Work Package 5 Policy Brief Series: Germany

***e**stablishing **C**ommunity **R**enewable **E**nergy **W**ebs*

- Rolling out a business model and operational tool creating webs of households that jointly manage energy to improve efficiency and renewables uptake

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Disclaimer

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1 Introduction

This is one of the six eCREW policy briefs. The policy briefs analyse the regulatory and administrative setups in Italy, Austria, Greece, Turkey, Spain and Germany. The policy briefs focus on how well the existing regulatory and administrative infrastructures can be expected to enhance the implementation of the eCREW approach in the European Union and Turkey. This policy brief focuses specifically on the Germany regulatory and administrative infrastructures that are of particular importance to the eCREW approach.

These policy briefs aim at specific topics relevant for member states in enabling an appropriate framework for energy communities in the sense of the Renewable Energy Directive (RED II) 2018/2001/EU[1] (Renewable Energy Community) and Internal Electricity Market Directive (ED 2019) 2019/944[2] (Citizen Energy Community) and the broader goals of the "Clean Energy for All Europeans Package".

This policy brief delivers the country profile from the eCREW perspective and identifies regulatory and administrative barriers and potentials for developing eCREWs in Germany.

The research reported in this policy brief was undertaken as a part of eCREW's Work Package 5, coordinated by Izmir University of Economics, Turkey.

2 eCREW approach

The eCREW project aims at activating and fostering the inherent and, so far, underused forces of community-driven collective actions initiatives (CAI). Empowering citizens and giving them the tools needed to produce, store and consume energy for a) their benefits, b) the prosperity of the (local) economy, and c) tackling climate change is an important and indispensable step on our road to a stable, secure, energy-efficient and climate-neutral future energy system. Recent European legislation has paved the way for unleashing the potential of such initiatives by granting them a certain degree of support and has set the scene for establishing Citizen Energy Communities (CECs) and Renewable Energy Communities (RECs). Unleashing the potential of such CAIs requires new business models, financially viable solutions, reliable ICT tools and low or no, entry barriers in order to engage as many citizens as possible. We define a CREW (Community Renewable Energy Web) as a group of citizens jointly utilizing household-level renewable electricity generation and storage capacities and establish CREWs as the third pillar of citizens' energy-related cooperation, complementing CECs and RECs. Joining requires simply signing a CREW contract, no up-front investment or need to establish a legal entity, and minimal or no, opportunity costs. CREWs can come in sizes, from small neighbourhood groups to whole city districts. For this purpose, the project considers the legal, administrative and other relevant operational and infrastructural requirements for eCREW. The administration of the CREWs, including the billing of participants and provision of the smart phone app as the operational tool of the households' cooperation, is provided by local energy retailing companies (the Community Administering Entity – CAE), who implement the eCREW approach as a new business model. Hence, eCREW provides an impactful way of cooperation for households with no access to CECs and RECs. The core assumption of a CREW (most participants are households, but a CREW is generally open also to other entities, e.g. industrial companies with PV) is that some entities/households with PV have excess electricity generation. Usually, this excess is sold to a retailer/grid (depending on national legislation) for a fixed low feed-in tariff (e.g. 3 cent/kWh), while each kWh purchased from the grid costs at least double (e.g. 6 cent/kWh, energy only costs). The CREW approach is facilitated through a "CREW contract" that participants establish with their CAE. In this contract, participants (e.g. prosumers, households owning storage capacities, and households only consuming electricity) have some standard electricity tariff for consumption and production (e.g. a flat tariff; or a spot-market tariff). In addition, the CREW contract stipulates that whenever CREWs members have excess electricity, others who need electricity at

[1] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, OJ 2018 L328/82.

[2] Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, OJ 2019 L158/125.

this time (i.e. households without PV) are first offered the excess electricity at lower than grid prices (e.g. 5 cents/kWh) and only when the community members entirely absorb this supply, further quantities are purchased from the grid as required. Energy sharing in the eCREW is facilitated through the public grid. Thereby, customers' electricity costs in this tariff are lower than buying from the grid only. At the same time, those with excess electricity (i.e. households with PV) obtain a higher rate than they would by selling to the grid (e.g. 4 cent/kWh). The margin between these two prices is the CAE's revenue (in this example 1 cent/kWh). The cooperation within a CREW is enabled through a software system that GreenPocket hosts, and a smartphone app serves as the easy-to-use interface for the CREW members. Customers' data are transmitted from the pre-system of the CAEs and processed at GreenPocket to display them in the eCREW app. The data records are stored on the database server of GreenPocket according to DSGVO guidelines. The CREW monitor is the central information hub within the smartphone app, which provides CREW members with aggregated information, e.g., electricity flows from/to the CREW as a total of all participants' individual flows and monetary savings achieved by high community-level share of self-consumption. The CREW monitor requires the members' electricity load profiles as input for the provision of these aggregations. The CAE serves as the regular electricity supplier for the CREW members. As such, it either already has access to the members' electricity load profiles in the granularity (e.g., hourly figures from smart meters) required for billing of the electricity supply contract or, if not, guarantees to the collection of this data in the CREW contract. The CAE requires no additional data for executing its special role of providing the CREW members with information regarding the members' individual electricity consumption, the CREW's performance in consuming shares of electricity produced within the CREW, or the members' individual monetary benefits through their participation.

3 Country profile

3.1 Demographic structure

Germany is located in Central Europe and is composed of sixteen federal states (in German: Länder), including its capital and largest city, Berlin. With an area of around 357 600 km², Germany is the 6th largest country in Europe and the 4th largest in the European Union (EU). In 2019, its population was approximately 83.2 million, resulting in a population density of 233 inhabitants per km².

Table 10 shows the population according to age groups, revealing that 28% is between 40 and 60 years old, 25% between 20 and 40and 22% between 60 and 80. 16% of the population is aged under 18.

Table 10: Population by age groups, 2019. Data source: Statistisches Bundesamt (Destatis) (2021a)

2019	Total	0-20	20-40	40-60	60-80	80+	>18	18+
Population	83 166 711	15 330 502	20 467 832	23 629 924	18 057 318	5 681 135	13 677 902	69 488 809
in %	100	18,4	24,6	28,4	21,7	6,8	16,4	83,6

The dependency ratio in 2019 (age-population ratio of those aged 15-64 typically not and typically in the labour force) is 55%, meaning the share of economically active is almost twice the share of economically inactive. This ratio has increased over the last three decades (World Bank, 2019). The age structure revealed in Figure 9 also indicates an increase in the future dependency ratio. The relatively large share of 50- to 60-year-olds and the relatively small share of those under 10 years old might thus impose a severe financial stress on Germany's future working population. The age pyramid further indicates a surplus of men in the under-60 population and a surplus of women in the over-60 population.

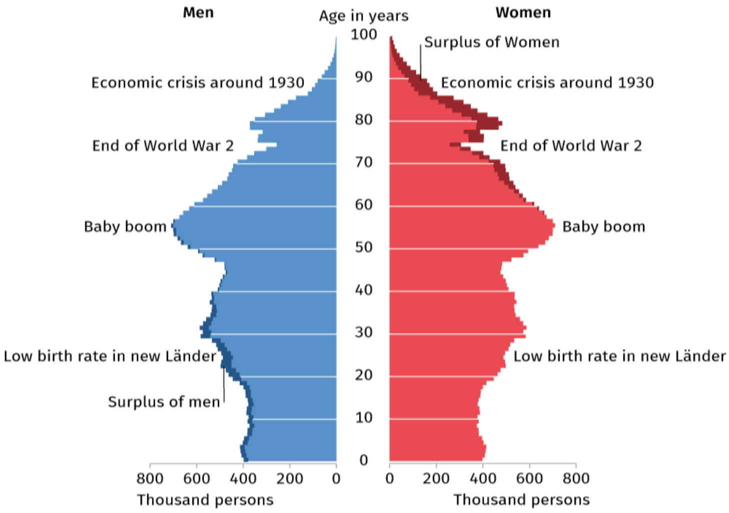

Figure 9: Age structure, 2019. Image source: Destatis (2021b)

Bavaria in the south is Germany's largest state by area, with 70 550 km², followed by Lower Saxony and Baden-Württemberg. North Rhein-Westphalia in the west is the largest state by population, with almost 18 million inhabitants, followed by Bavaria and Baden-Württemberg. Figure 10 depicts Germany's population density by administrative districts (in German: Kreise/Landkreise). The east is much less populated than the west, and the former East Germany area has many relatively sparsely populated regions. 77.4% of Germany's population is urban, 22.6% is rural (World Bank, 2019).

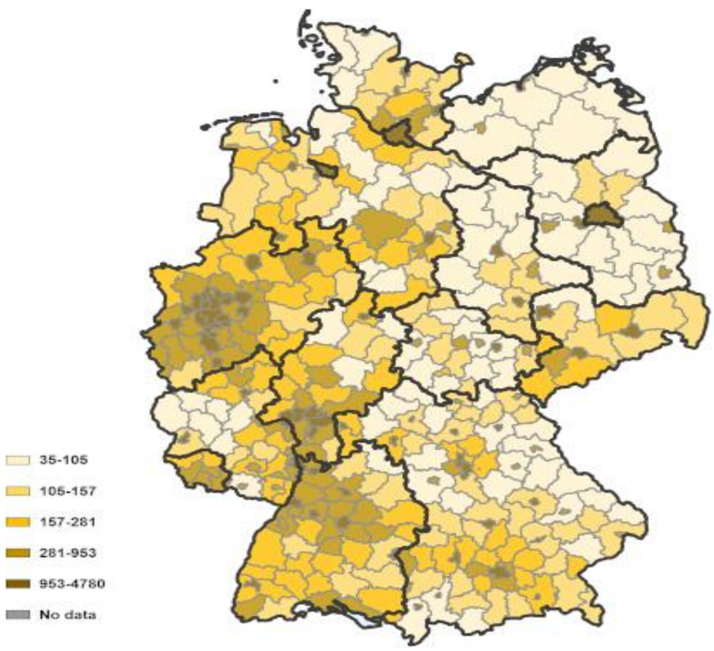

Figure 10: Population density by administrative district, 2019. Image source: Destatis (2021c). Legend was added.

In 2019, 29.9% of the population aged between 25 and 64 had a tertiary education attainment (ISCED classification). This is below the OECD average of 38% (OECD, 2021). However, regarding upper secondary education attainment, with 57%, Germany is well above the OECD average of 41%. Figure 11 further details tertiary education attainment by state. While population density shows a west-east divergence, there is a considerable south-north divergence regarding education attainment. In general, states in southern Germany have attainment shares around or above the German average, and those in the northern half are below average. Important exceptions are Hamburg and Berlin, with 33% and 43% shares, respectively.

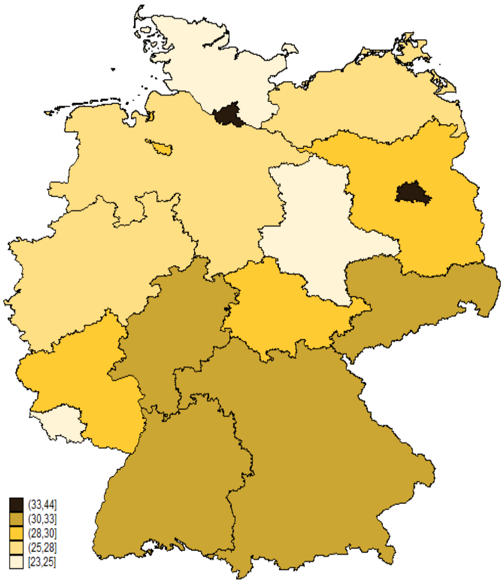

Figure 11: Percentage of the population aged between 25 and 64 with tertiary education attainment (ISCED) by state, 2019. Data source: Destatis (2020a)

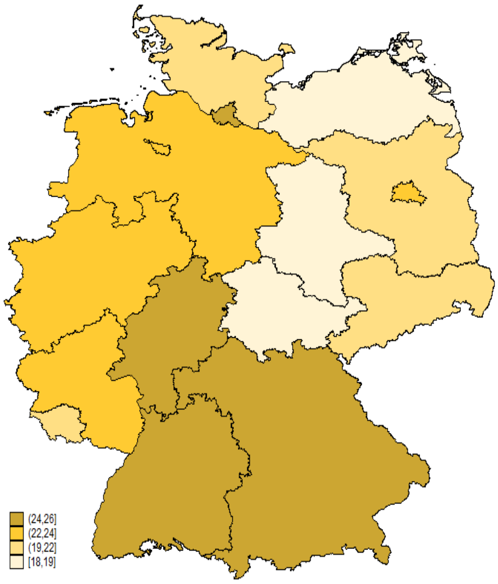

Figure 12: Gross hourly wage of employees by state, 2019. Data source: Destatis (2020b)

Figure 12 depicts employees' average gross hourly wage (without special payments in 2020 by state. At first glance, Figure 11 and Figure 12 look similar. Southern states show the highest hourly wages. However, again, the west-east divergence is much more than the south-north. While the hourly wages in the "New federal states" (in German: "Neue Länder"[3]) of former East Germany are all below the German average of 23.2€, and the wages in western states are mostly above average. Berlin marks an extreme in this comparison. While Berlin shows an unusually high share of tertiary education attainment, the hourly wage is barely above the average.

For historical reasons, the east is less economically developed than the west, as illustrated by the unemployment rate. Figure 13 shows the unemployment rate for Germany, the states of former West Germany and former East Germany (including Berlin) since 2005.

[3] "New federal states" refers to those states that reintegrated into Germany after the fall of the Berlin Wall and reunification in 1990 (cf. https://www.bpb.de/geschichte/deutsche-einheit/deutsche-teilung-deutsche-einheit/43695/geschichte-der-mauer; https://www.bundesregierung.de/breg-de/suche/neue-laender-und-landtagswahlen-436624).

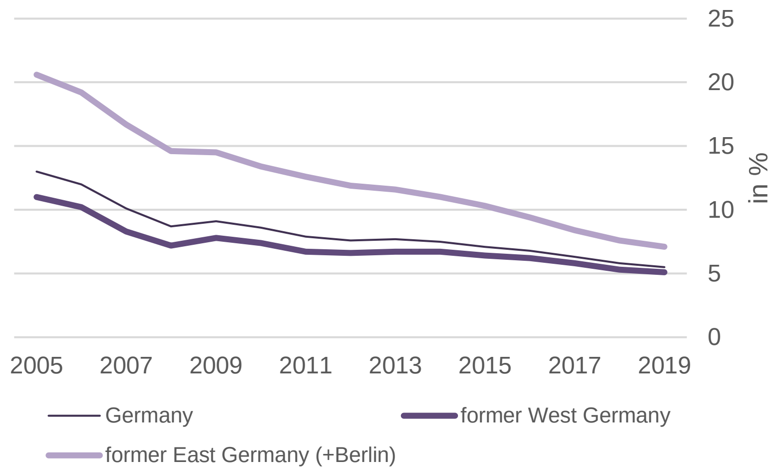

Figure 13: Unemployment rate since 2019, East- and West Germany.Data source: Destatis (2021d)

In 2005, there was still a massive gap between the east and the west. Unemployment rates were above 20% in the states of former East Germany. However, this gap decreased annually only around 2 percentage points in 2019, with 5.1% in the west and 7.1% in the east. The working population in Germany is approximately 45 million workers. Figure 14 shows that in 2019, 1.3% worked in the primary sector, 24% in the secondary sector, and 75% in the tertiary sector. While the percentage in the primary (1.7%) and secondary sectors (26%) slightly decreased since 2005, it marginally increased in the tertiary sector (73%).

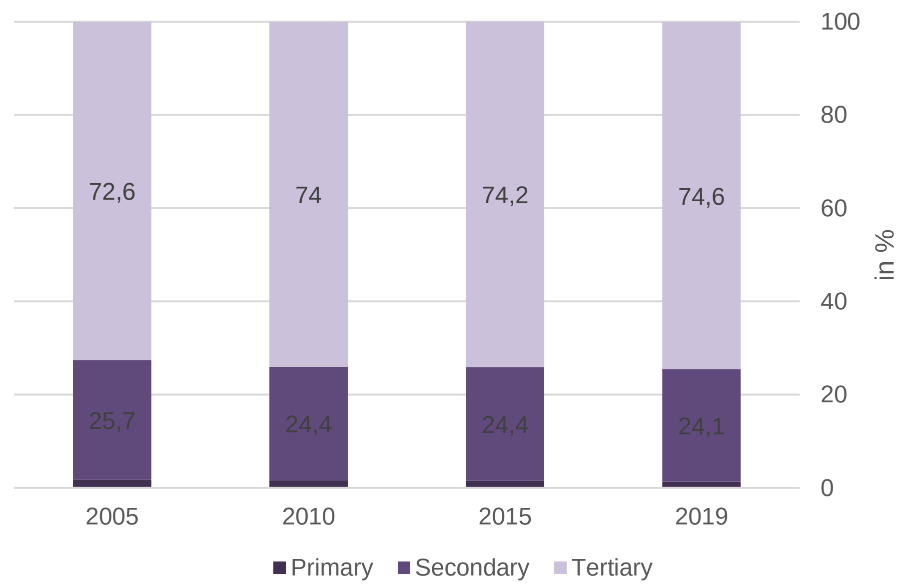

Figure 14: Share of workers by economic sector since 2005. Data source: Destatis (2021e)

Energy profile (production, supply, consumption etc.)

Table 11 provides Germany's energy balance in 2019, measured in Terajoule (TJ). Renewable sources make up 53% of Germany's national energy production, followed by coal with 33%. Gas, oil and energy from other sources, such as district heating and combustible waste, comprise the remaining 14%. Germany heavily relies on coal, oil and gas imports, equivalent to 95% of the gross available energy. In 2019, gross final energy consumption was 8973 Petajoule (PJ). In the Renewable Energy Directive (2009/28/EC) Germany's goal to achieve an 18% share of renewable energy in its gross final energy consumption by 2020 was surpassed with a share of 19.3% (Umweltbundesamt, 2021).

Consumers can be divided into three broad categories. Firstly, households, commerce and services consume 42% of gross final energy consumption. Private households account for 65% of the total. Secondly, the transport sector consumes 30%, and road transport accounts for 82% of the total consumption. Thirdly, the mining and industry sector consumes 28%. The largest shares in this sector are consumed by the metal- and basic chemicals industries, with approximately 20% each.

Table 11: Energy balance, 2019. Data source: AGEB (2021)

	Coal	Oil	Gas	Renewables	Electricity	Nuclear	Others	Total
1. Production	1 189 900	81 891	201 841	1 919 764			218 423	3 611 819
2. Import	1 179 949	5 445 622	5 570 651	88 695	144 450	818 952	57	13 248 377
3. Export	63 848	916 803	2 393 964	104 006	262 055		183	3 740 857
4. Stocks	58 817	99 317	156 662					314 796
5. Gross available energy (1+2-3-4)	2 247 184	4 511 393	3 221 866	1 904 453	-117 605	818 952	218 297	12 804 543
6. Conversion loss	2 245 179	4 514 866	881 128	1 185 536	29 056	818 952	139 667	9 814 384
7. Conversion output	379 809	4 419 966	229 166		2 193 469		457 786	7 680 195
8. Consumption of energy sector	7 608	230 855	150 232	20 157	148 153		15 994	572 999
9. Transport loss			15 655	3 081	98 906		40 772	158 414
10. Nonenergy Consumption	17 207	763 774	143 999					924 981
11. Statistical differences	60 749	-26 339	-75 013					-40 603
12. Gross final energy consumption (5+7-(6+8+9+10+11))	417 748	3 395 525	2 185 005	695 679	1 799 749		479 650	8 973 357
Mining, industry	403 196	84 531	873 233	112 737	786 411		251 642	2 511 751
Transport	-	2 562 089	5 848	112 160	41 792			2 721 889
Households, commerce, services	14 551	748 903	1 305 925	470 782	971 546		228 008	3 739 716

Figure 15 depicts Germany's energy mix from 2010 to 2019 in PJ. Gross final energy consumption has been relatively stable in the last decade and has decreased by around 335 PJ since 2010. Moreover, no significant changes in the composition of the energy mix can be observed.

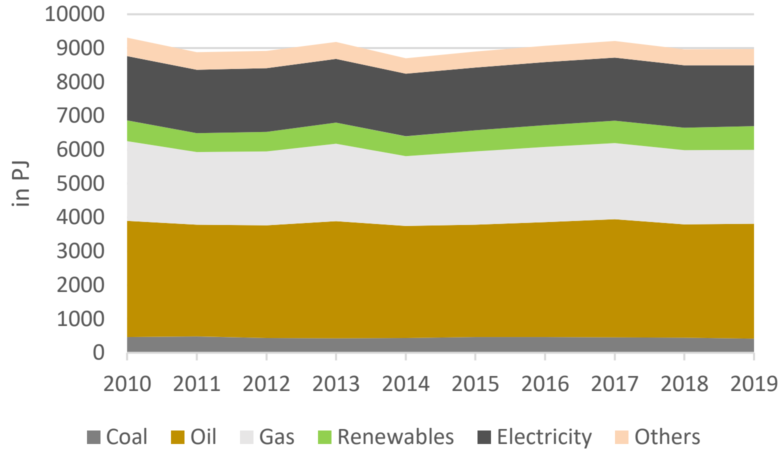

Figure 15: Energy mix in PJ, 2010-2019. Data source: AGEB (2020a)

Figure 16 shows Germany's energy mix in 2019. 38% of total gross final energy consumption was oil based, 24% gas-based, and 20%, electric energy. Germany relies heavily on imports of oil and gas, which play a significant role in overall energy consumption.

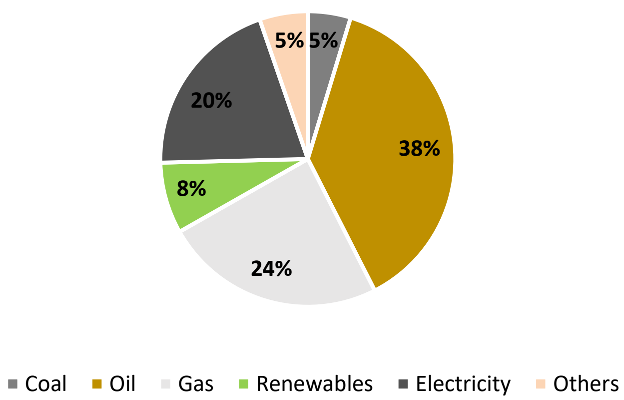

Figure 16: Energy mix in %, 2019. Data source: AGEB (2020a)

Germany's gross domestic electricity production equalled 2194 PJ in 2019, slightly below the level of 2010. As shown in Figure 17, over the decade, electricity production has fluctuated to some degree, reaching its decade low in 2019 and its high in 2017, with 2353 PJ. Since 2010, the shares of both coal and oil have decreased by approximately 30%. This is a necessary development if Germany intends to reach its goal of ending the use of coal-powered energy by 2038. This Coal Phase-Out Act[4] entered into force in Germany in 2020. As a result, coal-powered energy will be gradually reduced, and no new coal-based facilities (with exceptions) are being commissioned.

Further, financial compensation to operators of such facilities is offered (Bundesregierung, 2021a). While the share of gas has remained relatively stable, electricity from renewable sources has more than doubled. Germany plans

[4] Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung und zur Änderung weiterer Gesetze (Kohleausstiegsgesetz) Kohleausstiegsgesetz from 8. August 2020 (F.L.G. I p. 1818), last amended by article 3b of the Act from 3. December 2020 (F.L.G. I p. 2682).

to phase out electricity produced by nuclear power plants by 2022, but its share has decreased substantially since 2010.

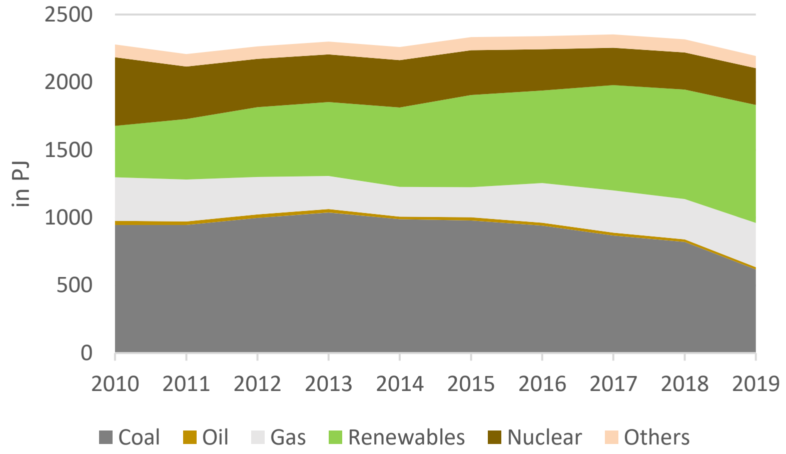

Figure 17: Gross domestic electricity production by source in PJ, 2010-2019. Data source: AGEB (2020b)

In 2019, 28% of domestic electricity production originated from coal and 28% from wind and solar energy. Gas contributes 15%, followed by nuclear energy with 13%. In 2019, Germany produced approximately 40% of its gross national electricity from renewable sources (see Figure 18). 65% of Germany's final electricity consumption is to come from renewable sources by 2030, according to the revised German Renewable Energy Act, effective in 2021[5]. Further, by 2050, the goal is to produce 100% of all electricity from renewable sources (Bundesregierung, 2021b).

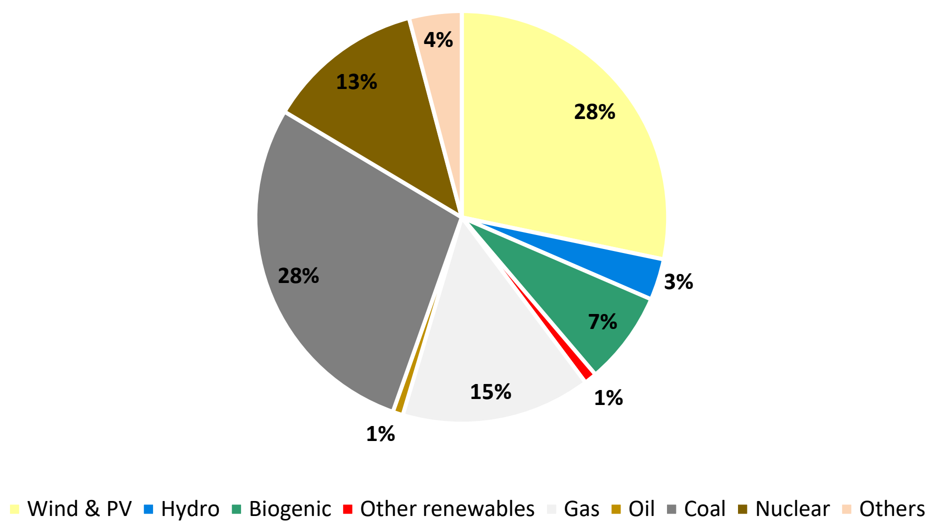

Figure 18: Gross domestic electricity production by source in %, 2019. Data source: AGEB (2020b)

By sector, industry accounts for 44% of gross final electricity consumption, followed by the commerce and services sector with 29%, and private households with 25% (see Figure 19).

[5] Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz - EEG 2021) Erneuerbare-Energien-Gesetz from 21. July 2014 (F.L.G. I p. 1066), last amended by article 1 of the Act from 21. December 2020 (F.L.G. I p. 3138).

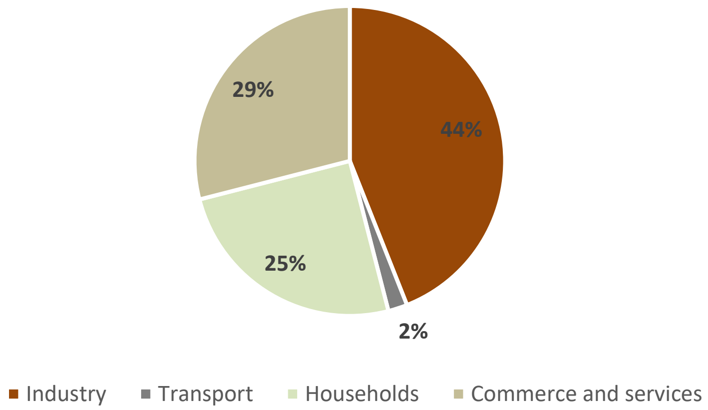

Figure 19: Gross final electricity consumption by sector, 2019. Data source: AGEB (2020a)

3.2 Energy infrastructure and infrastructure

Energy market

The German energy market was liberalized on April 29, 1998[6], and since then, all electricity customers have been free to choose their electricity supplier, and the number of electricity suppliers has sharply increased to more than 1000 by 2021 (Bundesnetzagentur, 2021a). In Germany, the Federal Network Agency (in German: Bundesnetzagentur) regulates electricity, gas, telecommunications, and post and railway markets.

The German market has several system charges, duties and taxes for electricity. In addition to the base energy price, there are other cost components. On average, in 2019, for households with a yearly electricity consumption of 2500 to 5000kWh, the Bundesnetzagentur (n.d.-a) determined the following consumer electricity price composition: The energy price accounts for about 25%, the system charges for 23%, the EEG surcharge (in German: EEG-Umlage) for 21%, and the rest (duties, taxes, etc.), for 31%. After the amendment of the EEG, which came into force on January 1, 2023, the EEG surcharge was not only set to zero but was generally eliminated and is therefore no longer to be paid.[7]

The energy price is composed of a monthly base price with the addition of the price per kilowatt hour consumed. System charges comprise the following: The system utilization charge (in German: Netznutzungsentgelt) covers costs incurred by system operators for the construction, operation and expansion of their networks. The metering charge (in German: Entgelte für Messung und Messstellenbetrieb) covers the costs of installation, maintenance and reading of metering points. The EEG surcharge financed the fixed feed-in remuneration of electricity from renewable energy sources into the national grid and was around 6,5c/kWh in 2019.

The two main types of wholesale electricity markets in Germany are the future and spot markets (BMWi, n.d.).

In the future market, electricity can be ordered as much as six years in advance. In this way, buyers can hedge against uncertainty and avoid increasing prices, and producers can secure long-term revenue. Futures products can be further distinguished as base load or peak load contracts.

[6] The liberalization took place through the "Act on the New Regulation of the Energy Industry Law" published of 28. April 1998 (F.G.L. I p. 731), which novelized the Energy Act (in German: Energiewirtschaftsgesetz).

[7] Cf. Website from Bundesregierung, available under: https://www.bundesregierung.de/breg-de/themen/klimaschutz/novelle-eeg-gesetz-2023-2023972 (23.02.2023)

Short-term trade is possible on the spot market and is crucial for balancing production and consumption. The spot market can be split into the day-ahead and intraday markets. Electricity supply for the following day is traded on the day-ahead market hourly. Buyers and sellers have to submit their offers by 12 pm. On the intraday market, electricity can be traded on a quarter-hour basis up to 30 minutes before delivery to a different control area or 5 minutes within the same control area. Since 2012, Germany has been divided into four control areas, each managed by one of the four existing Transmission System Operators (TSO): Amperion, TransnetBW, Trennet TSO and 50Hertz Transmission.

In Germany, every producer and consumer is part of one of the hundreds of balance groups. Each group is required to balance energy consumption and generation within the group based on quarter-hourly demand and generation forecasts. Electricity transaction schedules must be sent to the respective TSO the day before by the responsible balancing party (in German: Bilanzkreisverantwortlicher). In the event of unanticipated fluctuations in generation or discrepancies from the expected consumption level, the energy balance in the grid must be guaranteed by the respective TSO through different types of balancing services. The balance group that caused the respective fluctuation has to pay the costs for these balancing measures. Since balancing energy costs are generally higher than on the wholesale market, these costs act as a penalty payment for deviations from the registered schedules (Bundesnetzagentur, n.d.-b).

Energy infrastructure

The German electricity grid consists of approximately 37 000 km of maximum voltage network, 86 000 km of high-voltage network, 520 000 km of medium-voltage network and 1.2 million km of the low-voltage network (BdEW, 2018). Long-distance transports are managed by the four Transmission System Operators, Amperion, TransnetBW, Trennet TSO and 50Hertz Transmission; Further, over 900 electricity system operators distribute electricity to consumers. Regarding gas, roughly 50 000 km of a high-pressure network and 500 000 km of a distribution network are installed. 50% of all households in Germany are connected to the gas network (BMWi, 2021).

Germany's total capacity was 229 170 MW at the beginning of 2021 (see Figure 20). Renewable energy sources account for 56% of the total, and conventional energy sources, for 44%. Regarding non-renewables, natural gas makes up 13% of total capacity, followed by stone coal, with 10%. Nuclear energy still accounts for 3.5%. Regarding renewables, onshore wind energy accounts for 23% and solar energy for 22% of the total. Hydro power plays a minor role, with 2%.

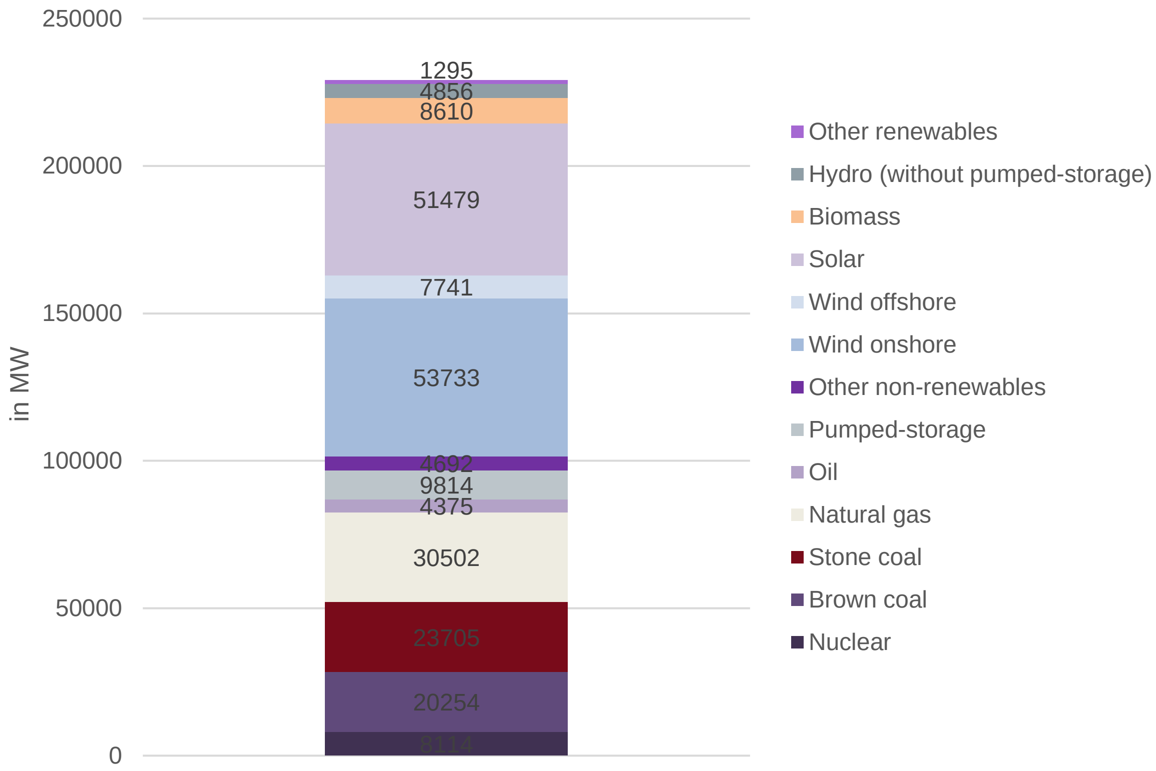

Figure 20: Capacity in MW by source, 2019. Data source: Bundesnetzagentur (2021b)

Figure 21 depicts the evolution of the total capacity from renewable sources in gigawatts (GW). Since 2000, capacity has increased every year. In the 2000's wind energy was the main driver, but in the last decade, wind and solar energy experienced considerable increases. Hydro power is at the same level as in 1995, and energy from biomass still makes up less than 10%, despite an increase in the last 20 years.

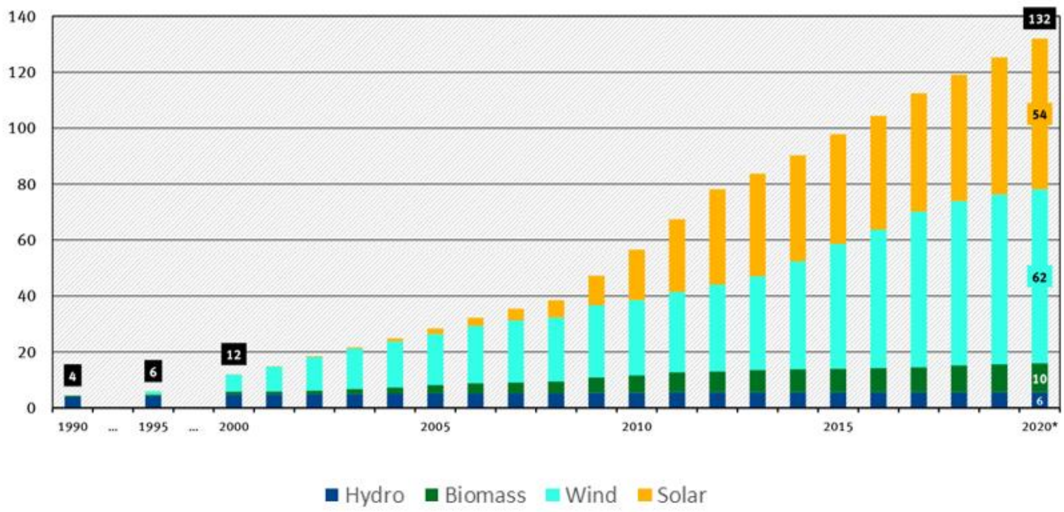

Figure 21: Capacity from renewable sources in GW since 1990. Image source: Umweltbundesamt (2021). The numbers for 2020 are preliminary. Legend was added.

Figure 22 presents Germany's capacity in MW per state in 2021. Most capacity is within Northrhine-Westphalia with 42 500 MW and Bavaria with 30 500 MW. 43% of Northrhine-Westphalia's capacity consists of coal-based facilities and another 20% gas-based facilities. In Bavaria, on the other hand, solar energy contributes 46%, followed by gas with 14%. Solar energy plays the most essential role in the southern half and wind energy in the northern half of Germany. Nuclear energy is still utilized in four states. These are Bavaria, Lower Saxony, Schleswig-Holstein and Baden-Württemberg.

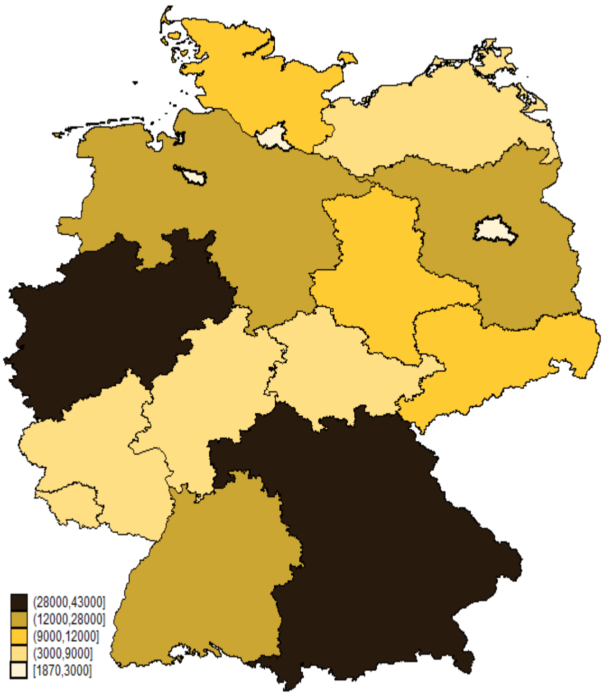

Figure 22: Capacity in MW by state, 2021. Data source: Bundesnetzagentur (2021b)

Regarding PVs, the southern states of Bavaria and Baden-Württemberg report the highest total capacities, and Bavaria stands out both in capacity total and capacity per km². However, while Bavaria still shows a relatively high PV-capacity per 1000 inhabitants, the eastern states of Saxony-Anhalt, Brandenburg and Mecklenburg Western Pomerania, states with low total PV-capacity, report the highest PV-capacities per 1000 inhabitants. Thus, in these states, the number of PVs is high relative to population density. (Bundesnetzagentur, 2019, as cited in Agentur für Erneuerbare Energien, n.d.)

4 Analysis of the legislative and administrative framework

After[8] considering Germany´s demographics, energy profile and infrastructure, we will now look at German legislation regarding energy communities and self-supply. In Germany, the central laws in energy are the Energy Act[9] and **Renewable Energy Act**[10]. The Energy Act aims to provide the most secure, affordable, consumer-friendly, efficient, and environmentally sound grid-based supply of electricity and gas to the public, increasingly based on renewable energy.[11] The purpose of the Renewable Energy Act is to enable the sustainable development of energy

[8] The following explanations are based on the research results of Deliverable 5.1 "Draft report on the legal and administrative framework regarding the adaptability of the eCREW approach" as well as on the results of the jointly prepared article "*Biresselioglu* et al, Legal Provisions and Market Conditions for Energy Communities in Austria, Germany, Greece, Italy, Spain, and Turkey: A Comparative Assessment, Sustainability 2021, 13, 11212, 1-27".

[9] Gesetz über die Elektrizitäts- und Gasversorgung (Energiewirtschaftsgesetz - EnWG) Energiewirtschaftsgesetz from 7. July 2005 (F.L.G. I p. 1970, 3621), last amended by article 3 of the Act from 14. March 2023 (F.L.G. I p. 71).

[10] Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz - EEG 2023) Erneuerbare-Energien-Gesetz from 21. July 2014 (F.L.G. I p. 1066), last amended by article 6 of the Act from 4. January 2023 (F.L.G. I p. 6).

[11] § 1 Energy Act.

supply, in particular in the interest of climate and environmental protection, to reduce the economic costs of energy provision also by including long-term external effects, to conserve fossil energy resources and to promote the further development of technologies for the generation of electricity from renewable energies.[12] These two laws include the central regulatory concepts in Germany[13] that are relevant to the eCREW approach.

The eCREW approach focuses on renewable electricity generated and consumed by participants in a CREW. A local energy retailer offers this concept via a contract that offers incentives for the electricity fed into the grid and for the electricity consumed by the participants. At the same time, the energy retailer supplies the remaining electricity required by the participants in a CREW. This concept is analysed below based on the legal and regulatory framework.

At the beginning of 2021 (concrete since 01.01.2021), an amendment to the Energy Act came into force, introducing adjustments to the Energy Act and the Renewable Energy Act 2021 (and other electricity provisions), as well as a further amendment to these laws (and other provisions). In this modification, the focus was on the implementation of the Electricity Market Directive 2019 (hereafter ED 2019) (such as adjustments in the area of customers) and provisions on hydrogen in the Energy Act.[14]

The compatibility of the eCREW approach with the existing 2021 German legal framework for a joint generation was examined in the legal analysis of D5.1. The legal framework has been further adapted in the meantime due to the Renewable Energy Directive 2018 (hereafter RED II) and ED 2019, and also the energy crisis due to the war in Ukraine has led to further regulatory changes. This policy brief is based on the analysis of D5.1 with the legal status 2021. These topics have been reviewed to ensure they are current, and the current status of these provisions has been incorporated as changes are being made to the relevant legislation between 2021 and 2023.

The Renewable Energy Act - now called **Renewable Energy Act 2023 -** was amended again on 28.07.2022. This law has been in force in part since 2022, and the remaining parts of the amendment only since the beginning of 2023.

The amendment of the **Renewable Energy Act 2023** aims at a consequent, faster expansion of renewable energies in gross electricity consumption to increase to at least 80% by 2030.[15] The law provides new impetus to strengthen local acceptance and anchoring of the energy transition. For example, wind and solar projects by citizen energy corporations will be exempt from tenders from 2023 and can thus be implemented with less bureaucracy.[16]

The amendment of the Renewable Energy Act in 2021 has already included a few adjustments according to RED II and ED 2019, but no explicit provisions that would have affected the European energy communities REC and CEC (see Deliverable 5.1.). In 2021, Germany assumed that parts of the legal framework already complied with the CEC requirements[17], but joint use of electricity through the public grid is still difficult to achieve. More extensive provisions on energy sharing are still lacking in the German legal framework,[18] which is not yet fully possible apart

[12] § 1 Renewable Energy Act 2021. Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz - EEG 2021) Erneuerbare-Energien-Gesetz from 21. July 2014 (F.L.G. I p. 1066), last amended by article 1 of the Act from 21. December 2020 (F.L.G. I p. 3138).
[13] The necessary further acts and regulations are consulted selectively, as far as they are useful for the analysis.
[14] Cf. Website of Federal Ministry for Economic Affairs and Energy: https://www.bmwi.de/Redaktion/DE/Artikel/Service/Gesetzesvorhaben/referentenentwurf-enwg-novelle.html (28.04.2021).
[15] § 1 (2) Renewable Energy Act 2023.
[16] Website of the Federal Government regarding Renewable Energy Act 2023 (available under: https://www.bundesregierung.de/breg-de/themen/klimaschutz/novelle-eeg-gesetz-2023-2023972 [stand: 27.02.2023]
[17] Cf. Draft law of Federal Ministry of Economic Affairs and Energy submitted to the German Parliament, p 57-58 (available under: https://dip21.bundestag.de/dip21/btd/19/274/1927453.pdf [28-04-2021]); This draft law of the Federal Ministry for Economic Affairs and Energy, p 54 (first published on 10.02.2021; available under: https://www.bmwi.de/Redaktion/DE/Downloads/Gesetz/referentenentwurf-enwg-novelle.pdf?__blob=publicationFile&v=8 [28-04-2021]).
[18] Linda Babilo/ Manuel Battaglia / Moritz Robers, Melanie Degel / Katrin Ludwig, Energy Communities: Beschleuniger der dezentralen Energiewende, dena-ANALYSE 2022, page 16 (available under: https://www.dena.de/newsroom/publikationsdetailansicht/pub/dena-analyse-energy-communities-beschleuniger-der-dezentralen-energiewende/); energiezukunft, Knackpunkte für die Bürgerenergie (02.05.2022) (available under: https://www.energiezukunft.eu/buergerenergie/knackpunkte-fuer-die-buergerenergie/).

from the existing tenant electricity model (see chapter 4.4).[19] The amendment in 2022 at least introduced REC by adapting an existing provision regarding "citizen energy corporation" (see below).In this context, the policy brief will present the provisions regarding energy communities according to RED II and ED 2019. As a further point, which legal frameworks currently exist on which eCREW fits will be presented.

4.1 A review of Renewable Energy Directive (RED II) 2018/2001/EU (defining "renewable energy communities")

RED II stipulates objectives that the member states must implement in national law. The requirements for REC can be found in Art 22 RED II, and the definition of REC is provided in Art 2 No. 16 RED II. It defines REC as a "legal entity:

(a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;

(b) the shareholders or members of which are natural persons, SMEs[20] or local authorities, including municipalities;

(c) the primary purpose of which is to provide environmental, economic, or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits".[21]

4.1.1 Current progress in the implementation of REC

The German National Energy and Climate Plan (NECP) of 2020 identifies the REC as having great potential for expanding renewable energies. Its comments refer to the fact that Germany has created a regulatory framework that supports and promotes the development of REC. It is emphasized that the regulatory framework opens up essential aspects, such as the access of end consumers to RECs on a non-discriminatory basis and enables access to existing support provisions.[22]

Even before RED II, provisions were already concerning the "citizen energy corporation "[23] and tenant electricity model (this one is described in chapter 4.4c)[24]. There is no definition for RECs as in RED II in Germany, but the German implementation of a REC is based on the construct of the citizen energy corporation.

With the amendment of the Renewable Energy Act (from 28.07.2022), the provision of the citizens' energy corporation was made an approximation to the European REC[25], which is briefly described below.

- **Citizen energy corporation (in German "Bürgerenergiegesellschaft")**

A definition of a citizen energy corporation had already existed for a long time in the Renewable Energy Act. The amendment adapted the legal definition in § 3 No. 15 Renewable Energy Act.

This definition now is as follows: "Citizen energy corporation" means "any cooperative or other corporation,

[19] Linda Babilo/ Manuel Battaglia / Moritz Robers, Melanie Degel / Katrin Ludwig, Energy Communities: Beschleuniger der dezentralen Energiewende, dena-ANALYSE 2022, page 16 (available under: https://www.dena.de/newsroom/publikationsdetailansicht/pub/dena-analyse-energy-communities-beschleuniger-der-dezentralen-energiewende/).

[22] Cf. *Federal Ministry for Economic Affairs and Energy*, Integrierter Nationaler Energie-und Klimaplan (2020) p 86.

[23] Cf. Website of Bundesnetzagentur: https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Ausschreibungen/Wind_Onshore/Buergerenergiegesellschaften/Buergerenergiegesell_node.html (Stand 28.05.2021).

[24] Cf. Website of Bundesnetzagentur: https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/ErneuerbareEnergien/EEGAufsicht/Mieterstrom/Mieterstrom_node.html (28.05.2021).

[25] This is the view of the federal government's draft law, pp. 170, 196 (available under: https://www.bmwk.de/Redaktion/DE/Downloads/Energie/04_EEG_2023.pdf?__blob=publicationFile&v=8).

a. which consists of at least 50 natural persons as voting members or voting shareholders,
b. in which at least 75 % of the voting rights are held by natural persons who are registered with a dwelling in a postal code area that is wholly or partly within a radius of 50 kilometers of the planned installation in accordance with the Federal Registration Act[26], the distance being measured from the outer edge of the respective facility in the case of solar installations and from the center of the tower of the respective facility in the case of wind turbines,
c. where the voting rights that natural persons do not hold are exclusively held by micro, small or medium-sized enterprises as defined in Commission Recommendation 2003/361/EC of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (OJ L 124, 20.5.2003, p. 36) or by local authorities and associations thereof with legal capacity, and
d. in which no member or shareholder of the corporation holds more than 10 % of the voting rights in the corporation"[27],

Regarding voting rights, there is another part of the definition that deals with control in the community. The determination of the voting rights of natural persons of at least 75% must also include a corresponding actual possibility of influencing the corporation and participating in decisions of the shareholders' meeting. In the case of a merger of several legal entities or partnerships into one corporation, it is sufficient if each of the corporation's members fulfills the requirements from a. to d. (see above). In the case of a company in which another company holds 100 percent of the voting rights, it is sufficient if the dominating corporation fulfils the requirements from a. to d. (see above).

If we now compare the above definition of REC from RED II and the new definition of citizen energy corporation, it is not difficult to see that the essential points are the same. The group of participants addressed in RED II has been adopted. One important specification also stands out: a minimum number of natural persons has been defined for a citizen energy company. In addition, these natural persons should have a significant voting right (more than 75%) in this community. As a result, in addition to the natural persons, the voting rights for the rest of the permitted group of participants will only amount to 25%.

The provision on the control of this community also shows the requirements of RED II, which should be with the company. This is shown by the 10% limit for individual members and the clarification regarding the influence on the corporation and the participation in the shareholders' meeting decisions.

The definition also includes the requirement of "proximity of the renewable energy projects". In Germany, this was defined by a geographical radius of 50 kilometers around the planned facility. This requirement is also related to the voting natural persons who must be located within this radius.

The requirement of 50 members, up from 10 members under Renewable Energy Act 2021, is a somewhat high to form a group. On the other hand, the 50 km radius is now welcome, as people can join together district-wide, which was impossible in 2021.[28]

All these requirements of the definition (cf. § 22b (4) Renewable Energy Act 2023) must already be met to have relief to the award process for the payment claim under § 19 in conjunction with § 22 Renewable Energy Act 2023.[29]

In this context, it should be noted that the definition and preconditions therein allow for facilitation or exemption from an award procedure. This simplification for surcharge procedures in connection with subsidies under the

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[26] Bundesmeldegesetz (BMG) from 03. May 2013 (F.L.G. I p. 1084), last amended by article 22 of the Act from 19. December 2022 (F.L.G. I p. 2606).
[27] § 3 No. 15 Renewable Energy Act 2023.
[28] Cf. Website of Kapellmann Rechtsanwälte, Bürgerenergiegesellschaften im EEG 2023 (08. Juli 2022) (available under: https://www.kapellmann.de/de/beitraege/buergerenergiegesellschaften-im-eeg-2023 [15.3.2023])]
[29] Cf. Website of Kapellmann Rechtsanwälte, Bürgerenergiegesellschaften im EEG 2023 (08. Juli 2022) (available under: https://www.kapellmann.de/de/beitraege/buergerenergiegesellschaften-im-eeg-2023 [15.3.2023])]

Renewable Energy Act 2023 with regard to the promotion of generated energy (see § 19 Renewable Energy Act 2023 that each generation plant must be attributed to a form of sale - see chapter 4.4).

The exemption refers to a surcharge procedure that is related to the market premium (see more under chapter 4.4). Provided that the German REC meets all the requirements of the definition, it may receive an exemption from the surcharge procedure under § 22 in conjunction with §22b Renewable Energy Act 2023. The surcharge procedure applies to the generation facility. The following generation facilities of citizen energy corporation are exempt from this surcharge procedure:

1. onshore wind turbines with an installed capacity of up to and including 18 megawatts; and

2. solar plants of citizen energy companies with an installed capacity of up to 6 megawatts.

In order for this exemption to be effective for the surcharge process, other requirements of § 22b Renewable Energy Act 2023 must be met, such as for solar installations, that this solar installation must be notified to the Federal Network Agency (in German: Bundesnetzagentur[30]) three weeks prior to commissioning and that no other solar installations of the same segment have been commissioned in the previous three years. For the eCREW approach, these provisions are not an obstacle because eCREW connects various people with their existing small and large generation facilities.

4.1.2 Evidence from implementations

The provision on the German REC, which is called in German "Bürgerenergiegesellschaft", is regulated in § 3 No. 15 as a legal definition and § 22b in connection with §§ 22 (2) and (3), 19 (1) Renewable Energy Act 2023. The draft law of the federal government with which the provision on citizen energy corporation was changed to a REC was brought forward on 02.05.2022 and was promulgated as an Renewable Energy Act amendment on 28.07.2022. Parts of the law did not come into force until 2023.[31]

4.1.3 Barriers & Motivators

Even with the introduction of a German REC, the possibility of using energy collectively will not necessarily become easier. The high number of participants and the requirement that 75% must be with natural persons could also be challenging. Although there might be concerns, it should be considered that the merging of citizen energy companies is already possible since 2017 and that the German population is not yet able to participate.[32]

There are no obstacles for the eCREW approach within the framework of the already existing energy law provisions, as of "citizen energy cooperative"[33], because eCREW requires no establishment of an association or company, but only a contract with an energy supplier responsible for the intermediation and administration, as well as the further supply of the remaining required electricity.

4.1.4 Other national legislation related with RED II

Guarantees of origin are issued for renewable energy and are used to demonstrate to an end customer that a specific percentage or amount of energy was produced from renewable sources. Art 19 RED II stipulates that the

[30] Cf. Website of Bundesnetzagentur (available under: https://www.bundesnetzagentur.de/DE/Allgemeines/DieBundesnetzagentur/start.html)

[31] Cf. Website of Bundesregierung, EEG 2023 – Ausbau erneuerbarer Energien massiv beschleunigen (2022). available under: https://www.bundesregierung.de/breg-de/themen/klimaschutz/novelle-eeg-gesetz-2023-2023972 (23.02.2023)

[32] Cf. Website of Kapellmann Rechtsanwälte, Bürgerenergiegesellschaften im EEG 2023 (08. Juli 2022) (available under: https://www.kapellmann.de/de/beitraege/buergerenergiegesellschaften-im-eeg-2023 [15.3.2023)]

[33] Cf. Website of Bundesnetzagentur: https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Ausschreibungen/Wind_Onshore/Buergerenergiegesellschaften/Buergerenergiegesell_node.html (Stand 28.05.2021).

guarantees of origin are extended to all renewable energies. Therefore, electricity, gas (including hydrogen), heating, and cooling are covered.

The German parliament has implemented the extension of guarantees of origin in a law only at the beginning of the year (2023).[34] In the Guarantees of Origin Register Act (in German “Herkunftsnachweisregistergesetz”)[35], the inclusion of gaseous energy sources as well as for heating and cooling from renewable energy sources created the basis necessary for the establishment and operation of a guarantee of origin register for gaseous energy sources as well as a register of guarantees of origin for heating or cooling from renewable energy sources. The German legislator is still in the process of introducing the obligations of RED II into national law.

4.1.5 Conformity to existing legislative framework

Germany has decided to build on an existing provision and develop it further. First, some aspects of the RED II requirements are still missing in order to implement energy sharing, such as adjusted grid charges as an incentive (cf Art 19 REDII and chapter 4.3). The legal framework regarding energy communities is still developing; among other things, the introduction of CEC is still missing.

4.1.6 Practical issues with legislation and adaption

With the new provision regarding the citizens' energy corporation, there is a simplification of the administrative procedure for the payment award. However, the spatial framework does not provide any further facilitation for distributing the renewable electricity generated. Rather, the framework has been drawn regarding the participating persons who jointly operate a generation plant, which further strengthens the population's acceptance. It is worth highlighting that the previous scheme had a focus on wind energy, but has now been expanded to include solar energy. Wind and solar energy are now available as renewable energy for the German REC, showing that renewable electricity is at the core of this citizen energy.

4.2 A review of Revised Energy Market Directive (ED 2019) 2019/944 (defining “citizen energy communities”)

The European provisions on CEC are set out in the ED 2019. The requirements for CEC are defined in Art 16 and Art 2 No. 11 ED 2019, and are to be implemented in national law by the member states. Art 2 No. 11 ED 2012 defines citizen energy community as “a legal entity that:

(a) is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises;

(b) has for its primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than to generate financial profits; and

(c) may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders”.

[34] Cf. Website of the German Parliament, available under: https://www.bundestag.de/dokumente/textarchiv/2022/kw48-de-herkunftsnachweis-energie-923104.

[35] Gesetz zur Ausstellung, Übertragung und Entwertung von Herkunftsnachweisen sowie zur Schaffung eines Herkunftsnachweisregisters für gasförmige Energieträger und eines Herkunftsnachweisregisters für Wärme oder Kälte aus erneuerbaren Energien (Herkunftsnachweisregistergesetz – HkNRG) from 4. January 2023 (F.L.G. I p. 9) (available under. https://www.gesetze-im-internet.de/hknrg/BJNR0090B0023.html)

4.2.1 Current progress towards the implementation of CEC

In the draft law of 09.03.2021[36], the German government pointed out that energy communities are already possible under German energy law in a variety of ways, for example through generation facilities that can be established and controlled. The following citation of the draft law of 09.03.2021 can be taken with regard to CEC after ED 2019: In the draft law of 09.03.2021 it was stated that the The merger of citizens into legal entities is already possible under German law, for example, also within the framework of a cooperative. It was pointed out that against the background, it is not necessary to create a new legal form for this purpose. From the federal government's perspective, the draft law also stated that the requirements for a CEC can be met within the framework of current law. [37] In this context, it is questionable whether all European CEC requirements should be considered fulfilled already in the existing legal system, even if the federal government believes so. The federal government does not refer to electricity law, but civil law provisions, such as the Cooperative Act[38]. Fundamentally, a cooperative is defined as a company with a non-closed number of members whose purpose is to promote its members' acquisition or economy or their social or cultural interests through joint business operations (cooperatives).[39] These previously listed purposes represent the "promotion mission" that must take place within the corporation. In this regard, each cooperative must be considered according to the type of cooperative and statute chosen. It should be emphasized that the cooperative is not committed to making a profit but is expected to do so. It is important that the purpose of the cooperative directly benefits its members. In the case of energy cooperatives, the motivation of the citizens is essential, such as their own energy supply, joint action, ecological aspects and as an ecological capital investment. It also shows that the members are possible by idealistic promotion due to the social interests specified in the statute. [40] The association of citizens to use energy collectively is legally possible in principle, but not necessary for the eCREW approach. The eCREW approach does not require the establishment of a cooperative to share electricity. eCREW acts based on a contract. The participants are divided into CREWs and can share electricity within themselves and effectively use it collectively.

The possible establishment of a cooperative is not to be confused with the legally anchored "citizen energy cooperative"; see above at Implementation REC by adjusting the definition (chapter 4.1.1). The citizen energy cooperative is an extended way cooperatives (meeting the requirements) can receive a special tendering provision for solar plants and onshore wind power plants. This provision relates directly to REC under RED II and not to CEC under ED 2019. For the eCREW approach, these provisions are not an obstacle because eCREW follows a simple way, without establishing a corporation, association or other legal entity.

Between 2021 to 2023, there have been no further developments regarding CEC in Germany, as there is no perceived need to adapt the legal framework.

4.2.2 Evidence from implementations

Contrary to the view of the German government, there are currently no indications of a legal adaptation or new introduction into German law for introducing the citizens' energy community, according to Art 16 of ED 2019.[41]

[36] Draft Law of Federal Ministry of Economic Affairs and Energy submitted to the German Parliament, p 57-58 (available under: https://dip21.bundestag.de/dip21/btd/19/274/1927453.pdf [28-04-2021]).
[37] Cf. Draft Law of Federal Ministry of Economic Affairs and Energy submitted to the German Parliament, p 57-58 (available under: https://dip21.bundestag.de/dip21/btd/19/274/1927453.pdf [28-04-2021]).
[38] Genossenschaftsgesetz in the version of the announcement of 16. October 2006 (F.L.G. I p. 2230), last amended by article 6 of the Act from 20. July 20222 (F.L.G. I p. 1166).
[39] § 1 (1) Cooperative Act.
[40] Cf. *Althanns*, Genossenschaftliche Modelle bei der Realisierung von Anlagen der erneuerbaren Energien, ZfBR-Beil. 2012, p. 36 (39).
[41] Cf. Linda Babilo/ Manuel Battaglia / Moritz Robers, Melanie Degel / Katrin Ludwig, Energy Communities: Beschleuniger der dezentralen Energiewende, dena-ANALYSE 2022, page 17 (available under: https://www.dena.de/newsroom/publikationsdetailansicht/pub/dena-analyse-energy-communities-beschleuniger-der-dezentralen-energiewende/).

4.2.3 Barriers & Motivators

The barriers and motivators why the citizen energy community has not yet been implemented or only partially implemented according to ED 2019 is unclear. It should be noted here that initially the government did not expect implementation to be necessary (see draft law of 09.03.2021 and above), but these views may have changed as the REC was introduced in addition to existing laws (see chapter 4.1).

4.2.4 Other national legislations related with ED 2019

There are implementation acts in Germany related to ED 2019, such as the definition of "aggregation" (Art. 2 No. 18 ED 2019) and how consumers are strengthened in their rights (aggregation contract) in the context of aggregation services (Art 13 ED 2019). Customer rights regarding enabling dynamic electricity supply contracts were also strengthened (Art. 11 ED 2019).[42]

With the amendment to the Energy Act in 2021 (see chapter 4 and 4.2.1), the rights of consumers vis-à-vis their suppliers were strengthened by adjustments to the legal framework.

In Germany, the role of "aggregator" is legally defined as follows, which contributes to the dissociation from other roles in the market: „natural or legal persons or legally dependent organizational units of an energy supply company that carry out an activity in which the consumption or generation of electrical energy is offered in the bundled form in energy facilities or in facilities for the consumption of electrical energy on an electricity market“[43].

In § 41 Energy Act, the framework conditions for energy supply contracts with the end consumer are defined (also related to Art. 10 ED 2019). Among other things, it stipulates that electricity supply contracts may not contain contractual provisions that prevent end consumers from agreeing on aggregation. This means that consumers have the right to use aggregation services in addition to the energy supply contract. Furthermore, there are framework conditions for contracts between aggregators and operators of generation plants or end consumers. Contracts for the provision of services for excess or shortfall generation and excess or shortfall consumption of electrical energy must be in writing. For this purpose, the requirements of § 41e in connection with § 41d Energy Act must be complied with.

Electricity suppliers must offer electricity tariffs for end consumers that provide an incentive to save energy or control energy consumption. These include, in particular, tariffs with regard to load-variable or time-of-day-dependent tariffs - insofar as this is technically feasible and economically viable. Electricity suppliers who supply more than 200,000 end consumers as of December 31 of any given year are subject to a secondary requirement. If this is the case, these electricity suppliers are obliged in the following year to offer to conclude an electricity supply contract with dynamic tariffs for end consumers who have a smart meter (as defined by the Metering Point Operation Act [44]).

The currently existing Energy Act also has a legal definition about fully integrated network components related to ED 2019. “Fully integrated network components”[45] according to the German legal definition, these are "network components that are integrated into the transmission or distribution network, including energy storage facilities, and that serve exclusively to maintain secure and reliable network operation and not to provide control energy or congestion management"; it is stipulated that, under some conditions, the operator of an electricity grid may own, construct, manage or operate energy storage facilities that produce electrical energy.[46]

[42] Cf. Presentation by Fabian Pause, 12th Göttingen Conference on Current Developments in the Energy Supply System on 22.09.2021 (available under: https://www.efzn.de/fileadmin/documents/Goettinger_Energietagung/Vortr%C3%A4ge/2021/GET_2021_Pause.pdf (15.03.2023).

[43] § 3 No. 1a Energy Act.

[44] Gesetz über den Messstellenbetrieb und die Datenkommunikation in intelligenten Energienetzen (Messstellenbetriebsgesetz - MsbG) Messstellenbetriebsgesetz from 29. August 2016 (F.L.G. I p. 2034), last amended by article 11 of the Act from 20. July 2022 (F.L.G. I p. 1237).

[45] § 3 No. 38b Energy Act.

[46] § 11b Energy Act.

The implementation of the ED 2019 is not yet complete and will certainly result in further changes in the German electricity sector.[47]

4.2.5 Conformity to existing legislative framework and Practical issues with legislation

In Germany there is no specific provision for the CEC in terms of the ED 2019, therefore no more information about it can be analysed. As mentioned above, it is generally possible to form cooperatives under civil law and without electricity law.

4.3 Differences between national implementation and Directives with regard to the Renewable Energy Community (RED II) and Citizen Energy Community (ED 2019)

Differences between the implementation of the directives in Germany and the ED 2019 and RED II are not easy to investigate under present conditions, as the implementation process is still underway. As shown above, there is no specific provisions for a European CEC, such as non-discriminatory access to all electricity markets and for CECs to be subject to non-discriminatory, fair, proportionate and transparent procedures, charges and levies (cf. Art. 16 ED 2019). Rather, the already existing provision on "Bürgergesellschaften" was adapted, which is now more in line with the requirements of RED II and thus the REC. However, it remains to be seen whether this is already the end of the adjustments or whether it is necessary to make further adjustments, such as fair, proportionate and transparent cost-oriented grid fees and relevant levies, charges and taxes[48] support energy distribution among members of citizen energy corporation.[49]

4.4 General overview of how the legislative and administrative framework conforms with the eCREW approach

The policy brief discusses the advance description of German citizen energy and shows how eCREW can operate within the existing legal framework.

4.4.1 Sharing renewable electricity through the public grid in Germany

It is necessary to clarify the legal situation when a citizen (or a company) intends to feed its surplus/complete electricity into the public grid. The focus of eCREW is on the efficient local use of renewable electricity, therefore, the provisions on renewable electricity are considered in particular. The eCREW links to an electricity trader who implements the approach. Whether it is possible to operate within the German legal framework in the sense of energy sharing is a question answered in this policy brief.

- **Renewable electricity will be purchased, transmitted and distributed**

The German § 11 Renewable Energy Act 2023 requires the system operator to physically assume, transmit, and distribute all electricity from renewable energy (or mine gas) on a priority basis without delay.[50] This refers to the electricity sold through the forms of sale provided for in § 21b (1) of the Renewable Energy Act 2023.

The provision on the form of sale stipulates that the operator must assign each facility to one of the four forms of sale defined by law (see below).

[47] Cf. smartEn, THE IMPLEMENTATIONOF THE ELECTRICITY MARKET DESIGNTO DRIVE DEMAND-SIDE FLEXIBILITY, Monitoring Report March 2022 (available under: https://smarten.eu/wp-content/uploads/2022/03/The_implementation_of_the_Electricity_Market_Design_2022_DIGITAL.pdf).
[48] Cf. Art 22 (4) lit d RED II.
[49] Cf. J. Wiesenthal, A. Aretz, N. Ouanes, K. Petrick, Energy Sharing: Eine Potenzialanalyse (2022) p74 (available under: https://www.ioew.de/fileadmin/user_upload/DOKUMENTE/Publikationen/2022/Energy_Sharing_Potenzialanalyse.pdf)
[50] Cf. § 11 (1) Renewable Energy Act 2023.

- **The forms of sale under § 21b (1) Renewable Energy Act 2021 are**

- The market premium under 20 leg cit (in German: Marktprämie),
- feed-in tariff under 21 leg cit (in German: Einspeisevergütung) and
- Tenant electricity surcharge under 21 leg cit (in German. Mieterstromzuschlag)
- other direct marketing under 21a leg cit (in German: sonstige Direktvermarktung).[51]

Both the system operator's physical acceptance and the commercial purchase of the fed-in electricity are required if the system operator is entitled to the feed-in tariff, and has asserted this right.[52] The obligation to physically purchase the electricity already creates the basis for using the public grid to distribute electricity.

This is a general advantage for eCREW, as electricity from renewable sources must be physically purchased according to the Renewable Energy Act 2023 and even bought by the system operator if a feed-in tariff has been legally claimed. This provides a good basis for the eCREW approach, which focuses on renewable electricity and involves using the public grid. In the following, the sale form direct marketing is to be particularly emphasized.

In **direct marketing**, there are two ways to use the public grid. Under direct marketing, on the one hand, the **facility operators can market the electricity themselves or use a direct marketer** that markets the electricity on their behalf.

The definition of direct marketing in § 3 No 16 Renewable Energy Act 2023 must be considered. **Direct marketing** is the sale of electricity from renewable energies to third parties unless the electricity is consumed near the facility and is not passed through a grid. The definition shows that in this case, the electricity is marketed to third parties through the public grid.[53] The use of the public grid results when the feed-in of a facility is assigned to an entry point (compare Electricity Grid Access Ordinance[54]) and thus to a balancing group.[55] The definition does not include electricity sharing that is not transmitted through the public grid and is located near the facility. In connection with "sale" to "third parties", the amount of payments, if any, are not important. The key is the term "marketing", as this implies the aim to supply the generated electricity to a third party on the energy market. The third party is any natural or legal person; the electricity is usually sold to direct marketing companies. Marketing to an end consumer is also possible.[56]

The other way, as described above, is to use a “direct marketing operator” to sell renewable electricity. A **direct marketer,** by definition, is someone commissioned by the facility operator with the direct marketing of electricity from renewable energies or who commercially purchases electricity from renewable energies without being an end consumer of this electricity or a system operator.[57] On the one hand, the direct marketing contractor can be commissioned. In this case, the activity will be based on the energy sector. The difference commercial acceptance is that the commissioning is carried out as a transaction under the law of obligations vis-à-vis a third party. In this case, the performance (electricity delivery) is provided by the facility operator directly to the third party by the direct marketing contractor. The contract is executed directly between the facility operator and the host. This procedure

[51] Cf. *Woltering*, EEG 2017 § 11 Abnahme, Übertragung und Verteilung, in Greb/Boewe, BeckOK EEG 11. Edition (Stand 16.11.2020) Rn 9-12.
[52] Cf. § 21 (1) second phrase Renewable Energy Act 2021.
[53] Cf. *Sösemann*, EEG 2017 § 3 Nr. 16 (Direktvermarktung), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 10-13.
[54] Stromnetzzugangsverordnung from 25. July 2005 (F.L.G. I p. 2243), last amended by article 6 of the Act from 16. July 2021 (F.L.G. I p. 3026).
[55] Cf. *Sösemann*, EEG 2017 § 3 Nr. 16 (Direktvermarktung), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 13.
[56] Cf. *Sösemann*, EEG 2017 § 3 Nr. 16 (Direktvermarktung), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 8-9.
[57] § 3 No. 17 Renewable Energy Act 2023.

is mainly used if the direct marketing contractor does not have its balancing group. Even without a balancing group, the facility operator's electricity can be sold to a third party, such as an electricity trader. In this case, the facility operator must ensure that the feed-in point is assigned to the appropriate balancing group so the direct marketer can fulfil the service vis-à-vis the third party.[58] On the other hand, the direct marketer can also purchase the electricity commercially, whereby its balancing group is managed. In this case, the direct marketer is not only contractually obligated to purchase the electricity (from facility operators) and to deliver it (to third parties) (as above), but also fulfils the transaction so that the claim is settled.[59]

The direct marketer is distinguished from the end consumer and system operator with regard to market role. A legal entity can fulfil several market roles unless prohibited by law. The direct marketer is between the end consumer and generator, being a system user and therefore referred to as a supplier.[60] It must be emphasized that the system operator can only purchase electricity within the feed-in tariff framework. It is also possible for a legal entity to have two lines of business, one for network operation and one for direct marketing. This is the case with municipal utilities if they have less than 100,000 connected customers because they do not fall under the provisions of unbundling (separation of production, supply and grid) according to § 7 (2) Energy Act.[61] This makes it possible for a regional municipal utility, which is not subject to unbundling, to carry out system operation and also act as a direct marketer.

In addition to the possibilities of direct marketing, it should be noted here that other legal requirements for the facility operator must be met. Please refer to the provisions in § 10b Renewable Energy Act 2023.

At this point, it is noted that according to § 21a Renewable Energy Act 2023, the facility operator has the right to directly market the electricity of his facility if it does not take payment according to § 19 (1) Renewable Energy Act 2023. However, as shown above, the plant operator must also physically take over, transmit and distribute this electricity.

The opportunity to provide electricity through an energy provider offering direct marketing, such as municipal utilities, allows eCREW to fulfil its intermediary activity between producers and/or consumers. eCREW approach is offered by local energy retailers, which can market the electricity between the individual CREW members and supply the required remaining electricity to the participants.

The possibility for an owner of a production facility or a facility operator to use a direct marketing contractor is a benefit for the eCREW approach, which also sees itself as an intermediary between the facility operator who generates electricity and the end customer who purchases it. This allows the eCREW concept to operate within the German legal framework. Furthermore, the sales forms have to be considered, which will also be further investigated regarding the eCREW approach.

- **Legally defined forms of sale of renewable electricity**

As mentioned above, there are four sales forms to which a facility must be assigned.[62] These are, on the one hand, the three forms of sale subsidized under § 19 (1) Renewable Energy Act 2023 and, on the other, “other direct

[58] Cf. *Sösemann*, EEG 2017 § 3 Nr. 17 (Direktvermarktungsunternehmen), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 3-6.
[59] Cf. *Sösemann*, EEG 2017 § 3 Nr. 17 (Direktvermarktungsunternehmen), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 7.
[60] Cf. *Sösemann*, EEG 2017 § 3 Nr. 17 (Direktvermarktungsunternehmen), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 8-10.
[61] Cf. *Sösemann*, EEG 2017 § 3 Nr. 17 (Direktvermarktungsunternehmen), in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 11.
[62] According to the legal definition § 3 No. 1 Renewable Energy Act 2023, a "facility is: "any facility for the generation of electricity from renewable energy sources or from mine gas, and in the case of solar energy systems, each module is a stand-alone facility; facilities that receive temporarily stored energy derived exclusively from renewable energy sources or mine gas and convert it into electrical energy are also considered facilities."

marketing" (in German: sonstige Direktvermarktung) ineligible for payment under § 19 (1) in connection to § 21a Renewable Energy Act 2023.

The system operator must pay the subsidies for the market premium[63], feed-in tariff[64], or tenant electricity surcharge[65] . This claim for payment (§ 19 (1) Renewable Energy Act 2023) against the system operator exists only if the facility operator does not claim an avoided charge for the electricity (according to § 18 (1) No. 1 Electricity System Charges Ordinance[66]). The following is a brief and concise description of the three forms of sale that are subsidized:

a) Market premium § 20 Renewable Energy Act 2023

The eligibility for payment of a market premium exists for those calendar months in which

i) the electricity is directly marketed
ii) the facility operator shall grant the system operator the right to use the electricity as an "electricity from renewable energy sources or mine gas, financed from the EEG surcharge" and
iii) the electricity must be balanced in a balancing or sub-balancing group, with balancing in only one of the following balancing groups:

- "a) where electricity from renewable energy sources or from mine gas that is directly marketed in the sale form of the market premium or
- b) those where electricity does not fall under letter a) and whose placement in the balancing or sub-balancing group is not the responsibility of the facility operator or the direct marketing operator".[67]

In order to receive the market premium, it is required that the electricity is marketed directly, as already described above. This form represents subsidized direct marketing, where the system operator pays the subsidy. The market premium is, therefore, a subsidy to the electricity price achieved through direct marketing.[68]

For the eCREW approach, this subsidy is to be considered in developing the business model for facilities supported by the market premium. In addition, incentives are to be created that promote energy efficiency in the CREWs.

b) Feed-in tariff § 21 (1) and (2) Renewable Energy Act 2023

The entitlement to payment of the feed-in tariff (according to § 19 (1) No. 2 Renewable Energy Act 2021) exists only for those calendar months in which the facility operator feeds the electricity into a grid and makes it available to the system operator according to § 11 Renewable Energy Act 2023.The payment entitlement of § 21 (1) must be considered in conjunction with § 53 REA, which specifies how the payment entitlement arises for facilities up to 100 kilowatts, more than 100 kilowatts, as well as for subsidized facilities. At this point, it is noted that the payment amount is based on this.

The system operator purchases the electricity commercially, i.e. the grid operator purchases the electricity commercially with the meaning of § 11 Renewable Energy Act 2023.[69] According to § 21 (2) Renewable Energy Act 2023, the facility operator claiming the feed-in tariff must make all electricity generated in this facility that is not

[63] § 20 Renewable Energy Act 2023.
[64] § 21 (1) No. 1, 2 or 3 Renewable Energy Act 2023.
[65] § 21 (3) Renewable Energy Act 2023.
[66] Stromnetzentgeltverordnung from 25. July 2005 (F.L.G. I p. 2225), last amended by article 6 of the Act from 20. July 2022 (F.L.G. I p. 1237).
[67] § 20 Renewable Energy Act 2023.
[68] *Schlacke/Kröger*, EEG 2017 § 20 Marktprämie, in Theobald/Kühling, Energierecht Werkstand: 109 (Januar 2021) Rn 7; Cf. Draft legislation of the German Federal Government: „Gesetz zur Änderung des Erneuerbare-Energien-Gesetzes und weiterer energierechtlicher Vorschriften" (BR-Drucksache 569/20) p. 113 (available under https://dip.bundestag.de/vorgang/.../267786 [15.06.2021]).
[69] Cf. § 21 (2) Renewable Energy Act 2023; cf. *Schlacke/Kröger*, EEG 2017 § 21 Einspeisevergütung und Mieterstromzuschlag, in Theobald/Kühling et al, Energierecht Werkstand: 109 (Januar 2021) Rn 7.

consumed near the facility and is transmitted through a grid available to the system operator. Furthermore, this facility may not be used to participate in the balancing energy market. In this case, the surplus electricity is transferred to the system operator, and the facility operator receives the feed-in tariff. Therefore, the feed-in tariff is fundamentally eligible for certain smaller and older facilities.[70]

This form of divestiture is not attractive to eCREW approach, which involves local energy retailers who are expected to take the generated electricity from CREW members and make it available to other participants without generation facilities.

c) Tenant electricity surcharge § 21 (3) Renewable Energy Act 2023

The Renewable Energy Act 2023 has already established a provision for electricity generation by a PV system on, at or in a residential building.[71] § 21 (3) Renewable Energy Act 2023 in connection with § 19 (1) No. 3 Renewable Energy Act 2023 regulates the requirements for entitlement to payment of the tenant electricity surcharge. This is a claim for paying the tenant electricity surcharge from the system operator to the facility operator. Renters' electricity is generated by a solar installed on, at or in a residential building, insofar as it has been supplied and consumed by the plant operator or a third party to an end consume. This supply to end consumers must occur within the building/apartment/annex building in the same district where this building (with solar system) is also located and without transmission through the public grid.[72] The electricity supply may be supplied to tenants and apartment owners, provided that there is a difference of persons between the facility operator and the end customer.[73]

This is a developed supply chain model regarding tenant electricity. This involves the following actors: The facility operator/landlord, an energy service provider/tenant electricity supplier, and the tenants/end consumers. This clarifies that tenant electricity also exists when electricity is not supplied by the facility operator but also by a third party (under the supply chain model).[74] In this context, it is pointed out that there are legal requirements for tenant electricity as to how a tenant electricity contract may be structured (see § 42a of the Energy Act). [75]

The limit for tenant electricity is the public grid. This limit was not a barrier to the eCREW approach, as this provision concerns payments to the solar facility operator and is not a barrier to sharing energy across the building. With tenant electricity, the tenants themselves can participate in eCREW, as their remaining electricity not covered by tenant electricity must be covered by another electricity supply, or the excess electricity can be passed on to a CREW. Under the tenant electricity contract, the facility operator/tenant electricity supplier could purchase the residual electricity from an energy supply company that offers eCREW facilities. The eCREW approach also pursues the goal of first consuming the self-generated electricity in a CREW, and then purchasing the additional electricity from the energy supply company. In doing so, the tenant electricity supplier could share surplus tenant electricity by participating in a CREW.

- **Reference to charge for decentralized feed-in**

At this point, we will briefly discuss decentralized feed-in and its remuneration (which is related to other direct marketing). This provision does not only apply to renewable energies. Therefore, only a brief description of the basic framework is given.[76] According to § 3 No. 11 Energy Act, distributed generation facilities are "a generation facility connected to the distribution grid close to consumption and load". Operators of distributed generation

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[70] Cf. *Wiemer*, EEG 2017 19 Zahlungsanspruch, in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 23.
[71] Cf. *Hakenberg*, Mieterstrom in Creifelds, Rechtswörterbuch "Mieterstrom"26. Edition 2021 (Stand 29.04.2021, beck-online.de).
[72] § 21 (3) Renewable Energy Act 2021.
[73] Cf. *Lippert*, EEG 2017 § 21 Einspeisevergütung und Mieterstromzuschlag, in BeckOK EEG, Greb/Boewe 11. Edition (Stand: 16.11.2020, beck-online.de) Rn 52.
[74] Cf. Draft legislation of the German Federal Government: „Gesetz zur Änderung des Erneuerbare-Energien-Gesetzes und weiterer energierechtlicher Vorschriften" (BR-Drucksache 569/20) p. 113 (available under https://dip.bundestag.de/vorgang/.../267786 [15.06.2021]).
[75] Cf. *Ehring*, Grundlagen der vertraglichen Gestaltung von Mieterstromverträgen, EnW 2018, 213 (204).
[76] § 18 Electricity System Charges Ordinane.

facilities receive a payment from the operator of an electricity grid into whose grid the electricity is fed.[77] This payment excludes, for example, the subsidized forms of sale under § 19 Renewable Energy Act 2023. The requirement is that the decentralized volatile generation plant was commissioned before 1.1.2018. These requirements result from § 120 Energy Act, as it provides for the phasing out of payments for distributed generation facilities; this has the advantage that when renewable electricity is marketed, a certificate of origin can also be issued.[78]

As shown in the direct marketing explanations, the end consumers can use a direct marketer for the surplus electricity of their PV system (see above). The provisions on other direct marketing are not an obstacle for eCREW.

- **Interim result**

In principle, using the public grid to feed surplus electricity is possible. With regard to a study on the potential of energy sharing, it has been shown that the legal framework needs to be adapted to enable economic energy sharing, as the potential for this exists in Germany.[79] With the order that generated renewable electricity must be marketed in any of the four sale forms, it is for eCREW to make the necessary adjustments depending on the participant. For each participant, these forms of sale with and without subsidies must be considered to create a sufficient incentive for participation in this business model. Through a bonus system, participants with a power generation facility can benefit and those without storage or power generation facilities. The eCREW approach is attractive for those natural persons and legal entities whose subsidies for their renewable electricity generation facilities are expiring or for those who highly value non-monetary incentives, such as participation in a community and contributing to the environment.

4.4.2 Data flow in eCREW under National Electricity Regulatory Framework

The eCREW approach requires data on energy consumption and generation in order to apply the incentives and thus the effective use of the available energy in a CREW. The Metering Point Operation Act[80] (hereafter: MPOA) came into force in Germany in 2016. This law is intended to contribute to the digitalization of the energy transition and regulates the measurement and metering system in a new way.[81] MPOA regulates, for example, the equipment with measuring devices, rights and obligations in connection with metering point operation, data communication, data protection, and data security.

- **Data flow, Data from smart meter, processing of data from third parties**

The law distinguishes in two types of electricity metering instruments: modern metering devices (in German: moderne Messeinrichtung)[82] and smart metering systems (in German: intelligentes Messsystem)[83].[84] The difference between the two meters is that the modern metering device is not integrated into a communication network - such as the telecommunications network, and remote reading is impossible. Nevertheless, this digital meter displays the current power drawn in kilowatts and it is possible to read the electricity consumption of the previous day, previous

[77] Cf. *Schlacke/Kröger*, EEG 2017 § 21a Sonstige Direktvermarktung, in Theobald/Kühling, Energierecht Werkstand: 109 (Januar 2021) Rn 3.
[78] Cf. § 79 (1) Renewable Energy Act 2023; cf. *Schlacke/Kröger*, EEG 2017 § 21a Sonstige Direktvermarktung, in Theobald/Kühling, Energierecht Werkstand: 109 (Januar 2021) Rn 3.
[79] Cf. J. Wiesenthal, A. Aretz, N. Ouanes, K. Petrick, Energy Sharing: Eine Potenzialanalyse (2022) p 74 (available under: https://www.ioew.de/fileadmin/user_upload/DOKUMENTE/Publikationen/2022/Energy_Sharing_Potenzialanalyse.pdf)
[80] Gesetz über den Messstellenbetrieb und die Datenkommunikation in intelligenten Energienetzen (Messstellenbetriebsgesetz - MsbG) Messstellenbetriebsgesetz from 29. August 2016 (F.L.G. I p. 2034), last amended by article 11 of the Act from 20. July 202 (F.L.G. I p. 1237).
[81] Cf. Website of Bundesnetzagentur (as a regulatory agency): https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Netzzugang_Messwesen/netzzugangundmesswesen-node.html (28.04.2021).
[82] § 2 No. 15 MPOA.
[83] § 2 No. 7 MPOA.
[84] Cf. Website of Bundesnetzagentur: https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Verbraucher/Metering/start.html (28-04-2021).

month and the annual consumption.[85] A smart metering system is also a digital meter that is integrated with a secure and standardized communication unit. The meter can thus be read remotely. Via an interface, viewing the consumption data on a digital end device is possible.[86]

The metering point operator (in German: Messstellenbetreiber) is obliged to install smart metering systems, provided that the requirements of the MPOA are fulfilled. For this, § 29 MPOA stipulates that end consumers with an annual electricity consumption above 6,000 kilowatt hours and those with an agreement under § 14a Energy Act (on controllable consumption devices) must be equipped with a smart metering system. Facility operators with an installed capacity of more than 7 kilowatts must also be equipped with a smart metering system.[87] The meter operator can also equate end consumers under 6,000-kilowatt hours and facilities with an installed capacity of over 1 and up to and including 7 kilowatts with a smart metering system.[88] Both variants, on the one hand, the obligation and on the other hand the possibility of the metering point operator must be seen in connection with the technical possibility (§ 30 MPOA) and economic justifiability (§ 31 MPOA). A modern metering device is provided for those cases where the law has not provided for equipment with a smart metering system, and installing modern metering devices is economically justifiable (§ 32 MPOA). According to this, all consumers should eventually be equipped with a modern measuring device by 2032.[89]

An intelligent metering system is required for an end consumer to participate in eCREW, as the measured values are available digitally and can be read remotely. Therefore, the rollout of smart metering systems benefits the eCREW approach, as it increases the number of potential participants now and in the future.

Generally, the measured data from the smart metering system is transmitted monthly to the metering point operator, who forwards the data to the supplier and the system operator. Electricity tariffs chosen by end consumers may require more frequent measurement and data transmission.[90]

The law contains specific regulations on data protection covering data communication in smart energy networks and the collection of metering data by the metering point operator and use by authorized bodies. In this context, § 49 MPOA lists the authorized bodies. In addition to the system operator, this also includes the energy supplier and third parties who have the consent of the end consumer. Based on these authorized bodies, reference should be made to § 60 MPOA. Furthermore, it is specified that the data of the smart metering system is transmitted directly to the authorized entities via so-called smart meter gateway.[91] This device is the communication unit of a smart metering system, which must comply with this law's technical and data protection requirements.[92]

§ 60 MPOA provides that the metering point operator transmits the data on feed-in and consumption from the metering point operator to the distribution system operator, transmission system operator, balancing group coordinator, and supplier.[93] This regulation fundamentally stipulates that the metering point operator must process and transmit the metering data[94] to the required extent to the authorized bodies as often as needed to fulfill their

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[85] *Bundesnetzagentur*, Energie Moderne Messeinrichtungen (folder available under: https://www.bundesnetzagentur.de/SharedDocs/Mediathek/Verbraucherhefte/Energie/ModerneMesseinrichtungStrom.pdf?__blob=publicationFile&v=2 [Stand 08.06.2021]).
[86] *Bundesnetzagentur*, Energie Intelligentes Messsystem (folder available under: https://www.bundesnetzagentur.de/SharedDocs/Mediathek/Verbraucherhefte/Energie/IntelligentesMessystem_SmartMeter.pdf?__blob=publicationFile&v=4 [Stand 08.06.2021]).
[87] § 29 (1) MPOA.
[88] § 29 (2) MPOA.
[89] § 29 (3) MPOA.
[90] *Bundesnetzagentur*, Energie Intelligentes Messsystem (folder available under: https://www.bundesnetzagentur.de/SharedDocs/Mediathek/Verbraucherhefte/Energie/IntelligentesMessystem_SmartMeter.pdf?__blob=publicationFile&v=4 [Stand 08.06.2021]).
[91] Cf. *Bartsch*, MsbG § 49 Verarbeitung personenbezogener Daten, in Theobald/Kühling, Energierecht Werkstand: 109 (Januar 2021) Rn 1-3.
[92] Cf. § 2 No. 19 MPOA.
[93] Cf. *Schäfer-Stradowsky/Timmermann*, Verschiebung von Kompetenzen zwischen ÜNB und VNB durch die Digitalisierung der Energiewende, EnWZ 2018, p. 202.
[94] This refers to the data presented in §§ 55 to 59 MPOA, such as electricity consumption data.

tasks[95]. In this regard, suppliers must receive the previous day's data daily if it is mandatory for the purpose under § 69 MPOA, such as billing for the energy supply contract.[96] Furthermore, the metering point operator must provide the facility operator (if an intelligent metering system is available) with information on time. This includes information about feed-in and consumption and feed-in values for the last 24 months.[97]

In principle, the metering point operator is the distribution system operator, but the distribution system operator may delegate the responsibility to a third party via contract.[98]

It should be emphasized that, depending on the constellation, separate authorizations are required to obtain energy data from the smart meters. In § 50 MPOA, the permissibility and scope of data processing is regulated. This processing refers to those data that result from or with the help of various measurement possibilities (according to § 50 (1) MPOA[99]). A distinction is made as to whether the consent of the connection user (i.e. end consumer and/or feeder) is required or whether it is necessary for the fulfillment of the contract, pre-contractual measures, legal obligations, or the tasks of the system operator.[100]

- **Interim result**

In case the energy supplier is also the distribution system operator and thus the metering point operator, there is no difficulty in obtaining data on consumption and feed-in for the eCREW concept. This is the case in the exception of § 7 Energy Act applies, where no unbundling requirements exist, namely, when fewer than 100,000 customers are directly or indirectly connected to the supply network/distribution system.[101] Furthermore, the contractual design of the eCREW approach in the form of an electricity supply contract also provides a basis for data collection. Another case is when due to unbundling regulations, the energy supplier does not operate the distribution system and receives the energy data the following day. The regulations on the data exchange of the metering operator to the respective authorized parties are helpful for the eCREW approach.

5 Practical framework

5.1 Energy behaviours of citizens and how they would associate with the eCREW approach, barriers, and motivators

This two-part section is based on the results of a large-scale survey carried out during the H2020 project ECHOES. The survey contained 114 questions aiming to provide insights into individuals' energy choices within an energy transition process. The survey covered 31 countries (EU 28 including the United Kingdom, plus Norway, Switzerland and Turkey). From a total of 18,037 participants in the 31 countries, 603 were from Germany. The first part of this section describes the attitudes of German citizens towards energy related matters and the second part their energy behaviour.

Perspectives on community and renewable energy aspects

36.8% of all German survey respondents stated that they would be interested in participating in a renewable energy investment, and 40.5%, that their pro-environmental behaviours are positively affected by their communities' views

[95] By tasks are those arising from §§ 50 in conjunction with §§ 61 to 73 MPOA, such as those involving the supply of energy and billing.
[96] § 60 MPOA; Thereby the authorized persons are listed, who receive the data and in which time frame.
[97] § 62 MPOA.
[98] Cf. § 2 No. 4 and § 43 MPOA; *Schäfer-Stradowsky/Timmermann*, Verschiebung von Kompetenzen zwischen ÜNB und VNB durch die Digitalisierung der Energiewende, EnWZ 2018, p. 118 (207).
[99] That are the following measurement possibilities: measuring device, modern measuring device, measuring system and intelligent measuring system.
[100] Cf. § 50 MPOA.
[101] Cf. *Finke,* § 7 EnWG Rechtliche Entflechtung von Verteilernetzbetreibern, in Theobald/Kühling, Energierecht Werkstand: 108 (September 2020) Rn 26-28.

and opinions. A much larger share, 72.3%, agreed that people could act together for the energy transition. These results point toward a great potential interest in RECs and CECs.

The German survey respondents have rather divided perceptions of how well the community is doing regarding energy behaviours. While 90.9% of them believe that human activities are at least equally responsible as natural causes for global warming, only 52.6% believe that these are the main reasons. Further, 55.9% of the German respondents feel angry that people in their community fail to save energy. On the other hand, 56% believe that a growing number of people in their community support policies in favour of energy transition, and 50.1% believe that many people in their communities will try to adopt energy-saving behaviours. However, only 37% of respondents observe that people in their communities increasingly adopt energy-saving behaviour regarding heating and cooling.

Regarding the extent to which respondents expect their community to support their energy-related behaviours, 45.8% consider that they would receive social support if they opted for policies favouring energy transition. 49.9% feel certain they would receive such support for consuming less energy, with 35% stating that their community would support energy savings regarding heating and cooling. Energy savings through unconventional behaviours are expected to experience a much lower support from respondents' communities. For instance, only 22% of respondents expect support from their community for allowing their grid operator to turn on/off non-critical appliances remotely.

Regarding beliefs and attitudes towards RECs and CECs, the ECHOES survey suggests that 80.8% of the German respondents are positive towards the environmental benefit of renewables. Moreover, 65.2% state that they intend to use renewable energy in such a way as to support energy transition. Regarding economic benefits, 47.1% believe that using renewables will create employment. Further, 76.5% of the respondents believe that global warming is in progress, underscoring the urgency of adopting green behaviour. On the other hand, only 2.2% are convinced that global warming is not real. Accordingly, 60.4% state that acting pro-environmentally is an important part of their lives. Further, 68.7% feel obliged to be energy efficient, and 66.4 % feel obliged to adopt energy savings behaviour regarding household heating and cooling. Lastly, 46.3% of the respondents from Germany favour pro-environmental policies, even if these result in higher costs.

An overview of energy behaviours of citizens

The ECHOES survey further provides valuable information about respondents' lifestyles. Lifestyle choices are important determinants of energy behaviours. Of all German respondents, 54.7%, live in apartment blocks. Another 25% live in single-family homes, and 16.6% in semi-detached or terraced homes. Regarding the floor areas of the dwellings, 37.3% are smaller than 70 square feet, and 20% are between 71 and 90 square feet. 12.1% live in larger dwellings of 91 to 110 square feet, and 13.8% between 111 and 130 square feet. 15.1% live in households of 131 square feet or larger. 69% of the German respondents use central heating for domestic heating, 16.1% use district heating, 4.5% use standalone stoves, and 4.2% use standalone electric heaters. Accordingly, 46.1% of the households use gas for heating, 18.6% oil, and 4.8% for electricity. 19.2% reported not knowing. The energy used for heating and cooling depends on individuals' comfort and temperature preferences. 46.4% of the respondents state that their comfort temperatures are close to the average, 38% prefer cooler temperatures, and 13.6%, warmer temperatures.

87.9% of respondents in Germany do not own an air conditioner. 7.5% use them rarely or rarely, and 4.5%, sometimes, regularly or often use air conditioners during hotter periods. 54.7% of respondents stated that they always or often disconnect electric appliances when not in use, 25.4% never or rarely and 19.9% occasionally. 89.7% use energy-saving light bulbs at home, and 74.6% have at least a share of 75% of energy-saving light bulbs.

35.8% of the respondents confirm that their energy provider has a particularly high share of renewable energy production, and a considerable share of respondents, 42.6%, gave no definite answer for this item. The remaining 21.6% confirm that theirs do not.

Further highly important aspects of energy behaviour are mobility habits and public transportation. A majority of almost 83% of all German respondents state that they drive private cars. 14.4% drive less than 5,000km annually, 22.7% drive between 5,000 and 10,000km, 17.9%, between 10,000 and 15,000km, 11.4%, between 15,000 and 20,000km and 6.3% between 20,000 and 30,000km. 70.4% drive alone at least 50% of the time. Of those, 20.8% almost always drive alone. 10.8% almost never drive alone. The majority (94.4%) of vehicles are petrol or diesel-fuelled. Only 2.2% are hybrid-electric or plug-in hybrid, and another 2.2% gas-fuelled. 89.7% of the respondents from Germany have never participated in car-sharing. Of those, 60.4% never intend to try, and the remaining 29.4% find the idea interesting. However, most who have tried car-sharing, 7.8% of 10.3%, report positive experiences. Regarding public transportation usage, 29.3% believe that public transportation is environmentally friendly, 22.3% believe that it is not, and the remaining 48.3% are undecided. 58.5% of the respondents state that they rarely use public transportation (less than once per week on average), 18.7% 1-4 times per week, and 8.2% 5-8 times per week. However, 14.7% use the public transport system in Germany more than 8 times per week.

Air travel has a considerable environmental impact and is thus a major part of energy behaviour. The survey results showed that 56.4% of the Germans report at least one non-business flight within the last year. The total annual time for these flights is generally equal to or less than 10 hours (for 29.4% of the total answers). 7.2% report flight times of more than 20 hours, which indicates either frequent flyers or long-distance flights.

5.2 Current status of communities in terms of energy-related endeavours

The term energy community is quite broad, and accordingly, energy communities are indeed very heterogeneous in terms of both organisational and legal frameworks, as e.g., describes in Caramizaru and Uihlein (2020). Individuals might have different reasons to join or invest in such projects. Profit maximization is often described as one, or even the main, aspect of individual decision-making. However, a study of the Leuphana University of Lüneburg and Nestle (2014) reports that financial reasons are not the main drivers of involvement in community initiatives for German citizens. Instead, contributing to an energy transition, protecting the environment and supporting the local economy are reported to be the most important factors. Accordingly, out of the nine countries that were analyzed in Caramizaru and Uihlein (2020) in 2019, Germany hosted the largest number of citizen-led energy organisations, namely 1750, compared to 700 in Denmark, 500 in the Netherlands, 431 in the United Kingdom, 200 in Sweden, 70 in France, 34 in both Belgium and Poland, and 33 in Spain.

The practice of tenant electricity is related to the broad topic of energy communities. In Germany, the law on the promotion of tenant electricity[102] entered into force in 2017. It describes electricity from solar energy produced within an apartment building or its immediate surroundings and directly distributed to and consumed by the tenants. Excess electricity is fed into the national grid. Tenant electricity is, exempt from several extra payments, such as system charges and electricity taxes. In addition, the operator of the generating facility receives remuneration for every kWh produced and consumed locally. The marginal remuneration depends on the capacity of the PV. In 2019, 1169 tenant electricity facilities with a total capacity of 24,5 megawatts were in operation. 72 PVs were installed in 2017, 355 in 2018 and 722 in 2019 (BMWi, 2020).

Two examples are given to get some insights into how existing energy community-related projects in Germany can look like. Firstly, a community energy initiative in Germany is Elektrizitäts Werke Schönau (EWS), a community-owned energy cooperative. Schönau is a rural 2400-inhabitant town in southwest Germany. It started as a citizens'

[102] Gesetz zur Förderung von Mieterstrom und zur Änderung weiterer Vorschriften des Erneuerbare-Energien-Gesetzes, F.L.G. I No. 49, in force since 24. July 2017 (available under: https://www.bmwi.de/Redaktion/DE/Downloads/M-O/mieterstrom-gesetz-bgbl.pdf?__blob=publicationFile&v=4 [Stand 16.07.2021]).

initiative in the aftermath of the Chernobyl disaster in 1986 to foster green energy. In the late 1990s, it took over the local electricity grid and supply. As of 2019, the cooperative has more than 8000 members. EWS and its subsidiaries, amongst other activities, handle electricity and gas grids in Schönau and surrounding municipalities, offer green electricity and energy services nationwide, and build and operate own and external green energy generating facilities (EWS, n.d.). Secondly, the Sprakebüll energy cooperative. Sprakebüll is a settlement of 247 inhabitants in the district of North Friesland, located within the state of Schleswig Holstein, which hosts more than 300 community energy projects. This is the largest number per capita of all 16 states in Germany. The town has more than two decades of experience with energy community projects. It started in 1998, when 22 local villagers set up the first wind park with 5 wind turbines, soon followed by a second wind park set up and owned by 183 local citizens. Several additional investments and repowering measures followed. In 2009, a local family constructed a 100 megawatts solar energy installation and sold the panels to local investors. Further, the villagers also utilize a privately owned biogas plant. A district heating network distributes the heat to local inhabitants (Isakovic, 2019).

5.3 Role of central government and local administrations in the energy transition – with special emphasis on their positions with respect to the eCREW approach

The above-mentioned legal framework for using surplus energy and the newly adjusted regulation on the German REC does not indicate any obstacles for the eCREW approach. There are several possibilities to share and/or sell renewable electricity in Germany, which have different legal consequences. Either the renewable electricity is sold through the public grid, or communities can be formed to generate electricity jointly. Although it is possible in principle to use the public grid, it must be pointed out that the appropriate legal framework for energy sharing is not yet in place, according to the Bündnis Bürgerenergie e.V. in its potential study on Energy Sharing.[103] The tenant electricity model also does not use the public grid to share electricity with tenants/apartment owners. The eCREW concept uses the public grid, therefore grid fees must also be considered. In addition, eCREW focuses on the effective use of renewable electricity, so the four forms of sale with the legal requirements must be observed. The tenant electricity model refers to the electricity shared outside the public grid, except for surplus electricity, which can be sold using the public grid. The tenant electricity supplier can also apply or participate in the eCREW approach within this model. On the one hand, the individual tenants can participate as CREW members; on the other, the surplus tenant electricity can be sold to a CREW via the public grid. For this, the contractual requirements of the tenant's electricity contract must be fulfilled.

Three of the four forms of divestment are subsidized, which must be considered when participating in a CREW and the split-incentives approach (SIA). The subsidies are time-limited, making the eCREW approach a possible incentive for the producer to participate in a CREW. Without subsidies, the electricity can also be marketed directly by a direct marketer or the facility operator. Specialized direct marketing companies can be contracted for this purpose. The eCREW approach is executed by local energy retailers, where they can also offer direct marketing. This variant allows the eCREW approach to be used with the split-incentives approach for the open market. eCREW can thus use direct marketer regulations.

Requiring data exchange on generation and consumption for electricity suppliers/retailers is beneficial for the eCREW approach. The data on consumption and generation are either available after 24 hours or are transmitted immediately. The contractual commitment between the provider of eCREW and the individual participants facilitates this data exchange. The data flow result, on the one hand, from the direct marketing of electricity, whereby the retrieval of the actual generation must be provided, and on the other hand, the required data is forwarded to the authorized persons by the metering point operator. This results in a data transmission appropriate for eCREW.

[103] Cf. J. Wiesenthal, A. Aretz, N. Ouanes, K. Petrick, Energy Sharing: Eine Potenzialanalyse (2022) pp 15 and 73-75 (available under: https://www.ioew.de/fileadmin/user_upload/DOKUMENTE/Publikationen/2022/Energy_Sharing_Potenzialanalyse.pdf)

6 Conclusion

In order to assess the potential success of widespread implementation of the eCREW approach, country and citizen characteristics must be carefully considered. Our assessments showed that Germany indeed presents rather advantageous conditions.

However, the partly significant German east-west divergence in several aspects should be a factor in mind during the implementation of eCREW. The eastern half of Germany is considerably less densely populated than the western half, and especially the area of former East Germany has many relatively sparsely populated regions. While the German population is well educated, tertiary education attainment rates show a significant south-north divergence. In general, southern states present above-average attainment rates. Regarding unemployment, former East Germany has historically higher rates than the rest of the country and correspondingly lower hourly rates of pay. Southern states report the highest hourly wages. eCREW is a highly technical project based on modern technology and the willingness to actively engage with technology that enables the monitoring of energy consumption and/or the production or storage of energy. Thus, the above characteristics are indeed relevant to the eCREW approach.

Further, PVs are especially relevant in the South, and total PV capacity is by far the highest in Bavaria. However, the eastern states report the highest numbers in terms of PV- capacity per 1000 inhabitants. Altogether, the South presents ideal conditions for a smooth implementation of the eCREW approach, while the East lacks some of the necessary characteristics.

Germany relies heavily on gas and oil imports. The share of renewable energy in gross final energy consumption is increasing but still below 20%. 40% of Germany's electricity production stems from renewable sources. However, as Germany plans to halt the production of electricity from nuclear power and coal-based energy, this percentage is indeed increasing, as well as the number of newly installed PVs, paving the way for a successful implementation of the eCREW approach all over Germany.

Next to country characteristics, another key factor for the CREW approach is citizens' energy behaviours and attitudes towards energy-related matters. The large scale ECHOES survey suggest that respondents are aware of the importance of adopting sustainable energy behaviour, and are willing to adapt their lifestyles to contribute to the energy transition. More than 80% of the German respondents are positive about the environmental benefit of renewables, and more than 60% state that is acting pro-environmentally is an important part of their lives. While the answers suggest that energy-saving behaviour is being incorporated in everyday life, mobility seems to lag behind in this regard. Most respondents have never tried car-sharing, and nearly 60% rarely or never use the German public transport system. Further, as eCREW is based on communities, the ECHOES survey underscores the importance of community in energy-related matters in Germany. More than 72% agree that people can act together for the energy transition, and 56% feel anger about others failing to save energy. About half of the respondents believe that people increasingly support policies in favour of the energy transition and that more and more people adopt energy-saving behaviours. Importantly, half of the respondents believe they would receive community support for consuming less energy.

Regarding the necessary legal framework, Germany already provides a basis for participation in community projects to generate and share renewable electricity. So far, the basic support for renewable energy is based on three defined types of subsidized renewable electricity sales. A further sale type does not receive a subsidy. It must be emphasized that every sale of electricity must be assigned to one category. Since the first three subsidized sale types are limited in time, the sale type without subsidy becomes obligatory after that time. The application of eCREW approach has to consider the respective forms of sale, and appropriate incentives must be created by eCREW. For those facilities that are no longer accessible to subsidized sales, the eCREW approach is particularly interesting as an intermediary such as a direct marketer can be involved. Since they lose the subsidy as a support for the price, eCREW could pursue an approach that, on the one hand, offers them a reasonable price for their surplus electricity and on the other hand, supports the efficient use of electricity within a CREW. Participants requiring only locally-produced renewable electricity would also benefit from a better price. The activity of a direct marketer can also be offered by an energy supplier company so that the latter could also apply the eCREW approach. eCREW joins the sales system in which it can act as a direct marketing concept itself, with the difference that the electricity is not sold to the European Energy Exchange or only to a specific third party but is transmitted to a defined group, namely the CREW. In particular, when a retail company, such as a municipal utility, uses the eCREW concept, it acts as an intermediary between the CREW members. It also supplies the residual power required by the members of a CREW. Lastly, the data transmission required by eCREW for its effective use of electricity in a CREW is also made possible by German legal regulations. With the processed information, the participants can check their behaviour in relation to electricity consumption and adjust their behaviour if necessary.

6.1 A quick SWOT analysis of the legislative and administrative framework with respect to the eCREW approach

SWOT	**Legislative and administrative framework with respect to the eCREW approach**	
	Strengths	Weakness
Internal perspective	• eCREW uses an existing legal framework • Unbureaucratic combination of participants into a CREW (no establishment of a legal form, as cooperative or citizen energy cooperative)	• No relief in the award procedure for renewable energy plants, such as citizen energy cooperative
	Opportunities	Threats
External perspective	• The focus of eCREW is on renewable electricity, thereby making subsidies for the generation and storage facilities of participants possible • The split approach of eCREW can be adapted to the German market • eCREW can be offered by professional energy retailers that have an existing customer base • eCREW can operate alongside citizen energy corporation because this German REC operates a very narrow framework; interested individuals and companies can use the eCREW concept and form virtual communities	• Amendment of the legal and administrative framework

6.2 A quick SWOT analysis for the practical framework with respect to the eCREW approach

SWOT	**Practical framework with respect to the eCREW approach**	
	Strengths	Weakness

Internal perspective	• Selling surplus energy is possible, but the legal framework for energy sharing is not yet ideal • Energy trader fulfils the administration and legal obligations • Citizen energy corporation have existed in Germany for a long time; the acceptance is there, and eCREW enables easier access to community-based efficient energy actions.	• Lack of knowledge/interest in one's electricity providers' share of renewable energy
	Opportunities	Threats
External perspective	• Efforts by the federal government to expand renewable energy and strengthen citizen energy	• Energy retailers not adopting eCREW approach • Smart-meter contingency

6.3 Suggestions for the wider uptake and further development of the eCREW approach

In Germany, there is already a basis for participation in joint projects for generating and using renewable electricity. This occurs either as a cooperative under civil law or as a German REC called "Bürgerenergiegesellschaft". The surplus electricity can generally be sold through the public grid, and the grid operators have the obligation to purchase the electricity physically. For real energy sharing with various facilitations is currently not yet visible, because, among other things, there is no clarification of the energy supply by the citizen energy cooperative.[104] The legal framework in Germany will be further observed, especially if the legal framework for energy sharing changes and if facilitations regarding grid fees and pooling of interested parties arise. The eCREW approach can be flexibly adapted by linking it to an electricity trader to function as a virtual energy community without overburdening administration.

The eCREW concept must consider the requirements on the respective sales forms and create appropriate incentives. For those facilities that are no longer accessible to subsidized sales, the eCREW approach is particularly interesting as an intermediary such as a direct marketer can be involved. Since they lose the subsidy as a support for the price, eCREW could pursue an approach that on the one hand offers them a fair price for their surplus electricity and on the other hand, supports the efficient use of electricity within a CREW. Participants requiring only locally-produced renewable electricity would also benefit from a better price. The activity of a direct marketer can also be offered by an energy supplier company, so that the latter could also apply the eCREW approach.

The adjusted legal situation regarding citizen energy companies is to be welcomed and in any case, does not represent an obstacle to the eCREW approach. eCREW can be offered without the requirements of virtual communities with the help of an electricity trader who offers the eCREW approach as an electricity supply contract and is therefore also possible for smaller groups than 50 participants.

[104] Cf. Energiezukunft, Bessere Bedingungen für Energiegemeinschaften gefordert (06.05.2022) (available under: https://www.energiezukunft.eu/buergerenergie/bessere-bedingungen-fuer-energiegemeinschaften-gefordert/).

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