efficiency and cost-effectiveness in the transition, while others prioritize social equity through a fair distribution of costs and benefits or environmental concerns, disagreements on policies and strategies occur. These differences in understanding energy justice were identified above all in the financial circumstances of households and industries as well as in the general recognition of energy injustices by the government.

Overall, the consequences of different understandings of energy justice can result in social conflicts, regulatory challenges, and dissatisfaction. Engaging in dialogue, collaboration and compromises to address these differences is crucial to achieve an energy-just transition.

Finally, the main research question “What are the energy justice-related challenges of the German energy transition?” is answered.

The thesis focused on five forms of justice: distributional, participational, procedural and power relational. The study highlighted that involved actors perceive the social components in the energy transition have been included and recognised late in the process in Germany and thereby opened space for injustices and challenges.

Costs have been passed on to the consumer, financially struggling households and small industries do not benefit equally to bigger businesses and financially stronger households from policies and subsidies. The transition plan consists of an abundance of laws and regulations that were made to ensure a smooth regulated and organised transition. Laws such as the EEG or the Combined Heating and Power Act regulate how the costs of expanding renewable energies are passed on to consumers. Costs and benefits are acknowledged by the policies. The issue is that rather often operators and owners of renewable energy systems, speaking of homeowners and businesses benefit from the laws because they get rewarded for investing in RE. With that, people who do not own property or run their renewable energy plant do not have access to tariffs or subsidies which puts them in a position with less power. It seems as if energy justice is a recognised topic in the German energy transition but the implementation of regulations that are of benefit to the general population does not seem to work yet.

A bureaucratic burden alongside the lack of participation and representation can be mentioned as one reason. The research has shown that financially struggling households and businesses are left out the most from policies and participation. A lack of transparency, knowledge and property leads to the lack of representation, and being left out of the benefits of the transition policies. On the other hand, people and businesses with financial means and property as well as people that actively engage in exchange, through open discussion rounds, supervisory boards or lobbies can benefit from policies by sharing interests and knowledge and potentially investments. The well-educated middle to upper-class citizens benefit the most together with medium-sized to large enterprises.

According to the results of this study, one can hardly speak of energy justice. If one considers that this group also benefits in other areas, it makes the injustice and resilience gap even greater. It is therefore essential that research on justice in the energy transition continues and more importantly that solutions are sought in ways that the justice question is not side-stepped.

6.2 Key Findings

Based on a literature review, interviews with different stakeholders, an analysis of German energy policies and observations at COP28, this study provides an analysis of what energy justice means for different actors.

For the energy justice scholarship, problems and concerns cannot be looked at separately but are closely linked to social structures and power relations. This scholarship emphasises the importance of political decisions, economic interests and social conflicts for environmental issues and calls for a holistic approach to engage with environmental problems (Sovacool & Dworkin 2015; Droubi *et al.* 2022).

First, energy justice theory is preoccupied with the distribution of costs and benefits for consumers and industries. Key takeaway messages from respondents to the interviews have been that the cost of the energy transition is passed on to consumers. Financially struggling households are often forced to think short-term while energy-efficient and renewable housing usually pays off long-term.

This research has shown that especially low-income households struggle with financing their energy intake. This is explained by rising prices caused by price fluctuations in import prices or adjustments to shock situations such as the war between Russia and Ukraine. Even though funding and subsidy programmes are gratefully accepted, the issue is that the programmes are not sufficient and do not target the most vulnerable groups and are often too complicated to fully grasp. Additionally, funding and subsidy programmes from the German government are not persistent as the state only has a limited amount of budget for subvention. When the volume is exhausted, the programme is usually discontinued, which means that households relying on support programmes are in fact excluded from the transition. This was stated in the interviews but it is also something that was highlighted in the global context at COP28. There is often a lack of sufficient financial support to modernize energy infrastructure and switch to renewable energies. The German EEG and other analysed Acts and Laws primarily benefit operators of renewable energy systems, which are either companies or (high-income) households owning photovoltaics or similar. This offers them a guaranteed feed-in tariff for the electricity of their produce and secures them access and availability as well as cost savings when purchasing energy. Without the mentioned financial support, low-income households are excluded from the benefits.

On the other side, financially strong households have more opportunities to adapt their lifestyle to the imperatives of the energy transition and bear the costs of energy renovation measures by e.g. building a photovoltaic plant, through their financial means obtaining their “green” electricity at more favourable prices. Access to the property has also an impact on the possibility of building its own plant. Mostly, financially stronger households have their roof or open space to build photovoltaics or even wind turbines. Consequently, not everyone benefits equally from the advantages of the energy transition which can lead to a further exacerbation of social inequalities.

However, the German government offers renewable energy at a similar price to conventional fossil energy and is therefore available and affordable for low-income

households as well. A difference lies in other energy uses, for example, electric vehicles where prices are higher than combustion engine cars and consequently not affordable for low-income households if they are not subsidised. Hence, the influence of national politics majorly determines energy access, availability and affordability of households and the number of options to choose from.

The energy policies were described as a demand and cost burden. The transition has been overwhelming people and companies to keep up, understand and act.

The financial matter only adds another dimension of burden for smaller companies and financially weaker households. The actors who benefit most from the current energy policies are the middle class and rising-income households, as well as energy industries and large corporations because of subventions and available financial possibilities.

Another important finding is the lack of inclusion of social aspects early on in the energy transition, as well as the lack of knowledge leading to policies that do not recognise social issues. The analysis of the governmental laws and regulations shows that the latter does not ensure enough to protect low-income households and small industries from the listed disadvantages and issues. However, the discourse is increasingly included and acknowledged in debates.

A democracy like Germany is characterised by citizen participation to raise concerns and develop solutions. Looking closer at the exchange of knowledge and experiences between actors shows that citizens are often not sufficiently involved in the decision-making processes relating to the energy transition. Although all involved stakeholders, including consumer advocates, trade unions and social associations are present in roundtables when new laws are discussed, the general population is not aware of these exchanges and the possibility to participate. Despite the possibility of citizen participation, it does not sufficiently take place. The communication is not perceived as transparent and clear for citizens to join committees and discussion rounds.

The laws and regulations appear in abundance and constant adjustments and changes to them are perceived as confusing, overwhelming and a bureaucratic burden. Especially between the industry and the general population, there is no dialogue about needs and struggles according to the empirical findings. However, energy justice is not granted by democracy or the government (Droubi *et al.* 2022). Addressing rising issues, injustices and inequalities is also the responsibility of the ones who experience the latter. Opening the communication and knowledge exchange on the matter can be done from all sides and all included actors. Democracy requires participation: one has to participate as a citizen to bring about change and justice.

Energy justice as a lens and aspiration can also help to identify the causes of inequalities in the energy sector and show how these are linked to power relations. It additionally helps to analyse the interests of different actors in the energy sector and how these interests feed into political decision-making processes (Sovacool and Dworkin 2015; Droubi *et al.* 2022).

Uneven power relations round up the key findings. Dominating businesses influencing politics by financially supporting politicians and parties can influence financial generosity. Lobbyists can exert direct influence on political decisions. Large corporations are put in a special position of power, leading to an imbalance of justice by making the voices of citizens and small businesses less heard. Not only are they having less power in the decision of power heating and electrical equipment at home but also in the cause of mobility. Through missing subvention, an average electric vehicle is more expensive than an average combustion car and the gas is also more expensive than electricity. Low-income households are therefore deprived of their choice and self-determination due to a lack of financial resources. This leads to an uneven power distribution.

Energy justice also includes discourses and narratives that emerge around environmental issues and influence political decisions. In energy policy, narratives, e.g., about the necessity of the energy transition or the role of renewable energies, can influence actors' interests and power relations. Politics acts as a link between the economy and the population. Energy justice scholarship emphasises that power relations shape the distribution of resources and environmental impacts in a society. In the energy sector, powerful actors such as energy companies or political decision-makers can influence energy policy design and pursue their interests, which can lead to injustices. The same phenomenon was observed at COP28. The decisions made at the COP28 in Dubai may not have been sufficiently transparent, concrete, and participatory. The voices of civil society were not sufficiently taken into account. It is important that such criticisms are taken seriously and that energy justice measures are continuously reviewed and improved to ensure that they lead to a fairer and more sustainable energy supply for all people.

Since the energy transition has been a voluntary approach to tackle climate change even with the launch of the Global Decarbonization Accelerator at COP28, the forward-thinking with an early transition in Germany can be seen as relatively positive but also with a lack of commitment. There is no legally binding agreement, leaving it up to the country itself to decide whether and how to implement the agreed measures. With its reputation as a pioneer in the energy transition, it can be argued that Germany has rested on its laurels and is now working on the consequences of leaving out the social components in the transition from the beginning on.

The current energy politics in Germany ensures sufficient energy resources and secure availability by making international treaties with countries with sufficient energy resources. Since Germany has been highly dependent on energy imports from Russia, the German government proved that even in a crisis, the energy reservoirs were full. The affordability of energy is arguable as households pay up to 16% of their income for energy services, which can be a financial burden for low-income households. The procedure of decision-making processes is debatable as there are platforms such as citizen participation rounds. However, there is little to no exchange between the industry and citizens and the industry has more power on policy-makers than the general population. Since there is little price difference between fossil energy and renewable energy import, all forms of households can decide to buy renewable energy and have therefore access to green energy. However, owning renewable energy plants or electric vehicles is currently exclusively affordable for higher-income households as the subsidies do not address these needs for lower-income households. The distribution of positive and negative benefits from the energy sector is rather questionable and unequally distributed towards the benefit of the financially strong. The intergenerational equity ensures that future generations are not negatively impacted by today's energy system. On the one hand, the transition towards renewable energies was partly made to achieve this goal. However, focusing on poverty and that some people spend an immense amount of their income on energy services, it can be argued that future generations are impacted by money that is missing from other investments. The responsibility, meaning the protection of nature and minimization of energy-related environmental threats, is addressed in the general thought of switching to renewable energies. Nevertheless, the construction of wind parks or photovoltaic plants can be seen as a concern for local and regional ecosystems and biodiversity. It is a whole new discourse to discuss and outweigh these arguments and make decisions and policies on that matter which can be a topic for further research.

The study reinforces the need defined by Sovacool and Dworkin (2015) and Droubi *et al.* (2022) to open up the debate around energy justice. It has identified key issues in the distribution of costs and benefits, participation, procedural justice and power relations in Germany. It contributes to the findings of the Consumer Advice Centre Germany by highlighting the financial burdens and worries of consumers. With over one-fifth of Germany's population at risk of poverty, high energy costs are a threat to financially struggling households. With less access to feed-in tariffs and independence through owning RE plants, financially weaker households and businesses do not benefit equally from the energy transition. This is reinforced by the funding and subsidy programmes. This study has importantly highlighted the component of people being overstrained by the transition and the abundance of laws and regulations. Adding to the overstrain is the lack of knowledge about options to

participate in the exchange around energy justice and transition, leading to a lack of representation which decreases chances for change.

6.3 Limitations and Novel Directions to Investigate

The path to greater energy justice in Germany requires continued efforts at various levels to tackle the existing injustices and find fairer solutions. One step could be greater consideration of social aspects in energy policy early on in the process. Energy insecurity and the burden on low-income households must be brought up more into the focus of energy policy to support suffering households. Additionally, community energy projects and participatory approaches could be promoted. The laws and regulations should also be available understandably for the broad population. Subsidy programmes should be made long-term for the whole range of participants of the society. Citizen energy projects could help ensure that citizens actively participate and be involved in the energy transition to benefit from the advantages of renewable energy. The decision-making processes must therefore be transparent to ensure citizens can play an active role. Open communication and the participation of civil society can help to ensure the interests of different groups are taken into account. To achieve a holistic and just energy policy, environmental and social justice must be closely linked early on in the decision-making processes which can be reinforced through citizen participation. Measures to reduce greenhouse gas emissions should be designed in a way that they also reduce social inequalities and support low-income households.

However, the concept of energy justice is limited in this study to four key aspects. Circumstances may not always fit into the four categories and can also look differently in different parts of Germany. Therefore, a generalisation of the findings should not be made.

Additionally, ecological aspects of energy justice have been included in the laws and recognised in the interviews as one-sided. While the energy transition has been promoted as a necessary step in reducing greenhouse gas emissions and tackling climate change, the downsides have not been highlighted. Environmental concerns about ecosystems destroyed by mining the materials, labour conditions, emissions caused by shipping and mining, resource scarcity, etc. have been rather silenced by the general German population as well as at COP28. Cross-scalar energy injustices provide scope for a far-reaching and important addition to the topic of energy justice and is a relevant topic for further research.

A continuous investigation and monitoring of the impact of energy policies on social justice is a crucial step and should be complemented by ecological aspects both in production and in the use of renewable energies. The findings resonate with the urgent need to centre energy justice in policymaking by showing that not all actors and stakeholders are recognised, represented, and benefit similarly.

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Popular Science Summary

Energy transition is a central process in tackling climate change by shifting from fossil fuels towards renewable energies. Key drivers for the energy transition are increasing prices of fossil fuels and environmental concerns coming from the general population, activists, the economy and the government.

Concerns regarding energy availability, affordability and distribution have increased since the 1970s. Especially low-income households are prone to suffer from a rise in energy prices. As laws and regulations tend to benefit the well-off and selected industries, ethical and moral concerns about equity need to be considered in energy debates and transition plans. A successful energy transition is characterised by being fair. That is why energy justice is the central theoretical concept of this work looking closer at the distribution of costs and benefits, participation, procedural justice, and power relations.

Germany is considered a frontrunner in the energy transition. However, the country is also facing socio-economic challenges with the energy transition. As there is little knowledge about how the different actors involved in the energy transition in Germany perceive energy justice, this paper focuses precisely on the topic.

Interviews with activists, parties, and industrial representatives provided different perceptions. Additionally, the analysis of German policies put the findings in context and were complemented by observations made at COP28.

Key findings include that the cost of the energy transition is passed on to consumers. Laws and regulations are perceived as a bureaucratic burden. The transition has been overwhelming people and companies to keep up, understand and act. The actors who benefit most from the energy policies are the middle class and rising-income households, as well as energy industries and large corporations because of subventions and available financial possibilities. Even though all involved stakeholders are present in roundtables when new laws are discussed, the general population is often not aware of these exchanges and the possibility to participate. There is a lack of inclusion of social aspects early on in the energy transition, as well as a lack of knowledge leading to policies that do not recognise social issues. However, the discourse is increasingly acknowledged in debates. With more emphasis on these challenges, the energy transition in Germany could remain a role model that benefits all involved stakeholders.

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Appendix 1

Renewable Energy Sources Act (Erneuerbare Energiengesetz)

With the Renewable Energy Sources Act in 2000, known as Erneuerbare Energiengesetz (EEG) in German, targets have been set and updated in the course of time. The aim of this Act is, in particular in the interests of climate and environmental protection, the transformation to a sustainable and greenhouse gas-neutral electricity supply based entirely on renewable energies (Bundesministerium der Justiz 2023). The main goals are the reduction of CO₂ emissions, the increase of power production through renewable sources and the promotion of energy efficiency (Moore and Gustafson 2018). The law regulates the privileges, remuneration and obligations for the generation and utilisation of electricity from renewable energy sources such as wind, solar and biomass. In addition, the EEG also regulates how the costs for the expansion of renewable energies are passed on to consumers (EEG surcharge) and under which conditions companies and self-producers are entitled to a reduced EEG surcharge. In order to achieve the objective, the share of electricity generated from renewable energy sources in gross electricity consumption in the territory of Germany shall be increased to at least 80% in 2030 (Bundesministerium der Justiz 2023; BMWK 2023). The primary instruments are feed-in tariffs and propriety regulations for electricity from renewable energy sources. With the regulations in the EEG, Germany significantly increased its share of renewable energy from 6% in 2000 to 44% in 2022 (Moore and Gustafson 2018; Bundesnetzagentur 2023).

In addition to increasing installed renewable energy capacity, improving energy efficiency has become another important goal. In particular, the aim is to ensure that energy consumption no longer grows in line with GDP growth. In this regard, Germany has invested significantly in measures to improve energy efficiency. Even though total energy consumption has remained relatively constant since 2000 and GDP has increased considerably, only partial success can be attributed to this. This is due to the fact that most of the improvements have been made in private households, while the energy-intensive industrial and transport sectors have remained largely unchanged (Moore and Gustafson 2018).

The energy transition brought with it several problems, particularly for the electricity grid. The dependence of renewable energies on external conditions such as import availability, and their strong spatial distribution poses a challenge for grid management. This is one reason why Germany still has the second-highest share of primary energy generation from coal and is also dependent on electricity imports from its neighbouring countries. The high proportion of coal is another limiting factor as to why Germany is not achieving its emissions targets (Moore and Gustafson 2018).

The last version of the EEG, which came into force on 1 January 2023, is considered the biggest amendment to the law in years. Based on the goals of the Paris Agreement to limit global warming to 1.5°C, it has the overarching goal of increasing the share of renewable energies in the German electricity mix to 80% by 2030. This is to be realised in particular by accelerating the expansion of photovoltaics and wind energy (Die Bundesregierung 2022).

The National Action Plan Energy Efficiency (Nationaler Aktionsplan Energieeffizienz)

The National Action Plan Energy Efficiency describes the Federal Government's energy efficiency strategy. The Action Plan was launched in 2014 and overhauled in 2019 (Bundeministerium für Wirtschaft und Klimaschutz 2014; Bundeministerium für Wirtschaft und Klimaschutz 2019; Bundesamt für Wirtschaft und Ausfuhrkontrolle 2023).

It bundles measures to reduce final energy consumption in the period from 2021 to 2030 and picks up on energy efficiency-related measures from the Climate Action Programme 2030. The implementation of the Action Plan package of measures is accompanied by annual monitoring to check its success and identify any need for readjustment (Bundesamt für Wirtschaft und Ausfuhrkontrolle 2023).

The key immediate measures of the Action Plan include the introduction of new competitive tenders for energy efficiency, an increase in the volume of funding for building refurbishment and the introduction of tax incentives for efficiency measures in the building sector supported by the federal and state governments.

The National Action Plan on Energy Efficiency essentially defines three cross-sectoral efficiency measures.

1. promote energy efficiency in the building sector,
2. establish energy efficiency as a return on investment and business model and
3. increase personal responsibility for energy efficiency (*ibid*).

The plan aims to mobilise all stakeholders to win over and involve all social classes. The plan aims to identify opportunities for all social stakeholders and to positively demonstrate their commitment to energy efficiency. The introduction of the competitive tendering model for energy efficiency measures is intended to specifically promote projects that can achieve energy savings with the least financial investment (Bundeministerium für Wirtschaft und Klimaschutz 2014; Bundeministerium für Wirtschaft und Klimaschutz 2019).

Combined Heat and Power Act (Kraft-Wärme-Kopplungsgesetz)

Since its adoption in 2002, the Combined Heat and Power Act has regulated the promotion of the simultaneous, efficient generation of heat and electricity in combined heat and power plants (CHP). Similar to the EEG, the CHP Act sets different remuneration rates for different types of plants. The financing mechanism is also

similar to that for renewable energies: All households and companies pay a levy per kilowatt hour of electricity (CHP levy) (Bundesministerium der Justiz 2016).

Building Energy Act (Gebäudeenergiegesetz)

The Act on Energy Conservation and the Use of Renewable Energies for Heating and Cooling in Buildings, or Building Energy Act, was passed at the end of 2020. It brought together several individual laws and ordinances relating to the energy consumption of buildings: the Energy Saving Act, the Energy Saving Ordinance and the Renewable Energies Heat Act (Bundesministerium der Justiz n.d.)

The Building Energy Act contains provisions on energy requirements for buildings, heating and air conditioning technology, energy performance certificates and the use of renewable energies in the heating sector (*ibid*).

From 1 January 2024, heating systems with 65% renewable energy must be installed in most new buildings. Transitional periods and various technological options apply to all other buildings. There is also extensive funding that is more socially orientated. The Act also stipulates that existing heating systems can continue to be operated. If a gas or oil heating system breaks down, it can be repaired. If it is irreparably defective, a so-called heating disaster, there are transitional solutions and transitional periods of several years. In cases of hardship, owners can be exempted from the obligation to heat with renewable energies. Anyone who wants to replace their heating system today or in the future and switch to 65% renewable energy will receive state funding. There will be a basic subsidy for everyone and additional subsidies for those who are particularly quick to convert their heating system or for people on low incomes, for example. The maximum possible subsidy is 70% of the investment costs (Die Bundesregierung 2023).

Renewables Energies Heating Law (Erneuerbare-Energien-Wärmegesetz)

The purpose of the renewable energies heating law is to enable the sustainable development of the heating and cooling supply and to promote the further development of technologies for the use of renewable energies in the interests of climate protection, the conservation of fossil resources and the reduction of dependence on energy imports. The Act is also intended to help increase the share of renewable energies in final energy consumption for heating and cooling (Bundesministerium für Wirtschaft und Klimaschutz 2022).

To this end, the law requires the heating requirements for newly constructed buildings to be covered proportionately with renewable energies. The obligation applies to a floor space of more than 50 m². The addressees of this obligation are all owners of newly constructed buildings, regardless of whether they are public or private building owners. The owner can decide which form of renewable energy is to be used (*ibid*).

The Energy Industry Act (Energiewirtschaftsgesetz)

The "Electricity and Gas Supply Act", or Energy Industry Act, regulates the functioning of the German energy market. The act defines the primary objective as the most secure, affordable, consumer-friendly, efficient, and environmentally friendly grid-based supply of electricity, gas and hydrogen to the general public, which is increasingly based on renewable energies. The Act contains provisions for competition in the energy industry and non-discriminatory grid access (Bundesministerium der Justiz 2005).

Since its first version in 1935, the Energy Industry Act has been repeatedly revised and adapted to new developments. An important turning point was the liberalisation adopted in 1998. It implemented the EC Directive on the internal energy market. So-called vertically integrated companies were obliged to legally separate their different business areas from one another. This process is known as unbundling. The separation of grid operation from energy sales ended the previous territorial monopolies in the energy supply sector and enables customers to freely choose their electricity and gas supplier (*ibid*).

Basic Electricity and Gas Supply Ordinance (Strom- und Gas- Grundsatzverordnung)

All customers in Germany are legally entitled to be supplied with electricity and gas by their local basic supplier. The contract is automatically concluded when energy is drawn from the grid, e.g. after a move. The basic supplier is always the energy supply company that supplies most households in a local grid area with electricity and/or gas. The basic supplier is only permitted to refuse or terminate a customer's contract in exceptional cases (Bundesministerium der Justiz 2006).

CO₂ Pricing

Carbon pricing for transport and heating is an energy policy instrument and the centrepiece of the climate protection programme aimed at contributing to the reduction of climate-damaging CO₂ emissions by increasing the associated costs for the polluters (emitters). Products such as combustibles and fuels whose use leads to CO₂ emissions are subject to energy taxes, which can also be explicitly labelled as CO₂ taxes. Pricing then leads to tax revenue for the state, which it can use for general purposes or for specific purposes, for example for climate protection measures, energy research or to support those affected, for example as subsidies for the energy-efficient refurbishment of buildings (Die Bundesregierung 2019).

The national emissions trading system started in 2021 with a fixed price system, i.e. the price per tonne of CO₂ is fixed and politically determined. Certificates are sold to companies that place heating and motor fuels on the market. The costs for the certificates are borne by the fuel trade. If companies sell heating oil, liquid gas,

natural gas, coal, petrol, or diesel, they need a certificate as a pollution right for every tonne of CO₂ that the substances will cause in consumption (*ibid*).

The federal and state governments agreed in the mediation committee to initially set the CO₂ price at 25€ from January 2021. The price will then rise gradually up to 55€ in 2025. A price corridor of at least 55€ and at most 65€ is to apply for 2026 (*ibid*).

The Electricity Tax Act (Stromsteuergesetz)

The Electricity Tax Act regulates the taxation of electricity in Germany. It was introduced in 1999 as part of the ecological tax reform (eco-tax). The electricity tax is an indirect consumption tax per kilowatt hour of electricity. The tax revenue is not earmarked for a specific purpose; the amounts are mainly channelled into pension insurance. This means that it only has a limited steering effect in terms of climate protection. The Electricity Tax Act also stipulates the conditions under which companies are entitled to pay less electricity tax (Bundesfinanzministerium n.d.; Bundesministerium der Justiz 2000).

The Energy Duty Act (Energiesteuergesetz)

Similar to the Electricity Tax Act, the Energy Duty Act defines the excise duties on fuels - from fossil fuels such as oil and gas to biofuels such as bioethanol and plant-based diesel. The Energy Duty Act replaced the Mineral Oil Tax Act in 2006. The extension of the mineral oil tax to other energy sources and its transfer to the energy tax was part of the ecological tax reform. This was intended to create general incentives to use energy more sparingly. Like the electricity tax, the energy tax is designed as an indirect consumption tax and the revenue is mainly used to stabilise the pension system (Bundesfinanzministerium 2019).

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