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REJenerAXION Project National Report Germany

Abstract

This paper is part of the project “REJenerAXion - Energy for a just and green recovery deal: the role of the industrial relations in the energy sector for a resilient Europe”, a European Union co-funded research project (101052341/SOCPL-2021-IND-REL) aimed at analyzing and strengthening the role of innovative industrial relations structures, including social dialogue, to respond in a socially fair and balanced way to the main challenges and opportunities offered by a clean-energy transition at national and European level.

Germany is actively engaged in an energy transition, moving towards a low-carbon economy by reducing its reliance on fossil fuels in favour of renewable energy. It has set a target to close or convert open-pit mining, lignite and hard coal-fired power plants by 2038 at the latest. However, it is crucial to emphasize that Germany's energy landscape is predominantly rooted in fossil energy sources, and lignite still plays a role in the economies of mining regions.

Therefore, this monumental shift carries profound implications for both the energy sector's workforce and regions directly affected by these changes. To address these challenges, a multitude of initiatives have emerged to support the transformations. Particularly noteworthy are the measures devised by the multi-stakeholder Commission on Growth, Structural Change, and Employment which play an important role in promoting a just energy transition.

In recent years, the trade unions and employers' associations within the fossil fuel industry have actively embraced the socio-ecological transformation. They often commit to the concept of "socially responsible redundancy," which prohibits compulsory layoffs and promotes retraining and transitioning to alternative employment opportunities. Furthermore, early retirement compensation remains of significant importance. Both social partners also advocate for the creation of new enterprises in regions adversely impacted by structural changes resulting from the energy transition.

JEL Classification:

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just energy transition, coal consensus, coal phase-out, employment trends, regional impacts.

THE ENERGY SECTOR IN GERMANY¹

1. AN INTRODUCTION

As part of the concept of the German energy transition – the so-called “Energiewende” (energy turnaround) – Germany is moving towards a low-carbon economy. To achieve this, primary energy consumption is being reduced, energy efficiency is being increased and energy sources are being switched. Fossil fuels and nuclear energy are declining in favour of renewable energy and Germany is on its way to a nuclear-free and coal-free energy system. However, decarbonisation goals have not yet been achieved, and not all of the ambitious targets that Germany has set in the past with regard to the ecological transformation of the energy system have always been met. Even though it is still necessary for the transition processes in the energy system to gain momentum: the phase-outs of nuclear energy and coal have already been underway for years, and renewable energy is becoming increasingly relevant. In addition to combating climate change, recently it is also Germany's massive dependence on energy imports from abroad – Russia first and foremost – that is driving the energy turnaround against the backdrop of supply security. Primary energy sources found in Germany are largely limited to lignite and renewable energy.

The transition process also has fundamental consequences for the people employed in the corresponding sectors. In coal mining in particular, hundreds of thousands of jobs have been cut since the heyday of coal in the 1960s and the process is not yet over. By 2038 at the latest, open-pit mining and lignite- and hard coal-fired power plants are to be closed or converted. Due to the open-pit mining and the lignite-fired power plants operated in the immediate vicinity, these changes have a fundamental impact on the surrounding regions. The expansion of renewable energy cannot cushion such regional impacts. Of the three German coal mining regions currently in operation, Lusatia in Eastern Germany is particularly affected. As a rural region, the dependence of the regional economy on mining is much stronger than in the other two regions.

In Germany, there are many initiatives to support structural change and a just energy transition. For example, the negative impacts of the COVID-19 pandemic were largely mitigated

¹ This paper is part of the project “REJenerAXion - Energy for a just and green recovery deal: the role of the industrial relations in the energy sector for a resilient Europe”, a European Union co-funded research project (101052341/SOCPL-2021-IND-REL) aimed at analyzing and strengthening the role of innovative industrial relations structures, including social dialogue, to respond in a socially fair and balanced way to the main challenges and opportunities offered by a clean-energy transition at national and European level.

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The aim of the paper is to provide the main results of research reports at a national level based on desk analysis and qualitative research (in-depth interviews with stakeholders) considering the transformations taking place in the energy sector oriented towards clean energy and their impacts on the world of work and the role of industrial relations and social dialogue for a just transition.

by measures that also benefited climate protection. Currently, structural measures proposed by the Commission on Growth, Structural Change and Employment, which were also developed under the influence of the social partners, are of particular importance regarding the coal phase-out. Early retirement compensation has been of particular significance in the past and continues to be so. This is also due to the fact that the employment structure in the coal industry has a very high average age. However, training and retraining measures also play a role.

The social partners have not always been at the forefront of transition processes in the course of the energy transition. For a long time, the social partners, together with companies in the fossil fuel industry, blocked the German energy transition. For the trade unions, it was a matter of preventing job cuts in good workplaces covered by collective agreements. The fossil fuel sector is well organised by trade unions, and the coal industry is subject to the strongest form of codetermination in Germany (Montanmitbestimmung). In the renewable energy sector, on the other hand, trade union representation often still has to be fought for. Only in recent years have the trade unions and employers' associations of the fossil fuel industry and the energy industry supported the socio-ecological transformation and exerted influence on the concept of a just transition in the sectors. Very often, the social partners in corresponding companies commit to “socially responsible redundancy” (*sozialverträglicher Personalabbau*), which means a ban of compulsory redundancies and the promotion of qualification measures. Both social partners also support the establishment of new companies in regions that are negatively affected by structural change.

In general, Germany considers itself well prepared for the socio-ecological transition processes. The existing system of vocational education and training is considered to be a good prerequisite for adjustments and changes brought about by the energy transition and it is widely assumed that the necessary adaptations can be enabled through the acquisition of additional qualifications. However, there is a shortage of skilled workers in many professions.

2. NATIONAL POLITICAL FRAMEWORK FOR ENERGY TRANSITION

2.1. Overview of relevant policy and legal framework

The basic concept behind the energy transition in Germany is called the “Energiewende” (*energy turnaround*). Central strategies of the energy concept, with which the energy transition is to be advanced, are based on the core goals of expanding renewable energy, reducing primary energy consumption and increasing energy efficiency. The main aim of the energy transition is to gradually shift the energy supply from fossil fuels and nuclear energy to renewable energy sources. The core targets are substantiated by further mid- and long-term targets for three main fields of action: power, heat, and transportation. According to the triple goals energy policy, the energy transition is to simultaneously ensure economic efficiency, environmental sustainability and security of energy supply (Bundesministerium für Wirtschaft und Energie 2021; International Energy Agency (IEA) 2020).

It is mainly the German federal government that shapes the energy and climate strategies in Germany. Almost all German ministries are involved in the energy transition. However, the

Federal Ministry for Economic Affairs and Climate Action and the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection are in charge of most legislative projects. The German government is supported in its strategy development regarding the energy transition by several agencies that are active in research or consulting. Particularly important among these are the German Environment Agency (Umweltbundesamt), which provides scientific support for the federal government in environmental issues and the implementation of environmental laws, and the think tank Agora Energiewende, which attempts to develop a multistakeholder compromise in topics regarding the energy transition (Federal Republic of Germany/Foreign Office 2015). The German federal states participate in energy policy through their role in the Federal Council, where they deliberate on federal legislation. In addition, the federal states can to some extent influence the legal implementation of laws in their own jurisdiction, for example by stipulating tighter energy efficiency requirements in the building sector or by influencing the renewable energy infrastructure such as the construction of wind turbines through planning laws (Egenter/Wettengel 2017).

Laws that are in particular important for the energy transition in Germany are:

- the German Renewable Energy Act (EEG, first adopted in 2000, with numerous subsequent amendments), which is to increase the share of renewable energy in the electricity supply through feed-in tariffs. For a long time, the Renewable Energy Act guaranteed compensation above market rates for renewable power. In accordance with the Renewable Energy Act a surcharge on most electricity consumption was added to finance the energy transition – currently the surcharge is suspended due to high electricity prices;
- the Phase-Out Act and amendments to the Atomic Energy Act (2011) to gradually phase out nuclear energy by April 2023; and
- the Act to Reduce and End Coal-Powered Energy and Amend Other Laws (so-called Coal Phase-Out Act, 2020) that regulates the phase out of lignite mines and lignite-fired plants until 2038 and hard coal-fired plants until 2027; and the Structural Support for Coal Regions Act (2020), which grants financial support for investments and other measures (business-related infrastructure, public transport, broadband and mobility infrastructure or environmental protection). Prior to this, hard coal mining in Germany had already been discontinued by 2018. The present German government, elected in 2021, agreed that the phase-out of lignite mines in the federal state of North Rhine-Westphalia would be brought forward to 2030 (instead of 2038).

2.2. Institutional initiatives to support a just energy transition

Approaches to support a just energy transition in Germany relate primarily to the coal phase-out. After the boom times of the sixties and seventies, hard coal and lignite production in Germany was reduced. In hard coal, for example, employment numbers reached 607,300 employees in 1957, but in 2018 when the last hard coal plant was closed down by a decision to end subsidised hard coal mining only 4,900 employees were still employed in the sector (Statistik der Kohlewirtschaft, n.d.-b). Although highly uneconomic, the hard coal industry in Germany was kept alive for years through direct financial support for hard coal mining. Regarding lignite mining, whereas in 1989 156,713 people were employed in the sector, the number fell to 17,984

in 2021 (Statistik der Kohlewirtschaft, n.d.-a). Programmes to support the transition in the affected German regions can be found as early as the 1960s, ranging from the Ruhr Development Programme (1968-1971, €8.7 billion), the Ruhr Action Programme (1980-1984, €3.5 billion), the Coal and Steel Regions of the Future Initiative (1987-1991, €1.1 billion), IBA Emscher Park (1989-1999, €2.5 billion), to the Act on Financing the Phasing Out of Subsidised Coal Mining (2007-present, €14.8 billion) (Furnaro et al. 2021). In addition, funding under several development frameworks of the Federal Government and Federal States Joint Task for the Improvement of Regional Economic Structures was available as well as significant funding from EU programmes for Germany's coal regions from structural and investment funds, European agricultural funding and "Horizon 2020". The programmes supported infrastructure investments in transport, urban development, technology and innovation, education, health, digitalisation and cultural life. Early programmes mainly focussed on supporting the large enterprises in the coal sector; only over time economic diversification and reorientation as well as initiatives for small and medium-sized enterprises in the regions came to play a role. Regarding the support of employees in the sector financial support was given to companies in terms of subsidies for the payment of training allowances, training facilities, early retirement schemes, pension contributions for miners, and jobs in environmental rehabilitation.

It should be noted that in addition there are programmes and measures of labour market policy available in Germany for all sectors. These include wage subsidies, subsidies for the unemployed, transitional assistance, job search assistance, job creation schemes, payments to enterprises for employing the unemployed, counselling for workers, and subsidies for training.

Regarding current developments, the Commission for Growth, Structural Change and Employment (so-called Coal Commission, 2018-2019) is of particular importance. The task of the Coal Commission was to formulate a strategy for the phase-out of coal-fired energy generation and structural measures to cushion the phase-out in the coal regions. The multi-stakeholder commission consisted of representatives of the affected federal states, ministries, coal companies, trade unions, NGOs, and experts from various scientific institutions. In its final report, the so-called "coal consensus", the commission recommended (Kommission, Wachstum, Strukturwandel und Beschäftigung“ 2019; Litz 2022):

- phasing out coal (lignite mines, lignite- and hard coal-fired power plants);
- supporting the transition of traditional mining regions (creation of new jobs, investments in infrastructure, research and innovation, compensation for the recultivation of lignite mines);
- modernising the electricity system (reducing emissions through renewables, ensuring security of supply, making the electricity system more flexible through more grids and storage); and
- mitigating hardship for those affected (maintaining industry competitiveness and affordability for households through electricity price compensation, compensating utilities for early shutdowns).

In addition, to ensure a just transition for workers, labour market measures are to be taken. These include funding for jobs, job guarantees for employees and trainees, the preservation of jobs in power plants, and early retirement compensation (so-called adjustment allowance).

The findings of the Coal Commission were reflected in the above-mentioned Coal Phase-Out Act and the Structural Support for Coal Regions Act. Regarding investments, the three regions in Germany with currently operating lignite mines will receive financial aid of up to €14 billion from the federal government until 2038 (Die Bundesregierung, n.d). Regions with hard coal-fired power plant sites and the former Helmstedt lignite mining area will receive financial aid of up to €1.09 billion. A further €26 billion shall be made available to improve infrastructure and create additional jobs in federal agencies in the coal regions. In addition, the decommissioning of coal-fired power plants will be remunerated through tenders in which premiums are set. In total, up to €41.09 billion shall be made available to the affected regions (Raitbaur 2021). Money from the Just Transition Fund shall also be used to finance these measures. In total, the affected federal states of North Rhine-Westphalia, Brandenburg, Saxony and Saxony-Anhalt will receive €2.5 billion for transition programmes from the fund (European Commission 2022a).

Furthermore, the Structural Support for Coal Regions Act gives employees from hard coal- and lignite-fired power plants and lignite mines the opportunity for early retirement through adjustment payments. From the age of 58, employees can receive financial compensation for a maximum of five years until retirement. Pension reductions due to early retirement are compensated by direct payments to the statutory pension insurance. For former employees in the hard coal mining sector (aged 50 and over), adjustment allowances have existed for a long period of time.

2.3. The geopolitical implications on energy transition

Various climate protection laws, plans and programmes underpin the energy transition and define the climate policy goals in Germany and the instruments with which the goals are to be implemented. The national targets have been tightened again and again over the years. Table 1 provides an overview of the energy and climate targets in Germany.

Table 1: Germany's energy and climate targets (as of December 2022)

Dimension	Targets
Greenhouse gas reduction	<ul style="list-style-type: none"> -65 % in 2030 (vs. 1990), net greenhouse gas neutrality by 2045
Share of renewable energy	<ul style="list-style-type: none"> gross final energy consumption: 30 % in 2030, 45% in 2040, 60 % in 2050 gross electricity consumption: 80 % in 2030 heat consumption: 50 % in 2030 energy consumption in the transport sector: 14 % in 2030
Energy efficiency	<ul style="list-style-type: none"> primary energy consumption: -30 % by 2030 (vs. 2008), -50 % by 2050 final energy productivity: 2.1 % per year (2008 - 2050, vs. 2008) gross electricity consumption: -25 % in 2050 (vs. 2008) primary energy consumption in buildings: -80 % by 2050 (vs. 2008)

	● energy consumption in transport: - 40 % in 2050 (vs. 2005)
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Source: own compilation

It is interesting to note that, in April 2021, the Federal Constitutional Court declared parts of the German Climate Protection Act unconstitutional. The lawsuit was supported by a group of climate activists who argued that the law was insufficient to achieve Germany's climate goals and thus endangered their fundamental rights to life and health. The Federal Constitutional Court ruled that the Climate Protection Act at the time violated the civil liberties enshrined in the German basic constitutional law and the state goal of climate protection. In particular, the court criticised the lack of clarity in setting emission reduction targets after the year 2030 and the deficient regulation on the distribution of emission budgets. The court called on the legislator to create new regulations by the end of 2022. These should ensure that the reduction targets for greenhouse gas emissions after 2030 are set in a clear and binding manner and that the distribution of emission budgets complies with the requirements of the Paris Climate Agreement. As a result, the CO₂ emission reduction targets have been extended beyond 2030 in Germany and increased at the same time. The reduction target for 2030 increased by ten percentage points to at least 65 percent (compared to 1990). For 2040, a new national climate protection target of at least 88 percent applies and net greenhouse gas neutrality is to be achieved as early as 2045.

For the most part, the targets are based on the targets adopted at the EU level and the EU climate framework. In some cases, however, the German targets exceed European targets, such as regarding the reduction in greenhouse gas emissions (-65 % instead of -55 % in 2030 vs. 1990) and emissions in non-ETS sectors (-38 % instead of -30 % by 2030 vs. 2005). However, Germany has not achieved all its targets in the past. For example, the target for the reduction in greenhouse gas (GHG) emissions of 2020 was narrowly missed (-40.8 % instead of -40 %) and the share of electricity consumption from renewable sources in the transport sector could not be achieved (7.3 % instead of 10 % in 2020 vs. 2005). Furthermore, there was not a sufficient reduction in primary energy consumption (-17.3 % instead of the targeted -20 % by 2020 vs. 2008).

To achieve the current goals, a fundamental transformation of Germany's energy sector is necessary, including a shift from fossil fuels, especially coal, to renewable energy. In Germany, coal deposits are regionally limited. Hard coal was mined in North Rhine-Westphalia (especially the Ruhr area and the Ibbenbüren coalfield) and in the Saarland. Lignite is produced in open pits in North Rhine-Westphalia (Rhineland), Brandenburg (Lusatia), and Central Germany (Saxony-Anhalt, the north-western part of Saxony and the east of Thuringia). Lignite-fired power plants are located in the immediate vicinity of the mines. Hard coal-fired power plants, on the other hand, are more widely distributed regionally and are mainly located in the Western German federal states.

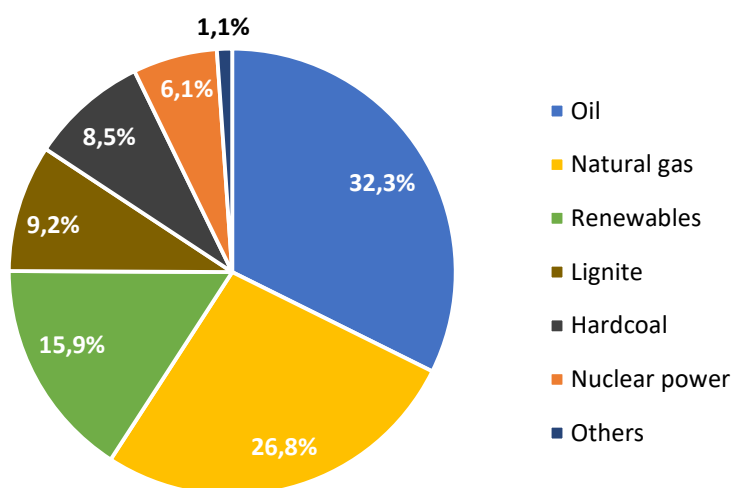
The shutdown of nuclear power plants in Germany is seen to have few implications for the affected regions, as the employees are often still involved in the maintenance of the closed plants (Kaltenborn 2021).

3. MAJOR TRENDS IN THE ENERGY SECTOR

3.1. Main characteristics of the country's energy system

Primary energy consumption in Germany amounted to 12,413 petajoules (hereafter PJ) in 2021 (2022: preliminary 11,829 PJ). The most important energy source in 2021 was mineral oil (32.3 %), followed by natural gas (26.8 %) and renewables (15.9 %) (compare Figure 1).

Figure 1: Primary energy consumption by source (2021, in %, PJ)

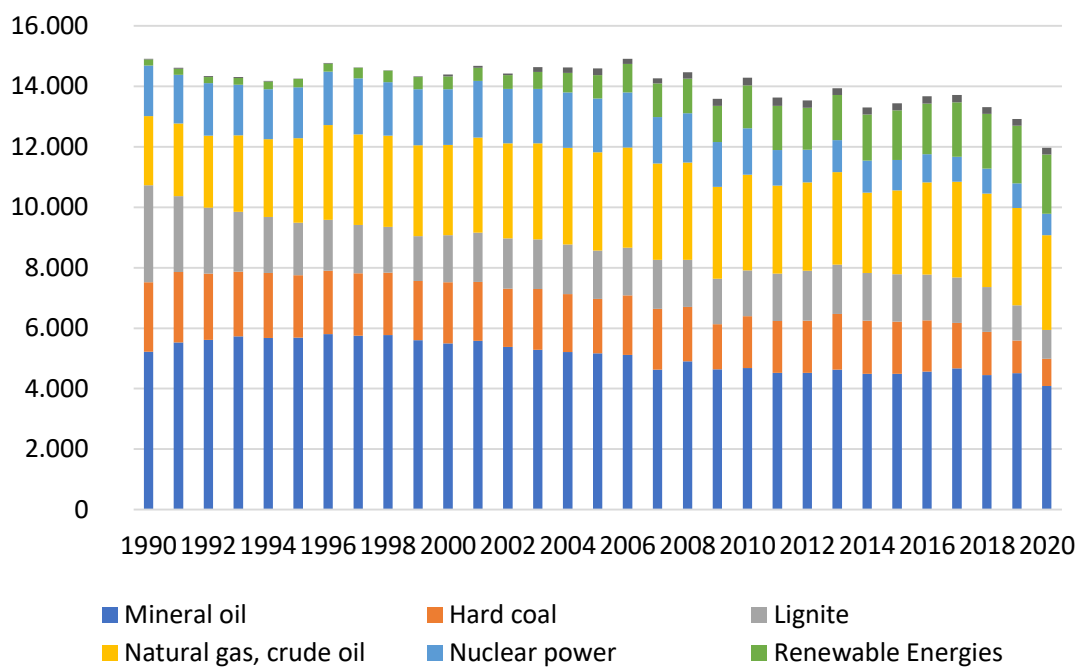


Source: Bdew 2022.

Regarding renewable energy sources, biomass (46.8% of renewables), followed by wind energy (21.2%), photovoltaics (9.1%) and biogenic waste (7%) plays the largest role in 2021 in Germany.

Figure 2 shows the primary energy consumption in Germany from 1990-2020 by energy source. Starting from 14,905 PJ in 1990, primary energy consumption has decreased somewhat, especially from the second half of the 2000s. Consumption in 2020 (11,899 PJ) corresponds to the lowest level since 1990, which is largely due to reduced mobility and overall economic activity because of the COVID-19 pandemic.

Figure 2: Primary energy consumption by energy source (1990-2020, PJ)



Source: Bundesministerium für Wirtschaft und Klimaschutz 2022: table 4.

Overall, efficiency increases can be observed. According to Eurostat the data for Germany show an energy intensity of 92 (2000: 134 toe/M€) and a primary energy intensity of 85 (2000: 124 toe/M€) in 2020 (European Commission 2022b: 121 and 124).

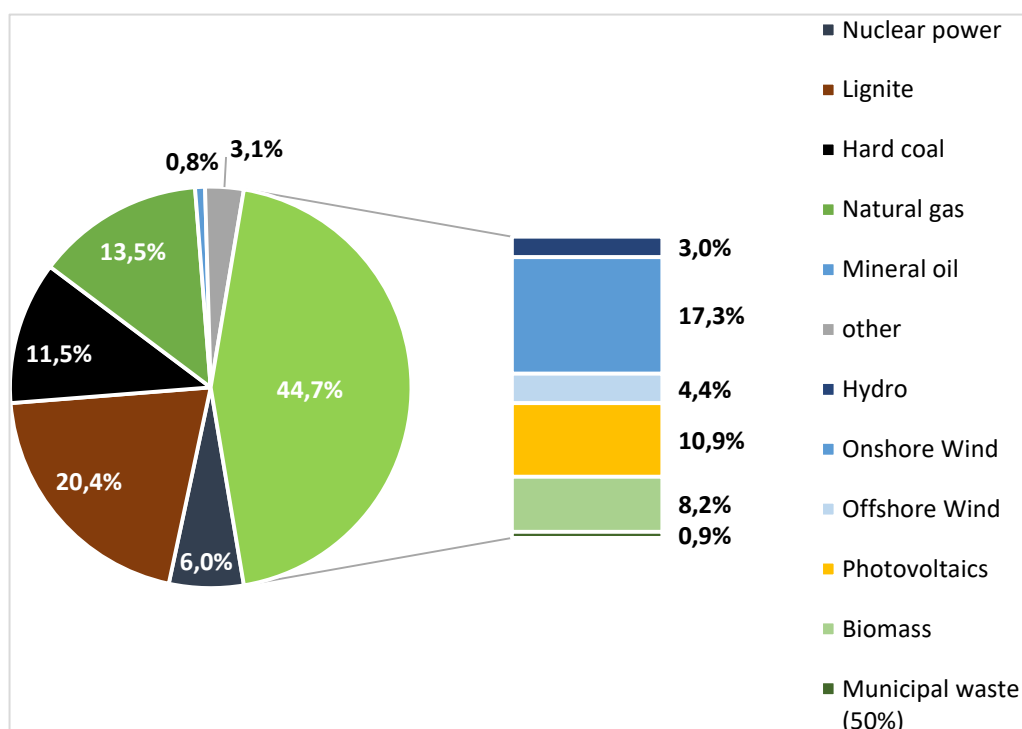
These increases also overcompensate for consumption-increasing effects such as rising per capita income and the growing population in Germany. The primary energy consumption (PEV) per GDP has fallen (1990: 7.1 PEV/GDP, 2020: 3.84 PEV/GDP; PEV per € thousand GDP, in 2015 prices) (Bundesministerium für Wirtschaft und Klimaschutz 2022: table 8). It should also be noted, however, that due to a different conversion standard for the individual energy sources, the substitution of energy from nuclear energy and fossil fuel with renewable energy statistically leads to a reduction in primary energy consumption.

Since 1990, the energy mix in Germany has changed considerably. In particular, the consumption of fossil fuels is declining. The consumption of hard coal decreased by more than 61 %, that of lignite by more than 70 %. Mineral oil consumption decreased by 22 %. Gas consumption increased by 37 % and the energy consumption of renewable energy literally

exploded (increase of 900 %).

In 2022, 574.5 billion kWh of electricity were consumed in Germany (2021: 585.0 billion kWh). In terms of the gross electricity consumption, the composition of sources differs greatly from that of the primary energy consumption. As Figure 3 shows, electricity generation consisted mainly of renewable (44.6 %), lignite (20.4 %) and natural gas (13.5 %). Renewables are largely made up of onshore wind energy (17.3 % of total gross electricity generation), photovoltaics (10.9 %) and biomass (8.2 %).

Figure 3: Gross electricity generation by energy source (2022, in %, kWh)



Source: BdeW 2022.

Eurostat data show the share of total energy needs of a country met by imports from other countries. It is calculated from energy balances as net imports divided by the gross available energy. In Germany, the energy import dependency was 64% in 2020 (2011: 62%) (Eurostat 2022a). The import ratio has remained relatively constant over the years. Imports of crude oil and petroleum products are the highest among all energy sources, followed by natural gas and hard coal. For crude oil and petroleum products the import dependency was 97% (2011: 96%) and for natural gas 89% in 2020 (2011: 87%). Except for the imports of biomass, renewable energy is completely produced from domestic sources. The most important suppliers of energy raw materials to the Germany in 2021 were Russia, Norway, the USA, Kazakhstan, and the United Kingdom. Russia ranked first among Germany's suppliers of energy raw materials in terms of crude oil, natural gas and hard coal (AGEB 2022).

Domestic primary energy production is distributed throughout Germany. Crude oil production dominates in the north of Germany (Schleswig-Holstein, Lower Saxony), while the coal regions, as mentioned above, spread from west to east around the middle of Germany.

Natural gas is mainly found in Lower Saxony.

3.2. Environmental trends in the energy sector

Germany emitted 762 CO₂ equivalent in million tonnes of greenhouse gas emissions in 2021 (1990: 1,273). Data from Eurostat shows the ratio between energy-related greenhouse gas emissions and gross inland consumption of energy. The data expresses how many tonnes of CO₂ equivalents of energy-related greenhouse gas emissions are emitted per unit of energy that is consumed. In 2022, the ratio was 84.1 in Germany (2008: 94.1). Since 2013 (90.4) the ratio has been declining (Eurostat 2022b).

Greenhouse gas emissions by sector show that with 33 % the energy sector makes the largest contribution to greenhouse gas emissions (247 CO₂ equivalents in million tonnes), but energy-related emissions of greenhouse gases in the sector have decreased by 39 % between 1990 and 2021 (Umweltbundesamt 2022). Most greenhouse gas emissions from the energy sector, approximately 96 % in 2021, are caused by the use of fossil fuels in power plants. Plants fired by lignite cause the highest emissions, followed by hard coal and natural gas (Deutsche Emissionshandelsstelle (DEHSt) 2022). The industry sector accounts for 24 % of emissions (181 CO₂ equivalents in million tonnes) (Umweltbundesamt 2022). The energy-intensive sectors of the chemical and metal industries as well as the sector for the production of mineral products are primarily responsible for this. Emissions in the sector fell by almost 41 % between 1990 and 2021. The building sector accounts for 15 % (115 CO₂ equivalents in million tonnes). The building sector includes emissions from stationary and mobile combustion processes in the commercial, trade, service, household and military sectors. The transport sector (domestic civil aviation, road transport, rail transport, inland navigation and national maritime transport) accounts for 19 % (148 CO₂ equivalents in million tonnes). Agriculture accounts for 8 % (61 CO₂ equivalents in million tonnes) in 2021 and emissions in the sector fell by 22 % compared to 1990. The sector also includes the fishing industry. The most significant reduction in greenhouse gas emissions occurred in waste management (-78 %). However, waste management accounts for only one per cent (8 CO₂ equivalents in million tonnes) of the emissions. These are emissions from landfilling, biological waste treatment (composting, fermentation), waste incineration, wastewater treatment and mechanical-biological waste treatment.

Annual comparisons show that greenhouse gas emissions in Germany are declining. The reason for the decline is foremost the shutdown of emission-intensive coal-fired power plants and the switch to lower-emission fuels such as natural gas and renewable energy. Another reason is the gradual shift to power plants with a higher degree of efficiency. It is important to note however that emissions outside the energy sector – CO₂ emissions from buildings and the transport sector – have risen due to an increase in oil and gas consumption (Bundesministerium für Wirtschaft und Energie 2021).

Regarding the emission of air pollutants, lignite is responsible for around 40-50 % of air pollutants in Germany (Schrems/Fischle 2021). It is also important to point out the negative effects of open-pit mining on nature and land consumption. The closure of mines follows a difficult renaturation process. Between the 1950s and 2018 around 300 villages were destroyed for open-pit lignite mines and over 120,000 people were resettled in Germany (BUND n.d.).

3.3. Economic trends in the energy sector

In total, companies in the coal mining and extraction of crude oil and natural gas sector in Germany generated revenues of around €3.4 billion in 2019. The turnover of the coal mining sector was €1.8 billion in 2019 (2015: €2.4 billion) and of the extraction of crude oil and natural gas sector €1.6 billion (2015: €2.7 billion) (Initiative für Transparent in rohstoffgewinnenden Sektor – Deutschland 2022b: 69). The gross value added in the sectors is declining as coal mines in Germany are closing and oil and gas fields are being sealed. In 2021, there were 12 companies in Germany with the main business in the extraction of petroleum, 13 in natural gas, two in hard coal mining and 13 in lignite mining (Wissenschaftliche Dienste 2022: 8-9).

In 2019, the energy industry (excluding the extraction of primary energy sources) generated a turnover of €589 billion (Bundesministerium für Wirtschaft und Klimaschutz 2022: table 2). The core business of the 3,252 companies of the energy industry is electricity, gas supply, and heating.

Company data on renewable energy is not available as renewable energy is not considered a separate category in the sense of an economic sector classification of the Federal Statistical Office, but is distributed across various economic sectors. It can be said however, that there is a diverse mix of players in the sector, with some big companies and municipal utilities, start-ups and private individuals with rooftop solar panels. Estimates for 2017/2018 put the number of companies at 30,700 with a gross value added of €20.5 billion (Initiative für Transparent in rohstoffgewinnenden Sektor – Deutschland 2022a).

Box 1: The energy sector in the pandemic

The COVID-19 pandemic created challenges for the energy sector in Germany due to declining energy demand and falling sales prices. In particular, the consumption of fossil fuels – coal, natural gas and oil products – declined in 2020 (Bundesministerium für Wirtschaft und Energie 2021). In 2021 the dampening impact of the pandemic could still be observed. In response to the pandemic, the German government passed an “economic stimulus and crisis management package” worth €130 billion in June 2020. The package was aimed at stimulating the economy and cushioning social hardship. However, many of the measures in the package were also related to climate protection, including support measures for public transport and electromobility, investments in climate protection technologies (especially in the framework of a National Hydrogen Strategy) and funding to a building renovation programme to reduce CO₂-emissions. Similarly, the German Recovery and Resilience Plan (GRRP) which is to contribute to overcoming the Covid-19 crisis, also has a focus on tackling climate change. Measures in the plan target renewable hydrogen, climate-friendly mobility, renovation and construction and climate protection research (Federal Ministry of Finance 2020).

Box 2: The energy sector during the war in Ukraine

In 2021, Germany imported more than half of its natural gas and hard coal and roughly one-third of its mineral oil from Russia. However, Russia's war against Ukraine has led to a turning

point and Germany aims to reduce its dependency on energy imports from Russia (Heymann 2022). To reduce import dependency, the German government aims to expand renewables to diversify supplying countries and transport structures and to save energy. The goal is to be totally independent of Russian oil, gas and coal (Die Bundesregierung 2023). Natural gas supplies are mainly to come from Norway and the Netherlands, hard coal from the USA (but also from Poland and South Africa). The supply of crude oil from different countries is expected to play a role, especially from Norway and Saudi Arabia (Weltenergierat Deutschland 2022:11-12). While it has already been possible to largely switch to other importing countries for oil and hard coal imports, the switch of natural gas poses a particular challenge. As pipelines only exist to Russia, the switch requires the development of an import infrastructure for liquefied natural gas (LNG) transported by ship. So far, Germany has only two LNG onshore terminal (as of January 2023). Coal-fired power plants that were to be closed were put on stand-by until 31 March 2024 to replace gas-fired power plants, if need be, and the last three nuclear power plants will continue to operate until 15 April 2023 (at the latest), so that they can also contribute to the security of energy supply. The services union ver.di points out that by keeping coal-fired power plants on standby, there are regulatory gaps for employees who may now be expected to work longer than originally planned and no longer benefit from early retirement.

To deal with the energy shortage and sharply rising prices, the Commission “Gas and Heat” was set up in September 2022 to develop proposals for dealing with the rising gas prices (ExpertInnen-Kommission Wärme und Gas 2022). As a result, the so-called “economic defence shield” was drafted by the federal government (Bundesministerium der Finanzen 2022). The measures of the defence shield aim at reducing the consumption of energy, introducing a gas price brake and an electricity price brake, reducing the VAT on gas and heating, and a one-off payment for the month of December 2022 for gas and district heating customers. In view of the sharp rise in energy prices, the federal government has also launched three so-called “relief packages”. They include the suspension of the EEG surcharge on electricity consumption, heating cost subsidies, suspension of the energy tax on fuels, cheaper tickets for public transport, subsidies for photovoltaic systems and much more. Expert interviews in the context of this study pointed out that measures for employees in gas-fired power plants who are negatively affected by the crisis were not the subject of political debates.

In 2022 the energy supplier Uniper SE, whose business model focussed on fossil fuels and was massively dependent on Russian natural gas supplies, was taken over by the federal government to secure the energy supply for electricity in Germany. As a result of the supply stop of Russian gas, the company had run into existential difficulties.

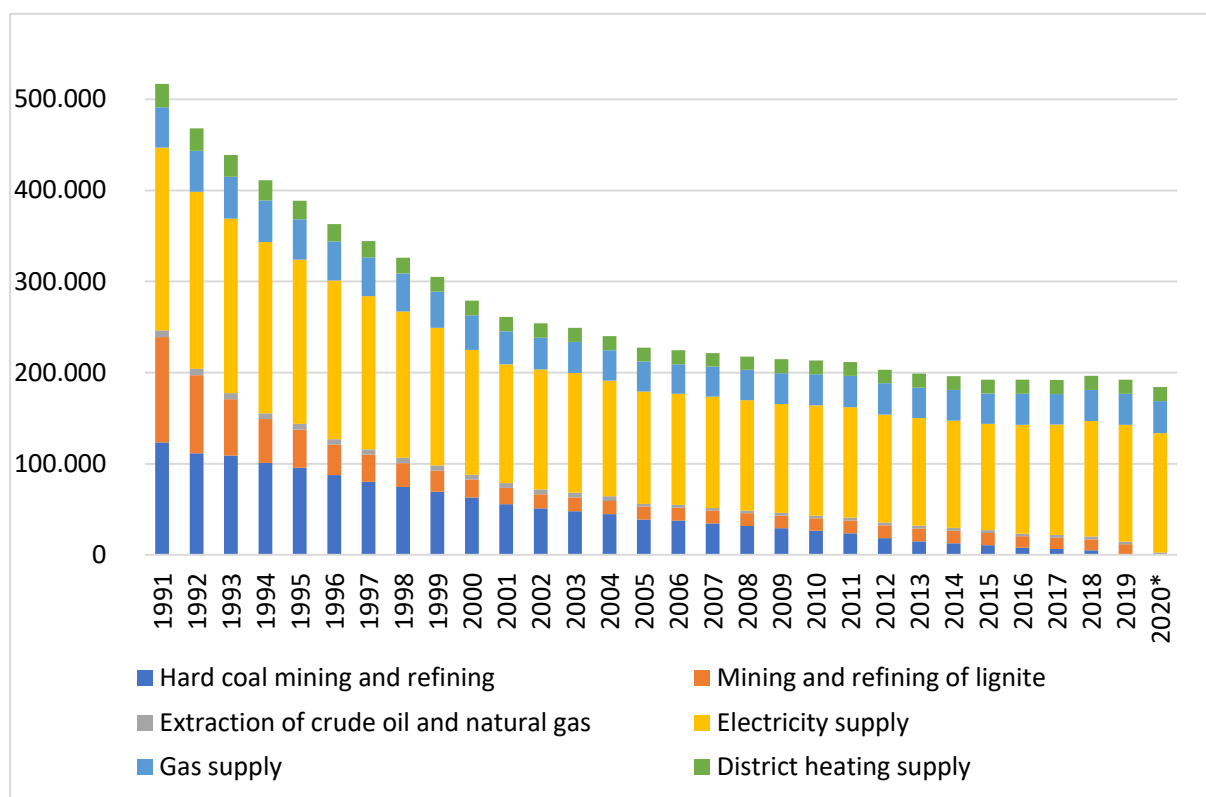
3.4. Employment trends in the energy sector

The number of people employed in the energy sector in 2019 was 192,263 (excluding renewable energy and petroleum refining).² By far the largest share of employees is in electricity supply (130,907), followed by gas supply (35,099) and district heating supply (15,578). In 2020,

² It should be noted that depending on which sources and which methods are used to collect the employment figures, the values sometimes differ widely.

2,641 people were employed in the extraction of crude oil and natural gas.

Figure 4: Number of employees in the energy sector (1991-2020)



Note: *: for the year 2020, no employment data for lignite mining and refining are provided by the Federal Ministry of Economics and Climate Protection.

Source: Bundesministerium für Wirtschaft und Klimaschutz 2022: table 2.

The figures for employees in the coal industry differ greatly between the Federal Ministry of Economics and Climate Protection and the statistics of the coal industry. For 2019, the Federal Ministry gives a total of 11,637 employees for the coal industry. In contrast, the statistics of the coal industry for the same year show no employees in hard coal and 20,336 employees in lignite. For the years 2020 and 2021, the coal industry statistics show 19,483 and 17,948 employees, respectively (Statistik der Kohlewirtschaft, n.d.-a and n.d.-b). The coal industry statistics also include employees in companies involved in the post-closure care of open-pit lignite mines, the lignite-based chemical industry and employees in power plants.

The distribution of employees subject to social security contributions by gender shows that women are strongly underrepresented among the employees in domestic primary energy production. Their share is 13 % in coal mining and 22 % in the extraction of crude oil and natural gas (Initiative für Transparenz im rohstoffgewinnenden Sektor - Deutschland 2022c).

3.4.1 The impacts of the energy transition on employment (direct and indirect)

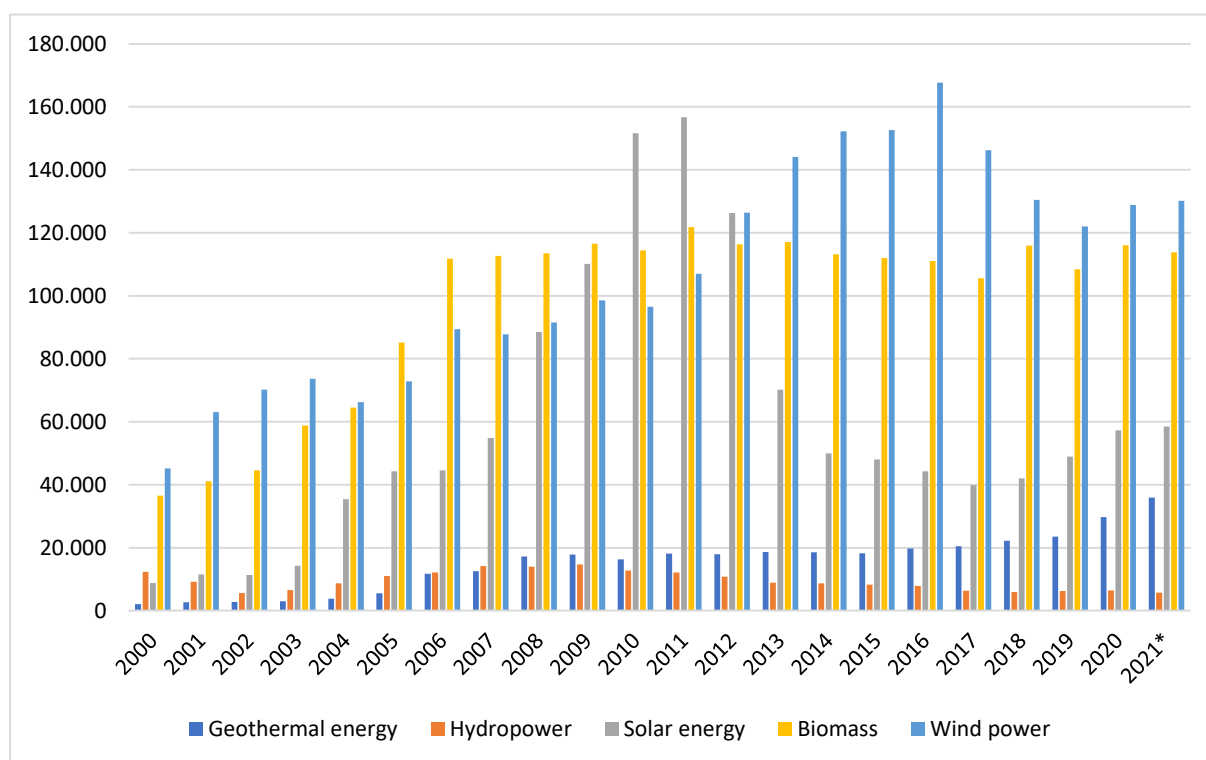
Employment figures show that the number of employees in the energy sector is declining.

All sub-sectors are affected by the reduction in employment. However, the decline in employment is highest in the coal industry. After a drastic decline since the 1960s, the number of people employed in the hard coal mining and refining industry was 123,341 in 1990 and rapidly declined further to 4,917 when in 2018 hard coal mining was discontinued. The reduction of the workforce was cushioned by various programmes (cf. Chapter 2.1) and the reduction was achieved primarily through early retirement, but also through retraining and qualification measures and job placement. Since 1990, 83,500 employees in the hard-coal sector have taken early retirement (WWF 2019). Of the 4,917 workers remaining in 2018, 1,413 employees were participating in qualification and training measures or received short-time allowances. The number of employees in lignite mining and refining also declined rapidly (1990: 115,507). With German reunification there has been a massive structural break in East Germany's open-pit lignite mining industry. In East Germany's lignite sector, more than 100,000 employees lost their jobs between 1989 and 1994 (Furnaro et al. 2021). Just as in the hard coal sector the share of older persons in the lignite mining sector is high. Slightly more than a third of the employees were between 55 and 65 years old in 2014 (latest available data) and early retirement plays a significant role for the reduction of the workforce. In 2016, about 28 % of workers were in early retirement (RWI - Leibniz-Institut für Wirtschaftsforschung 2018: 7). Calculations assume that by 2030, 63 % of those employed in lignite mining will have retired (Hermann/Schumacher/Förster 2018). In conclusion, it can be said that by 2038 when the mines and coal-fired plants will be closed, many employees will have reached retirement age or will receive financial support foreseen in the Structural Support for Coal Regions Act to supplement unemployment benefits until they reach retirement age. It should also be noted that some of the jobs will be retained for the recultivation and the geological and hydrological management of the post-mining land (Arepo consult 2017).

According to the Federal Ministry for Economic Affairs and Energy, gross employment from renewable energy in 2021 reached 344,100.³ This figure includes employees for the construction of renewable energy plants and jobs in operation and maintenance as well as employment in the provision of renewable fuels (for example biofuels and biogas plants). Most employees were in wind power (130,200) and biomass (113,800).

Between 2000 and 2021, the number of jobs in the renewable energy sector roughly tripled (see Figure 5). However, the number of employees was lower in 2021 than in 2011. A strong increase in employment until 2011 was followed by a significant decline in the following years, which was due to the collapse of the domestic photovoltaic industry. Many German companies in this sector were forced out of the market by low-priced Chinese imports of photovoltaic systems. Overall, the number of employees involved in the construction of renewable energy plants has declined while employment in the area of operation and maintenance is growing continuously.

³ With regard to the employment figures for renewable energy, there are also deviations in the data in Germany depending on the source.

Figure 5: Number of employees in renewable energy sector (2000-2021)

Source: Bundesministerium für Wirtschaft und Energie (2022)

The results of the interviews for this study suggest that the total impact of the energy transition on the workforce is difficult to determine. For example, it was criticised that the effects of the energy transition on energy-intensive sectors and companies in the value chain of fossil fuel companies are often not considered and seldom part of political measures focussing on the energy sector.

It should also be noted that employees in coal mining are not necessarily affected by unemployment or early retirement, as mines close. Lignite companies in Germany are increasingly diversifying economically and are engaged in various mining-related products and services that are used in various sectors in and outside of Germany. These include drilling and engineering services, waste disposal and gardening and landscaping (Arepo consult 2017).

3.4.2 Skill needs and training

The expansion of renewable energy has created a number of new occupations in Germany. These include, for example, technicians for wind turbines, solar technicians, specialists for renewable energy and energy efficiency, and grid fitters for the expansion of new energy infrastructure (Klimaschutz- und Energieagentur Niedersachsen 2018).

Overall, however, according to the interviews conducted in the framework of this study, energy transition does not create completely new occupations but rather leads to changes in existing professions. Frequently the energy transition merely requires an upgrading of existing qualifications. For example, some Chambers of Crafts and Trades offer further training to become a solar technology specialist for craftsmen in the trades of sanitation, heating and air-

conditioning, construction, roofing, electricity and metal working. In addition, some Chambers of Crafts and Trades also offer further training as solar installers. However, these training courses are not officially recognised, as the installation of the system on roofs is not subject to professional regulations.

The German system of vocational education and training provides good preconditions for transformations, as it relies on the teaching of basic qualifications that are open to new technology and enable a broad spectrum of adaptations (Brehm 2021). Both social partners are involved in developing new training regulations and modernizing existing ones.

Even though regional differences prevail in Germany, the experts interviewed for this study assumed that there is a shortage of skilled workers in almost all occupational groups related to the energy transition (see also Bundesministerium für Wirtschaft und Energie 2021). The expansion of renewable energy requires many professions that are also in demand in other sectors and are already in short supply. The shortage of skilled workers particularly affects jobs in construction and technical professions (Koneberg, Jansen and Kutz 2022).

For the expansion of wind energy, skilled workers with a background in construction or technology are needed, as well as experts for power grids, scientists in research and development and specialists for licensing procedures. Regarding the offshore wind sector, 40 % of the companies stated that they had difficulties filling their positions in 2020. Overall, it was assumed that in 2021 there were around 15,000 jobs for engineers in energy and electrical engineering that could not be filled in the renewable energy sector (Brehm 2021: 19). Another study concludes that, for the 190 occupations identified as relevant to the expansion of the wind and solar energy, the skills gap amounted to 216,252 people on average for the years 2021/2022. The largest gaps in skilled labour existed in electrical engineering, sanitary, heating and air-conditioning technology and information technology (Koneberg, Jansen and Kutz 2022).

To counter the shortage of skilled labour, the Federal Government adopted a skilled labour strategy in October 2022. The strategy's fields of action are enhancing vocational training, promoting further education for employees, increasing labour force participation, improving the quality of work, and reducing emigration and support targeted immigration (e.g. by simplifying the recognition of foreign vocational qualifications) (Deutsche Energie-Agentur 2022).

3.4.3 The impact of the energy transition on work organization and working conditions

As the experts interviewed for this study point out, working conditions in companies in the coal industry and the energy industry (electricity, gas supply, district heating) are good. Trade union density in the sectors is high and workers receive high collectively-agreed wages. Employees in the coal industry enjoy benefits from the strongest form of codetermination in Germany (Montanmitbestimmung), which guarantees them parity representation on the company's supervisory board. In coal companies, executives must obtain workers' approval before making decisions involving issues such as changes in wages and working hours, layoffs, and safety standards. In 2016, 73 % of employees in the coal industry were covered by collective bargaining agreements (Germany in total: 56 % in 2016; IG BCE 2019: 31). According to the

Federal Statistical Office, the energy supply sector was one of the sectors with the highest gross monthly earnings in Germany in 2021. An estimated 85 % of workers in the sector are covered by collective bargaining agreements (Germany in total: 43 % in 2021; Öffentlicher Dienst News 2022).

In contrast, employment conditions in the renewable energy sector are heterogeneous. In the many small and medium-sized companies in the sector, co-determination plays less of a role. A survey by the IG Metall trade union (albeit from 2014) showed that in 60 % of the companies there were no collective bargaining agreements (IG Metall 2014). Collective bargaining coverage in the "pure wind companies", i.e. the companies that generate their entire turnover in the wind sector, was below 40 percent in 2021 (Ludwig et al, p. 63). Salaries in the wind power industry and the solar sector are 20-30 % below the wages in collective agreements of the metal and electrical industry – and on average pay €900 less a month than those in the manufacturing industry in Germany. In addition, less than half of the employees receive holiday pay or a thirteenth month salary.

3.4.4 The territorial and regional impacts of the energy transition (also in an intersectoral perspective)

Historically, energy production in Germany has been centralised in large power plants. Instead, renewable energy is generated at many different smaller sites. It was pointed out by the interview partners interviewed for this study that the transition to renewable energy and its structural effects caused by the construction of many small power plants throughout Germany has a great potential to create jobs that are geographically widespread and might benefit structurally weak regions in particular. However, so far, as the interview partners noted, renewable energy generation is not evenly spread throughout Germany.

Lignite plays a particular role in terms of regional impacts of the energy transition. As mentioned above, lignite is currently still produced in open pits in the Rhineland, Lusatia, and Central Germany. The importance of lignite mines for the regions varies greatly according to the interviews conducted for this study.

A good indication for the regional relevance of mines (and accompanying power plants) is the comparison of the employment and value added of the respective lignite mines with the total employment and value added in the regions. Data is available for the three regions for 2016 (RWI - Leibniz-Institut für Wirtschaftsforschung 2018). It shows that the share of employees in the lignite sector of all social security-covered employment in the respective districts was 2 % in the Lusatian mining area, 1.2 % in the Rhenish mining area and 0.3 % in the Central German mining area. When including indirect and induced employment effects, the share of employees amounts to 3.3 % in the Lusatian mining area, 1.8 % in the Rhenish mining area and 0.5 % in the Central German mining area. The share of income tax revenue due to the work in lignite mines and power plants was 4.6 % in the Lusatian mining area, 2.0 % in the Rhenish mining area and 0.7 % in the Central German mining area. The share of trade tax revenue was 4.3 % in the Lusatian mining area, 2.4 % in the Rhenish mining area and 0.9 % in the Central German mining area. The figures show that the lignite sector is of importance especially for the region of the Lusatian mining area. Lusatia is also the only lignite region that is very rural and

has no links to metropolitan areas. In contrast, in the other two regions cities and urban centres with a diverse economy exist. Demographic developments are also critical regarding the situation on the local labour markets. In general, in the eastern regions of Germany many young people are migrating, and the population is shrinking – this affects the Lusatian mining area in particular. However, the interviews also revealed that Lusatia has been relatively successful in supporting structural change and that new companies successfully settled in the region. So far, a political focus in the Lusatian mining area has been on setting up research institutions and promoting tourism. In Lusatia, Europe's largest artificial water landscape and Germany's fourth-largest lake district were created by flooding unused open-pit lignite mines and thereby forming a new Lusatian Lake District. However, the flooding is viewed by some critically due to the larger surface area for water evaporation in the drought-affected region (Herpich et al. 2023).

3.5. Drivers, Barriers and dilemmas to the energy transition

The interviews conducted for this study emphasised that the energy transition in Germany is still a long way away from reaching its aims. Without a more rapid expansion of renewable energy and adjustments regarding the use of fossil fuels, Germany's ambitious goals will not be met. It should be noted that even though the share of renewables in power generation is high in European comparison, it must be greatly expanded to reach the goal of 80 % renewables in electricity consumption in 2030. However, not a single wind power plant was built in Germany in 2020 and very little capacity was added in 2021 (Agora Energiewende 2022). In addition, the use of renewables must expand to other sectors (so-called sector coupling), especially to the heating and transport sectors, where renewables only play a limited role.

In addition to the expansion of renewable energy, the aim must therefore be to establish different sources of renewables throughout Germany. For example, a new law stipulates that 2 % of the land area in Germany must be set aside for onshore wind power. In addition, a law introduced in 2023 has made it more difficult to bring actions against the establishment of wind turbines and power lines in administrative court proceedings.

Another issue is that renewable energy production locations and the centres of consumption are often geographically far apart. The northern part of Germany, for example, is strongly dominated by wind power, while in the south photovoltaics play a key role. The geographical concentration of certain renewable energy sources leads to a high simultaneity of feed-in that results in overproduction or shortages (Wettingfeld/Schenuit 2022).

Currently, it is being debated how the wind power capacity of Northern Germany can be used throughout the country. Renewable energy production locations and the centres of consumption are often geographically far apart. An expansion of the transmission grid for electricity is needed across Germany, but so far there are challenges regarding grid capacity and stability (Bundesministerium für Wirtschaft und Energie 2021).

The interviewees also elaborated that, in the long term, the expansion of renewable energy in Germany could transfer structurally weak regions, such as the coastline or the sparsely populated east of Germany, that are particularly suitable for renewable energy in major economic regions. Regions that currently benefit from energy-intensive sectors, on the other hand, might be negatively affected. As has been shown, there are several programmes and

measures targeted at structural change to avoid regional inequalities and disparities that might arise in the course of the energy transition. In individual cases, it must be seen whether this kind of support will provide sufficient conditions for the future viability of fossil fuel-dependent regions. On the company level the energy transition most likely leads to new requirements for employee mobility, further training and short-time work (Lehndorff 2022).

It was also pointed out in the interviews that gas-fired power plants will face challenges in the conversion to a climate-neutral energy supply or in the course of further gas shortages. While it was noted that it is mostly possible for gas-fired power plants to run on (green) hydrogen, it was emphasised by the interview partners from the trade unions and employers' associations that the EU's plan to unbundle gas and hydrogen grids could jeopardise the power plants' new business models.

4. SOCIAL DIALOGUE, INDUSTRIAL RELATIONS AND INNOVATIVE PRACTICES IN SUPPORT OF THE ENERGY TRANSITION

4.1. Industrial relations systems in the energy sector

The system of industrial relations in the energy sector consists of numerous players in Germany. In particular, the representation structure on the employers' side is diverse. The "who's who" of the energy transition lists over 40 business associations and lobby groups on the employers' side (Federal Republic of Germany; Foreign Office 2015). However, not all on the list are employers' associations in the true sense and participate in collective bargaining within the framework of social dialogue. Important business associations in the fossil fuels sector are the Federal Association of Natural Gas, Petroleum and Geoenergy (BVEG), the German Lignite Industry Association (DEBRIV) and the Hard Coal and Mining Association (BSN). In the renewables industry there is the German Renewable Energy Federation (BEE), the German Solar Industry Association (BSW), and the German Wind Energy Association (BWE), among others. The Federal Association of the German Energy and Water Industry (BDEW) represents around 1,900 companies in the energy industry, including many municipal utilities as well as the large energy suppliers RWE, E.ON, EnBW and Vattenfall.

Outside of some municipal utilities, where the collective bargaining agreement in the public sector is used, there is no sectoral collective agreement in the energy sector. Instead, several in-house collective bargaining agreements exist. In particular, the coverage of collective agreements is very high in the fossil fuels sector and in the energy industry (power and heat generation). Collective bargaining agreements play less of a role in the comparatively young sector of renewable energy. It should also be pointed out again that the coal sector benefits from the strongest form of codetermination (Montanmitbestimmung) in Germany (see chapter 3.4).

Various trade unions are active in the energy sector. The trade union for the mining, chemical, and energy industries IG BCE and the united services union ver.di both represent workers in the German fossil fuels industry. There is not always a clear demarcation of responsibilities between the two trade unions, but the IG BCE represents mainly workers in

lignite mining and coal-fired plants alongside employees in the energy-intensive chemical and steel industry. Ver.di represents workers in electric utility industry such as the municipal power plants.

The IG Metall has made attempts to win members in the renewable energy sector (Helfen/Nicklich/Sydow 2019; Ludwig et al. 2023) – although it does not represent them exclusively, as the IG BCE, for example, has also concluded collective bargaining agreements in companies in the renewable energy sector. By far the most members of the IG Metall are in the metal, engineering, and automotive sectors.

All three trade unions are members of the German Confederation of Trade Unions (DGB).

4.2. Position of social partners with regard to the energy transition

Not surprisingly, companies and employers' associations in Germany that have their core business in renewable energy are in favour of the energy transition. However, in the past companies in fossil fuel industries, as well as many companies in the energy industry and their employers' associations have opposed the energy transition and have spoken out against the phase-outs of nuclear and coal-fired energy. For years, companies in these sectors have rarely made attempts to adapt their business models to the energy transition. Only in recent years against the backdrop of the inevitability of a transition can increased investments in renewable energy be noted. For example, in 2016 the energy provider RWE spun off its fossil and nuclear power operations into the company Uniper SE and founded Innogy SE, a company primarily doing business in renewable energy. The company later went to E.ON in an asset swap.

Today, most German companies and employers' associations have accepted the need for an energy transition and basic demands from the employers' side to shape the transition include (Lehndorff 2022):

- the availability of large quantities of green and low-cost electricity as well as security of supply;
- the pursuit of a green hydrogen strategy and the provision of necessary infrastructure;
- financial support for research and process innovation regarding the greening of the economy;
- protection against price dumping in foreign trade; and
- financial relief for transformation processes as well as planning security for long-term investment and production decisions.

In Germany, trade unions have also mobilised against the energy transition and spoke out against an early phase-out of coal in the past. For many years, trade unions were primarily concerned about job losses in the affected sectors and only over time shifted from an oppositional to a reactive strategy (Kalt 2022). Today however, the work of the German trade unions mostly focusses on the social aspects of a just transition. Above all, the focus is on ensuring that new jobs with good working conditions are created where jobs are lost due to the coal phase-out. The demand for new jobs leads to a partial overlap of interests with employers, who are also committed to the establishment and development of industry. The common ground between the social partners leads at the regional level to joint efforts to influence and shape structural change.

The most significant changes in recent years can be observed in the IG BCE, which has long opposed the coal phase-out and adopted a defensive strategy towards the energy transition and its goals. For many years, the trade union emphasised a trade-off between jobs in the coal sector and climate protection, stressing the importance of coal mines and coal-fired power plants not only for the regions but the future of German industry and the prosperity of the country (Kurwan 2021). Only in recent years – and especially in the wake of the work of the Commission “Growth, Structural Change and Employment” and the “coal consensus” – has the IG BCE come around to advocating an industrial policy-oriented transformation. Since about 2019, the official policy of the trade union has therefore no longer been dominated by the attempt to put the brakes on climate policy change to safeguard employment in affected sectors, but rather pursues a strategy of socio-ecological change in close cooperation with the employers' side (Lehndorff 2022).

Ver.di, IG Metall and DGB tended towards a more affirmative strategy in support of the ecological transformation of the economy in the past. But here, too, a change can be observed over time. Among the German trade unions, ver.di was one of the first to embrace the idea of a just transition. Although ver.di was also opposed to the energy transition at the beginning and pointed to possible job losses, it recognised the need to initiate the process for a social-ecological transformation much earlier than other German trade unions. Even before the Commission “Growth, Structural Change and Employment” and the “coal consensus” was initiated ver.di already in 2016 spoke out in favour of a coal phase-out supported by “socially responsible redundancy” (*sozialverträglicher Personalabbau*) and structural measures in the regions. With regard to current gas supply issues and the energy industry's dependence on it, ver.di is calling for a conversion to climate-neutral energy supply and a switch to hydrogen in particular (ver.di 2022).

IG Metall, which has made attempts to organise employees in the sector of renewable energy, pursued different approaches regarding the energy transition, depending on the sector and business models of companies of its members. In particular it acted with restraint when the energy transition was discussed in connection with a transformation of transportation and changes to make transport more climate friendly. As mentioned above, large parts of the membership of the IG Metall are in the automotive industry. However, since 2018 at the latest, the IG Metall has clearly been supporting a transformation process aimed at shaping the social-ecological transformation (Sharp et al. 2020). Here, too, overlaps of trade union demands with the demands of the companies in the affected sectors can be found. For example, just as the employers' side, the IG Metall calls for state investments in grid expansion, security of supply in terms of renewable energy, the promotion of key technologies, and state incentives for investments. However, the trade union demands also go beyond these and, regarding labour market policy, call for financial assistance for apprenticeships, a four-day week within the framework of so-called “collective bargaining agreements for the future”, and a linking of state support for companies to employment commitments. Furthermore, investment commitments and collective bargaining coverage shall be taken into account when awarding contracts in public procurement (Lehndorff 2022).

The German Trade Union Confederation (DGB) has published few statements on the coal phase-out. In recent years, the discussion in the DGB regarding the energy transition has mainly

revolved around structural change and just transition. The DGB demands that the energy transition is accompanied by measures cushioning economic and social hardships. In addition, it should be ensured that the energy transition leads to an increase in employment – and good jobs in particular. This requires support measures for innovation, investments, and qualification of employees. Good working conditions should further be strengthened through collective bargaining agreements and co-determination (DGB-Bundesvorstand 2021; Kurwan 2021).

Regarding the gas embargo against Russia, IG BCE, IG Metall, and IG BAU published a joint position paper in spring 2022 in which they warned that 100,000 jobs in energy-intensive sectors could be at risk. They called for a relief package for industrial jobs with financial assistance for affected companies and short-time work benefits (IG BCE 2022). In view of rising power prices, the DGB drafted a “DGB-Concept Energy Price Cap”, which calls for a cap on rising energy prices, especially for private households (DGB 2022).

4.3. Role of the social dialogue in support of a socially just energy transition

Social dialogue in Germany offers different levels of action for influencing the socio-ecological transformation. Dialogue can take place on the political level (statements by the social partners on laws, representation in tripartite commissions), the regional level (participation in regional transformation councils), the company level (co-determination on the supervisory boards or economic committees) and the establishment level (works councils) (Wahle 2022).

In the coal industry in particular, the advantages of the involvement of the social partners for consensus-building processes can be seen. The Commission “Growth, Structural Change and Employment” had the mandate to work out a consensus for German society on the coal phase-out and the future of coal energy. By engaging diverse stakeholders, including political entities, NGOs, affected federal states and regions, as well as trade unions and employers' associations, the commission aimed to mitigate the escalating conflicts between proponents and critics of coal. Through dialogue, a consensus was finally reached with which both social partners were satisfied and all trade unions in Germany support the “coal consensus” set out in the commission's final report (DGB, n.d.; Kurwan 2021). For the social partners, it was particularly important that the process of structural change in the regions is politically and financially supported, employees are protected, and social dialogue plays a role in shaping the transition. For example, the final report of the coal commission states that “binding collective agreements are to be concluded between the social partners, e.g. to secure (...) work through placement and compensation for wage losses, training and further training, [and] to cushion financial losses for earlier retirement (...)” (Kommission “Wachstum, Strukturwandel und Beschäftigung” 2019: 98). Consequently, the commission gives the social partners a co-responsibility for shaping the energy transition through collective bargaining agreements. The report stated further that workers' representatives and trade unions are also to be involved in negotiations on the closure of open-pits mines and power plants, and that negotiated decisions are to be laid down in collective agreements between the social partners. In fact, already in the past the reduction of employment in the coal industry was negotiated in the framework of social dialogue. Often, social partners negotiated social compensation plans in the context of staff reductions which made use of early retirement as an instrument for “socially responsible”

downsizing. At RAG, a hard coal company, forced redundancies were banned by a collective bargaining agreement. Furthermore, the agreement provided for severance payments, adjustment allowances in the case of early retirement and training and qualification measures. Between 1997 and 2022, an in-house training company provided support for the retraining of workers and job placement for employees who did not qualify for the adjustment allowances (Wahle 2022).

In 2020, the IG BCE and ver.di concluded the collective bargaining agreement “Coal phase-out” with RWE, which regulates benefits to be provided for employees affected by staff reductions when coal mines and coal-fired plants close down. Benefits include, above all, early retirement compensation and, for younger employees, the offer of new jobs within the group or severance pay (RWE 2022: 27-28).

In December 2021, the DGB launched the “Revierwende” Project (*Project on the Turnaround of Coalfields*) that supports trade union activities in accompanying structural change in the coal regions.⁴ Within the framework of the project six local Revierwende offices were established in the affected regions. The offices function as contact points for the exchange of information, offer knowledge transfer and networking across regions, and distribute examples of good practice in structural change. In addition, they provide counselling and training for stakeholders – especially workers’ representatives – regarding structural change, regional and structural policy, and technical know-how. In some activities of the Revierwende project, the employers’ side is also involved, for example in the form of regional chambers of industry and commerce. The project offers various platforms for exchange to jointly address challenges and formulate common positions to influence structural policy.

There are also examples outside the coal industry for the involvement of social partners in the just energy transition. For example, regarding the asset swap of Innogy SE in 2018, the IG BCE and ver.di have agreed with E.ON and RWE on a joint declaration of collective bargaining principles as well as on the collective bargaining agreement “Future and Job Security” (ZuB). Both agreements are dedicated to social safeguard measures for employees and ban compulsory redundancies. Furthermore, the contracts agreed that all existing collective bargaining agreements and company agreements continue to apply (ver.di, n.d.). Similarly, regarding Uniper SE, it was agreed that the spin-off should not result in any disadvantages for the employees. Here also forced redundancies were to be prevented and existing collective bargaining agreements, company agreements and other regulations continued to be valid. Job cuts at other energy suppliers, such as Vattenfall and EnBW, were also in the past carried out in a “socially acceptable” manner and without compulsory redundancies within the framework of social dialogue (Anhelm/Tuttli 2020).

⁴ <https://revierwende.de>

ANNEX TO THE GERMAN NATIONAL REPORT

As part of the project, ten interviews were conducted with selected interviewees who have extensive expertise regarding the effects of the energy transition and socio-ecological change in Germany. These include interviews with three representatives of the trade unions relevant to the energy sector: the services union ver.di (Vereinte Dienstleistungsgewerkschaft), the industrial metalworkers' union IG Metall (Industriegewerkschaft Metall), and the trade union for the mining, chemical and energy industries IG BCE (Industriegewerkschaft Bergbau, Chemie, Energie). In addition, three persons were interviewed from the Revierwende project, which accompanies the structural changes in regions particularly affected by the energy transition. Furthermore, interviews were conducted with two employers' associations – the Federal Association of the Energy and Water Industry BDEW (Bundesverband der Energie- und Wasserwirtschaft) and the Association of Local Public Utilities VKU (Verband kommunaler Unternehmen) – in order to identify the challenges for companies in the sector. In addition, a representative of the NGO Environmental Action Germany DUH (Deutsche Umwelthilfe) was interviewed to reflect on political and civil society debates. Apart from that, one person from the political Heinrich Böll Foundation with special expertise on employment effects of the energy transition and changing skill needs was interviewed. The Heinrich Böll foundation affiliated with the Green Party, which named the current Minister for Economic Affairs and Climate Action as well as the minister for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection in Germany. It should be noted that the professional careers of many interviewees covered a range of organisations and institutions in science and politics.

Employment, skill needs, and the quality of work in the energy sector

All interview partners agreed that the energy transition will result in the loss of jobs in the companies in the fossil fuel industry and energy-intensive sectors, while new jobs and occupational fields are being created in renewable energy – but also in the segment of distribution and transmission networks. However, the interview partners noted that employment effects of the energy transition can hardly be quantified due to limitations in the availability of data and the application of different measurement methods in statistics. There were differing views among the interviewees as to whether the energy transition will actually lead to job creation. For example, regarding photovoltaics, it was remarked that currently there is very little domestic manufacturing capacity for solar power systems in Germany and thus hardly any jobs in production.

It was also emphasised that, in companies in the fossil fuel industry that are negatively affected by the energy transition, collective bargaining agreements between the social partners are usually used as an essential element for socio-ecological transformation. For example, via these agreements remuneration components of employees are cut or eliminated in exchange for a guarantee of employment. Furthermore, interviewees pointed out that employees in open-pit mining and lignite- and hard coal-fired power plants are hardly affected by unemployment as

the "coal consensus" established adjustment allowances and early retirement for these workers. However, employees in energy intensive sectors or small and medium-sized companies in the supply chain that depend on the fossil fuel industry may well be threatened by job losses and, in addition, are not covered by the regulation on early retirement through adjustment payments following the "coal consensus". It was also noted by some interview partners that other sectors, such as the automotive industry and the chemical industry, are sometimes neglected in the political debates on the effects of the energy transition, even in the context of regional structural policy.

With regard to the next generation, all interview partners emphasized the need for companies to settle in regions negatively affected by the energy transition to create new workplaces. Some of the interviewees also pointed to challenges regarding the supply of apprenticeships in vocational training in the region when the fossil fuel industry declines: the companies for lignite mining have so far offered numerous apprenticeships and the downsizing of these companies will affect the number of available training spots in the respective regions.

All interview partners also agree that there is a widespread shortage of skilled workers in various professions and that this threatens to limit the expansion of renewable energy in Germany. The shortage of skilled workers ranges from craftsmen to academics such as civil engineers. The general lack of trained specialists is intensified by demographic change. The generation of baby boomers are or will soon reach retirement age. In addition, the energy sector is in strong competition for skilled workers with other sectors of the German economy. One interviewee therefore critically noted that the early retirement of the often highly qualified employees in open-pit mining and lignite- and hard coal-fired power plants is rather counterproductive, as the measure actually exacerbates the shortage of skilled workers in Germany even further.

In regard to the attempts to secure energy in Germany by putting coal-fired power plants that were to be closed on stand-by following the sanctions against Russia as a result of the war against Ukraine, it was also pointed out that it has not yet been clarified what impacts this reserve position of power plants will have on employees and the option of early retirement that has been granted in the measures following the "coal consensus". Similarly, the shortening of the coal phase-out period by eight years in North Rhine-Westphalia has unclear effects on employees in the affected mines and power plants. Interview partners from the trade union side pointed out that the regulation following the Coal Commission was agreed on by consensus and thus should not be repealed.

In addition, the interviewees also noted that there is a lack of adaption measures for gas-fired power plants that must shut down for a certain period of time due to a shortage of gas. The reduction of available gas is also a result of the sanctions against Russia, which was Germany's largest supplier. Some interviewees criticised the fact that there was no such thing as a "coal compromise" for the gas-fired power plants. The Commission "Gas and Heat" that was set up in September 2022 only developed proposals for dealing with the rising gas prices but did not elaborate on measures to cushion the impact of the gas shortage on employees of the gas-fired power plants. Trade unions and employers' associations alike hope for a conversion of gas to hydrogen to be able to continue operating the plants. It was also pointed out that, when

switching to hydrogen, the existing transmission grid of the gas transport system should be used for the hydrogen infrastructure. Against this, the EU plans an "unbundling" of gas and hydrogen networks. This attempt is viewed critically by the interviewed employers' associations and trade unions. As one representative of an employers' association put it, companies in fossil fuel energy that cannot continue their line of business should at least be given a chance to adapt and find economic opportunities elsewhere.

Furthermore, interview partners also referred to a particular shortage of skilled workers for the installation of heat pumps. The goal to install heat pumps (but also district heating, bioenergy and other non-fossil solutions) in German households is part of the draft Building Energy Act. The draft law would ban fossil heating systems completely by 2045 in order to archive Germany's goal of climate-neutral heating by that year (which is also the year in which Germany aims to have made its economy entirely climate neutral). Currently, a quarter of Germany's 19 million residential buildings heat with oil and half with natural gas. It is aspired to install 500,000 new heat pumps per year from 2024 onwards. For this the Federal Ministry for Economic Affairs and Climate Action plans to promote further training of professionals in the skilled trades and other professions specifically on the topic of heat pumps through a "Heat Pump Development Programme" (Aufbauprogramm Wärmepumpe) to attract workers.

Regarding qualification needs and workforce skilling it was noted that training in Germany is in general lengthy and therefore cannot solve the shortage of skilled workers in the short term. For example, it was explained that apprenticeship training to become an electrician takes 3.5 years and after completion of the training it must be assumed (due to the complexity and dangers in the working environment) that the apprenticeship graduate must be accompanied by another more experienced employee for another year or two until he or she is fully capable of working on their own.

Overall, however, the interviewees assumed that only a few completely new professions will be created in the course of the energy transition. Rather it was concluded that the demand for certain professions will change and that qualifications in certain professions will be extended by additional training to meet new requirements. It was also emphasized that the training regulations are regularly further developed in close cooperation with the social partners, which ensures that the skill profile of a certain occupation is in accordance with the needs of the economy.

In general, the interview partners do not assume that the qualification level of the workforce will change because of the energy transition. In particular, trade unions pointed out that so far there are no indications of an occupational devaluation or a de-skilling of employees. Reasons given include the aspects that in the German labour market jobs for low-skilled workers are in general hardly efficient from an economic point of view. Employees that work in the fossil energy sectors are for the most part highly qualified and will look for correspondingly qualified jobs elsewhere. On the part of the employers' associations, it is assumed that in very few areas, such as the assembly of solar panels, less qualified workers might be a sufficient source of labour.

In general, company-external retraining is estimated by many interview partners as being low. If there is retraining of the workforce, it mostly takes place within large companies for a selected group of employees as a part of personnel policy.

It should also be noted that in the opinion of many interviewees, changes in the qualifications of the workforce are less the result of the energy transition, but rather of the trend of digitalisation. It was emphasised that the need for digital skills increases in almost all occupations in the energy sector.

With regard to working conditions and the quality of work, interview partners pointed out that the energy transition and the expansion of renewable energy does not per se lead to a deterioration in working conditions. Instead, it was noted by trade union representatives that the high degree of unionisation and the high level of co-determination coverage in the fossil energy sector have led to very good working conditions in Germany. Such preconditions do not (yet) exist in the renewable energy sector. One main demand of the interviewees from the trade union side is therefore that "good" new jobs need to be created in regions where jobs in the fossil energy sector are being lost.

With regard to the funding of start-ups, one interviewee pointed out that this should not be a common measure in structural policy, as working conditions in start-ups often have some disadvantages.

Various interviewees from all interview groups noted that working in the renewable energy sector is seen by many employees as "meaningful" because of the active contribution of the sector to environmental protection. Furthermore, it was assumed that jobs in renewable energy are rather secure as the sector – and with it the need for workers – is expanding.

Drivers for and barriers to the energy transition

Against the backdrop of climate change, the need for a sustainable economy was not questioned by any of the interviewees. The climate policy goals of the German government were accepted across all stakeholder groups, even if the timely achievement of the energy and climate targets within the set timeframes was questioned by some interview partners as being rather unrealistic. Furthermore, all interviewees agree that the expansion of renewable energy in Germany is progressing too slowly. And some interview partners pointed out that under the current circumstances and conditions it can be assumed that fossil fuel power plants must continue to be operated for a longer period than planned. However, it was admitted that the law on the acceleration of administrative court proceedings in the infrastructure sector introduced in the spring of 2023 has indeed accelerated the speed of the expansion of renewable energy, in particular with regard to the new LNG onshore terminals.

The question of the location of plants generating renewable energy is described by the interviewees across all stakeholder groups as a major challenge. The challenges lie on the one hand in the scarce availability of land in the German federal states. On the other hand, the highly bureaucratic approval procedures for the expansion of renewable energy are criticised, particularly by the employers' associations but also by interviewees. All interview partners agreed that the involvement of the local community is a necessary means to manage the socio-ecological transformation. In some cases, reference was made to the rejection of renewable energy plants by the local population. Accordingly, in the opinion of the interviewees, a successful energy transition needs social acceptance and the involvement of the citizens. In this

context, the interviewed NGO also referred to the strong resistance on the island of Rügen against the planned LNG terminals currently in the German media (as of Spring 2023).

The European law on state aid, which prohibits subsidies and other benefits from state funds that could distort competition, was criticised by some interview partners. Compared to the possibilities that the Inflation Reduction Act (IRA) of 2022 in the US offers, companies in Germany see themselves at a great disadvantage. The Inflation Reduction Act is to lead to more than \$369 billion in investments to promote climate solutions such as wind, solar, nuclear, carbon capture and storage, geothermal and carbon-free fuels, and includes provisions to reduce methane emissions. Therefore, companies call for more financial support by policy makers for the development of renewable energy. This applies in particular to the solar industry, which in the opinion of some interview partners should be greatly expanded and supported by the state.

Further hurdles are seen in environmental regulation as there is a dilemma between different dimensions of environmental protection. The interviewees pointed out that renewable energy plants in open spaces – in contrast to rooftop photovoltaic systems – take up land and therefore directly compete with an agricultural or forestry use of the land. Moreover, nature and species conservation have an impact on the establishment of renewable energy plants. In particular, species protection regulations for birds often stand in the way of renewable energy installations.

Structural change in the regions

The interviewees uniformly expected the regional distribution of labour to change during the energy transition. They pointed out that this can lead to socio-political and economic challenges if new jobs are not created where old ones are lost. While jobs in energy production based on fossil fuels tend to be centrally located, renewable energy creates a base for geographically dispersed jobs.

The interview partners had different options if the law to increase and accelerate the expansion of onshore wind turbines (*Gesetz zur Erhöhung und Beschleunigung des Ausbaus von Windenergieanlagen an Land*) that stipulates that whether the target of 2 % of the land area in Germany to be set aside for onshore wind power by 2032 should be understood as a target for each federal state or for Germany as a whole. It was noted that the expansion of renewable energy should also be efficient and that not every federal state is suitable for establishing wind energy plants. As one interviewee put it, the wind does not blow equally everywhere.

However, an uneven distribution of renewable energy between the German federal states will also impact the location and development of businesses. As summarised by a representative of the employers' side: industry follows energy. This means that regions that are currently still economically well off due to the centralised location of energy-intensive industries might be particularly negatively affected by the energy transition. In the future, however, according to many interviewees, currently structurally weak regions, such as the German coastal federal states or many eastern federal states, would benefit from the expansion of renewable energy. Because of their location (wind energy in coastal regions) or vast space due to a lower population density, it is assumed that the expansion of renewable energy will be pursued especially in these federal states and benefit their economic development.

With regard to the regions that are characterised by open-pit lignite mining, i.e. Lusatia, Rhineland, and Central Germany, the interviewees came to different conclusions regarding the future viability of the regions.

As mentioned above, it was emphasised with regard to the phase-out of coal and due to the regional integration of businesses that not only the coal-producing companies and the coal-fired power plants are affected by the energy transition. Companies in the supply chain and local energy-intensive companies that settled in close proximity to the power plants are also affected. Whereas the employees of companies performing open-pit mining and lignite- and hard coal-fired power plants are covered by the measures of the Structural Support for Coal Regions Act, which cushions the transition socially, great challenges for the regions were therefore seen in securing employment in dependent companies and in the value chain.

With regard to Lusatia, interview partners emphasized the relative success in attracting new companies to the region. Research institutions are being set up and tourism is promoted by creating artificial lakes in unused open-pit mines. A particular reference was made to the establishment of a new railway depot of the German railway company, Deutsche Bahn, in Cottbus, which creates 1,200 new jobs in the region. In agreement with the region's lignite mining company, LEAG, redundant pit workers are to be qualified and given employment with the railway company. In particular, interviewees with a trade union background pointed out that, as in the energy industry, the working conditions at Deutsche Bahn are very good. It was emphasised that, for example, the high salary levels of employees in open-pit mining can mostly be maintained when they change to jobs at the Deutsche Bahn. In addition, LEAG itself plans to diversify its services and products and has developed a number of new business areas, including renewable energy and storage, energy and industrial services, raw materials and recycling, land development and logistics, and mobility.

It was also noted that various business organisations and other civil society actors in the region work closely together to meet the challenge of regional structural change and find solutions.

While interviewees were mostly satisfied with the structural policy interventions in the Lusatia region some challenges were also pointed out. Mostly the special historical development of the region was emphasised. After German unification and the systemic change from a centrally planned to a market economy, Lusatia was subjected to a large-scale de-industrialisation. This greatly affected the Lusatian lignite economy and led to negative impacts of transformation-related structural change on the local labour market. One interviewee involved in structural policy in the region explained that the structural break experienced after unification continues to shape the views of the population in the region. It is striking, for example, that the local population generally tends to refer to the unattractiveness of the region, although current economic conditions do not confirm that the state of the region is poor. The after-effects of the structural break-up in the 1990s still affects young people, who are shaped by the attitudes of their parental homes, and brings them to leave the region. In particular, it must therefore be an objective of the structural policy measures to keep young people and potential trainees in the region, for example by providing more information on the economic state of the region to young people. To this end, actors in charge of structural change in the

region are also closely working together with the German Federal Employment Agency, for example, within the framework of a so-called “future team.”

There are already signs that the shortage of skilled workers is spreading in Lusatia. It was noted that the region does not have metropolitan areas and therefore skilled workers would have to be recruited from outside the region. One interviewee also critically pointed out that, although there are far-reaching plans for the establishment of new businesses in the region, the social infrastructure in the corresponding municipalities in the region (for example, day-care centres or schools) are not yet prepared for a possible increase in the population.

In the Rhenish mining area, lignite is mined at three locations in the triangle of Cologne, Aachen and Mönchengladbach. Regarding the Rhineland, the interviewees have different opinions on how much the region and the local workforce are negatively affected by the energy transition.

On the one hand, reference was made to the many metropolitan areas in the Rhineland that go hand in hand with possibilities for economic developments and employment. In addition, there is a shortage of skilled workers existing in the region which can benefit the position of workers. On the other hand, it was emphasised that – unlike in the other two affected regions – in the course of the coal phase-out new large-scale industrial projects have so far failed to materialise in the Rhineland. It was also pointed out more strongly for the Rhineland than for the other regions that job matching could present a special challenge as labour supply and demand do not seem to match very well. While there is a shortage of skilled employees, there are also workers who are threatened by unemployment. One demand from the trade union side was therefore to take up initiatives to focus training on these workers so that they can stay in employment.

Interview partners from the trade unions and employers’ associations agreed that there must be “planning certainty” regarding the energy transition for all actors involved. In the case of North Rhine-Westphalia, however, this planning certainty is being questioned. The Ministry of Economic Affairs, Industry, Climate Protection and Energy of North Rhine-Westphalia reached an agreement with the Federal Ministry of Economic Affairs and Climate Action and the energy company RWE AG to bring forward the coal phase-out by eight years from 2038 to 2030. A corresponding law came into force on 24 December 2022. However, interview partners questioned whether the shortening of the operating period will be accompanied by a corresponding acceleration of the structural adaptation measures. It was also questioned whether the energy supply can be switched to other sources in a timely manner.

In general, it was assumed that the Central German mining area faces fewer challenges compared to the other regions. The reasons for this are that firstly lignite mining plays a smaller role for the local economy than in the other two regions and secondly that a number of sustainable companies have already located in the region. Here, too, structural change is accompanied by monitoring committees, in which both social partners are represented.

Role of the social dialogue in supporting a socially just energy transition

All representatives from trade unions that were interviewed identified socio-ecological

transformation as an important issue and have put it on their political agenda. A main aspect of the trade union work concerns the political support of the energy transition, for example by demanding political support for climate-friendly electricity and heat generation using renewable energy or climate-friendly local transport concepts. However, the representatives from trade unions pointed out that, above all, the socio-ecological transformation demands great efforts from the employees and in particular from those working in the affected sectors.

The interviewed trade unionists emphasised that, while they do not oppose structural change in the course of the energy transition, disadvantages for employees in terms of employment must be prevented. According to the trade unions, structural change needs to take place without social upheaval. They demand that new jobs be created with the phasing out of the coal industry and that these new jobs meet the trade union requirements of “good work.” In addition, the energy transition should be an opportunity for regions to grow and contribute to the equality of living conditions throughout Germany. “Good work” is defined by trade unions in terms of decent permanent jobs that are subject to social security contributions, coverage by collective bargaining agreements that are common in the sector, co-determination in companies, availability of apprenticeships, company health care, strategic personnel planning, and work-life balance and family-friendly jobs.

All trade union representatives interviewed saw the broadly supported consensus of the coal commission and the coal phase-out according to social criteria as important contributions in shaping the social-ecological change in Germany. They also pointed out that the presence of trade unions in the commission’s work was very important in pushing through social ideas such as that there should be no compulsory redundancies in open-pit mining or lignite- and hard coal-fired power plants and that adjustment allowances should be established for workers retiring before their formal retirement age.

In particular, IG Metall makes attempts to expand union organising to the renewable energy sector. Especially in organising districts where renewable energy plants exist, specific demands concerning the workforce in renewable energy are formulated. IG Metall also carries out a long-term project called "Perspektive Ost" (Perspective East)⁵ which deals with specific concerns in the Eastern German federal states. These include fewer collective agreements and works councils in Eastern Germany, wage differentials, differences in working time, greater demographic change, and little local influence on company policies, as company decision-making is often made on the level of the headquarters of companies, which are typically located in Western Germany.

Three of the interview partners were involved in the Revierwende project. The Revierwende project was launched on the initiative of the German Trade Union Confederation DGB (Deutscher Gewerkschaftsbund) to support trade unions in their regional activities in regions affected by the coal phase-out. Through the work of the initiative the transformation in German coal regions should be accompanied by participation-oriented processes influencing structural developments. Furthermore, within the framework of the initiative, former coal regions should be made sustainable and future-proof by attracting companies to the regions that maintain or

⁵ <https://www.igmetall-perspektive-ost.de/>

create good work for the next generation of workers.

In order to enhance participation and local involvement, district offices have been set up in (current and former) coal regions throughout Germany with a total of seven regional offices. The offices primarily serve as contact points for the project's target groups (trade unions, works councils, and employees – especially of companies that are dependent on the coal industry). The activities of the offices include networking and exchange, the provision of content-related and technical know-how, advice on transition processes, training, and special qualification. For example, training courses provide knowledge on the development of structural change in the region or on the framework conditions of regional and structural policy. There are also qualification offers targeted at young people or employees in companies without co-determination.

The interview partners from the employers' associations mentioned that it is of particular importance that a level playing field is created regarding the energy transition so that all companies have the opportunity to be economically active. This includes companies that have so far been dependent on fossil fuels, which must be given the chance to change and invest in future-oriented services or production. Furthermore, it is necessary that for such investments, the business community needs planning security regarding political decision-makings. The large investment sums necessary to enhance the transformation of the economy to meet the goals of the energy transition should also be made possible and profitable through financial support from government.

It is striking that the interviewees on the employee and employer side often held similar views on questions concerning the design of structural change and the interpretation of issues and challenges (for example, the need for an accompanied energy transition, the effects on employment, the skills shortage, the limiting regulation on state aid, or the operation of the gas networks with hydrogen). The common ground between the social partners can mainly be explained by the shared interest to promote affected regions and regional economies. The social partners are also in agreement that the appropriate strategy is to establish new industrial companies and support existing ones in affected regions to generate value added and working places.

The large overlap in interests leads to the social partners working together in various bodies to jointly address challenges and formulate common positions vis-à-vis politicians. In the affected regions there are numerous exchange platforms between trade unions and, for example, the regional chambers of industry and commerce to shape structural policy in cooperation.

The interviewees from the trade union side pointed out that they work to some extent together with NGOs to promote a just transition. For example, NGOs are sometimes involved in projects of the *Revierwende*. It should also be noted that *ver.di* together with many NGOs is a member of the Climate Alliance Germany, which addresses the need for structural change to create a climate friendly economy. It is also worth mentioning that in 2020 some of the stakeholders interviewed in the framework of this project – VKU, *ver.di*, and DUH – issued a joint statement on the expansion of heating networks, which called for investments in green heating networks (based on heating supplies from renewable or climate-neutral sources) with the aim of promoting a switch from coal to renewables and climate-neutral heating. The joint

statement also demanded an economic stimulus programme for green heating that should increase the density of the heating network for a better penetration of renewable and climate-neutral heating, improve the personnel and financial resources of the municipalities to implement high-quality heat planning, and include a qualification offensive for workers.

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