



Energy policy and the labour market

STUDY



European Economic
and Social Committee



Final Report

Energy policy and the labour market: consequences for employment in regions undergoing energy transitions

Study

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Abstract

This study examines the socio-economic situation of three lignite regions in the process of transitioning out of coal mining: Lusatia in Germany, Wielkopolska in Poland, and Upper Nitra in Slovakia. It assesses the effectiveness of various instruments, factors and approaches in creating quality jobs, employment, and economic growth. The research results suggest that a successful energy transition requires the involvement of all stakeholders, the development of tailored strategies, and the addressing of miners' identity issues. The study provides general recommendations for a just energy transition, such as aligning strategies across scales of government, investing in skills and training, and providing adequate funding.

Executive summary

This study examines **three cases of lignite regions in the process of transitioning out of coal mining: Lusatia in Germany, Wielkopolska in Poland, and Upper Nitra in Slovakia**. Its overall aim is to **assess what specific instruments, factors and approaches in play during the energy transition might make a real contribution to regions' (un)successful adaptation to a green economy in terms of consequences for regional employment, quality jobs and economic growth**. The research conducted for this study involved three main tasks: providing an overview of the socio-economic situation of the selected case studies; understanding what elements of the energy transition were effective for creating quality jobs, employment, and regional growth; and formulating policy recommendations that could contribute towards or facilitate a just transition.

In **Lusatia**, Germany, the shift away from lignite has caused deindustrialisation and a decrease in employment opportunities. However, there are initiatives to create new jobs and provide training and qualification measures to help older miners. The coal phase-out law with a target date of 2038 is a good compromise, and has led to the expansion of cross-border infrastructure and the creation of new high-quality industrial jobs.

In 2018, Poland began its energy transition process, aiming for a zero-carbon energy transition, while investing in innovative technologies to reduce emissions. However, in **Wielkopolska** social partners were often not included in the dialogue and the agreements reached through the social dialogue were frequently broken, leaving employees to deal with the challenges alone. This has caused a lack of tailor-made solutions that respond to regional challenges and allow the region's potential to be strengthened. Policy makers need to consider the role of interplay between the labour market and energy policies, abide by the agreements from the social dialogue, and support the planned activities with public funds.

In 2017, policies were put in place to end mining in the **Upper Nitra** region by 2023, and measures were taken to address the social impacts of the transition, such as providing early retirement for miners and compensation for those laid off. Funding for the transformation of the region is mainly from the EU Just Transition Fund, with national and local resources playing a minor role. Challenges for the region in the coming years include decarbonisation, increased energy efficiency, and further participation of local and regional actors.

Based on a thorough analysis of those cases, the study finds that a successful transition requires the engagement of various actors, including trade unions, science, enterprises, government, and NGOs. For this reason, the involvement of all stakeholders and the development of strategies tailored to local circumstances is necessary. The study also found that – as transition takes decades rather than years – it must include mechanisms which are independent from the electoral cycle to ensure success, including funding mechanisms. Finally, it concluded that miners’ identity issues must be addressed in the transition process, as they can affect miners’ willingness to take advantage of labour market policies.

Factors at play during the energy transition are therefore:

- **Assessment of baseline/current economic, environmental and social situation.**
- **Analysis of existing infrastructure and assessment of strengths and weaknesses of existing economy.**
- **Building and implementing strategies based on local assets.**
- **Involvement of all stakeholders.**
- **Coordination between social partners and trade unions.**
- **Adequate and stable financing.**
- **Creating new high-quality jobs.**
- **Cultural factors (miners’ self-identification, sense of belonging, and willingness to cooperate).**
- **Long time horizon (decades rather than years).**
- **Redistribution of costs and benefits of transition.**
- **Focus on long-term investments.**

The study also provides **general recommendations for a just energy transition in coal regions**. These include aligning strategies and activities across scales of government, involving local and regional levels, taking demographic factors into account, investing in skills and training, creating decent jobs, utilising social insurance programs, and providing adequate funding and local capacity building. They can be summarized as follows:

- **Align strategies and activities across scales of government.**
- **Involve local and regional level in sustainable development.**
- **Acknowledge a network of relationships between regions.**
- **Ensure transparent and well-designed process.**
- **Take into account demographic situation in region.**
- **Invest in skills, training and retraining.**
- **Support new jobs with decent salary.**
- **Implement social insurance programmes, income support and labour market support, adjusted to regional conditions.**
- **Access to adequate funding and local capacity building.**
- **Regularly evaluate and review transition policies and plans.**
- **Retain flexibility in policies and technologies.**

The study highlights it that there is **no one-size-fits all recipe for a just transition** that could benefit every region, and it is important to take a tailored approach to creating and implementing a local transition plan.

Introduction

Sustainability has lately been one of the most prominent topics in the world, including in the European Union (EU). It has become an increasingly important concept in the face of climate change, as it promotes the use of renewables and invites people to take action to reduce their environmental impact. During the UN Climate Change Conference (COP21) in Paris on 12 December 2015, 196 parties, including the EU Member States (EU MS), adopted **the Paris Agreement**, a legally binding international treaty on climate change. It entered into force on 4 November 2016. The Paris Agreement sets out a global action plan to limit global warming to below 2°C and aims to keep it at 1.5°C. It laid the groundwork for the European Commission's (EC) **Green Deal** (European Green Deal, EGD) set of policy initiatives approved in 2020, with the overarching goal of achieving climate neutrality for Europe by 2050.

The European Green Deal envisages the implementation of a series of measures to transform the EU into a modern, resource-efficient and competitive economy. Such an economy would be characterised by zero net greenhouse gas emissions in 2050, decoupling economic growth from resource use, and an equal standard of living across all EU regions. To achieve carbon neutrality within the planned timeframe, current levels of greenhouse gas emissions will have to be reduced significantly over the coming years. This is why the EU has been working to revise its climate, energy and transport legislation as part of the so-called **“Fit for 55” package**. The implementation of the package's proposals involves changes to employment in certain regions that are either dependent on energy resources or linked to energy production.

In regions that were rich in coal resources, the industrial revolution created many well-paid jobs over the course of the nineteenth and twentieth centuries, as well as social structures underpinning vibrant local communities with a strong sense of identity and solidarity (Friends of Europe, 2018). In 2017, the energy sector employed nearly 58 million people worldwide. About half of these jobs were in the fossil fuel industry (Czako, 2020). In terms of declining sectors in the EU, nearly 237,000 people were employed in coal-related activities in 2021, while nearly 10,000 were employed in peat extraction and about 6,000 in the oil shale industry. Changes related to the transition towards carbon neutrality will also involve employment in carbon-intensive sectors, which will have to cut back or cease operations (EC, 2021a).

According to EC analyses, in a pessimistic scenario the effects of a transition to climate neutrality, combined with an inappropriate policy mix, could mean up to 0.26% job losses and up to 0.39% loss of GDP in the EU. However, with the appropriate accompanying policies, the green transition could result in a total of around 1 million additional high-quality jobs in the EU by 2030, and 2 million by 2050, in sectors such as construction, ICT or renewable energy (EC, 2021a).

While extensive research has been undertaken in terms of statistical predictions of job structure changes caused by energy transition, only a limited number of studies focus on the nature of the changes in employment patterns due to the shift to climate neutrality. The overall aim of this study was to fill this gap and **assess what specific instruments, factors and approaches in play during the energy transition might make a real contribution to regions' (un)successful adaptation to a green economy in terms of consequences for regional employment, quality jobs and economic growth.**

In particular, the objectives of the study were as follows:

1. to provide an overview of three cases of fossil-fuel based regions which have undertaken the transformation;
2. to deepen understanding of the interplay between energy and employment policies, and their interaction with the broader regional context in terms of industrial, economic, political and social relations;
3. to provide policy recommendations for a just transition, both in comparative terms and with a case-specific overview.

Three case studies were developed and examined for the project. The identification of cases was based on desk research embracing previous studies focusing in particular on fossil-fuel related industries. In order to guarantee the requested comparability of cases and secure a comprehensive literature review, **three lignite regions vulnerable to the phase-out of coal mining were chosen: Lusatia in Germany, Wielkopolska in Poland, and Upper Nitra in Slovakia.** The chosen case study regions feature similar characteristics, including the legacy of the economic transformation of the 1990s (former East Germany, Poland, Slovakia), the industrial makeup of relations between entrepreneurs and trade unions in the mining sector specifically (with union density in Poland at 12%, and 11% in Slovakia in 2012, according to ETUI, n.d.-a; ETUI, n.d.-b), and a relatively significant scale of employment in the mining sector prior to the transition. The Wielkopolska and Upper Nitra case study regions can be described as locations in need of a just transition, which further supported their choice in terms of comparability. Still, despite the phase-out commitments of Germany, Poland and Slovakia differing – the latter has set an ambitious phase-out commitment to be realised in 2023, while Germany has taken a more cautious approach with 2038, and Poland is keeping phasing-out under consideration – the choice of case studies thereby allowed for direct comparability between Poland and Slovakia, and for a sound degree of comparability between all three case studies.

The study is based on research comprising three main tasks. The main aim of the first task was **to provide an overview of the socio-economic situation of the selected case studies.** It included an overview of the regional rationale, challenges and main policies supporting the transition (desk research and literature review, including academic and policy-oriented papers, reports, and studies, etc.) during which relevant programmes, policies and initiatives supporting the transformation were mapped and analysed. It also included an overview of the roles played by the various stakeholders in the development and implementation of policies and programmes, their cooperation and dialogue, as well as formal and informal partnerships that were established. As part of the first task, the key indicators (demographic, sectoral and economic) for presenting the overall performance of the region before, during and after the transition (if applicable) were also collected for each of the researched regions. The full list of indicators as well as values and information on each regional case study are presented in Annex 1.

The aim of the second task was to understand **what elements of the energy transition were effective for the creation of quality jobs, employment and regional growth in the selected regions, and what elements were unsuccessful in this respect.** This task sought answers to the question of what specific instruments, factors and approaches might decide whether a region could successfully undergo the energy transition, and included the process of stakeholder selection. First, on the basis of desk research, detailed stakeholder lists were prepared for each case study. Secondly, the further choice of stakeholders to be engaged in the qualitative phase of the research process was based on the following assumptions: 1) to approach stakeholders holding a mandatory role in the energy transition process; 2) to involve

stakeholders from different territorial levels; 3) to engage a wide spectrum of stakeholders impacted by the transition process to gather different perspectives and views. The chosen stakeholders were invited to take part in round tables – designed to collectively gather opinions and gain validation of different elements of the regional transition process and its impact on quality jobs, employment, up- and reskilling and regional development – and semi-structured interviews. According to the initial methodology proposed for the study, the aim was to gather at least 12 representatives from different groups of stakeholders for one round table per case study, and to conduct at least five interviews per case. During the research, however, the organisation of the round tables encountered major logistical problems, particularly with regard to the availability of stakeholders and their responsiveness. As a result, at least one round table was held for each case study region, but with fewer than the expected number of participants, and more interviews were conducted instead. When discussing the transition processes with stakeholders, the focus was on three pillars of successful energy transition: 1) cooperation at all levels; 2) support for workers; 3) aligned funding supporting the transition.

The third and final research task encompassed **formulating policy recommendations that could contribute towards or facilitate a just transition.**

This report is divided into three main chapters. Chapter 1. “Energy policy and the labour market – a general overview” provides an insight into the links between energy policy and the labour market, discusses the consequences of energy transition for employment from a regional perspective, and presents an overview of relevant EU, national and regional policies. Chapter 2. “Transformation of the lignite industry – case studies” provides an overview of all three researched regions, focusing on such aspects as the economic structure of the region, its labour market, policies and reasons behind the transition, and the funding of transformation, among other things. Chapter 3 is devoted to the presentation of conclusions and recommendations.

Last but not least, the study fed into an own-initiative opinion by Maria Carmen Barrera Chamorro on “Energy Policy and the labour market: consequences for employment in regions undergoing energy transitions” (SOC/718-EESC-2022) adopted by the EESC on 22 February 2023 (see EESC, 2023). The opinion contains an annex with recommendations based on the study’s results.

Chapter 1. Energy policy and the labour market – a general overview

1.1 Links between energy policy and labour market

The transition to renewables can contribute to employment creation in such sectors as renewable energies, electromobility, energy storage, energy efficiency, and smart metering (IDB, 2021). Before the ongoing “multicrisis” – comprising the climate emergency, COVID-19 pandemic, Russia’s invasion of Ukraine and the emerging energy and food crises – some studies expected global GDP to be higher by 2.5% with energy transition than under the ongoing and planned policies (IRENA, 2019). Although according to estimates in the global sustainability scenario of the Labour Organisation (ILO) around 6 million jobs may be lost by 2030 due to the transition to a green economy, the creation of around 24 million new jobs was also forecast (ILO, 2018). Taking into account the COVID-19 pandemic’s impact, the recent assessment of the Partnership for Action on Green Economy (PAGE) estimated that some 20 million additional jobs could be created by 2030 in a green recovery programme scenario (PAGE, 2021). And considering the current global turmoil, the transition to renewables may appear increasingly relevant, while its acceleration is perceived by some as crucial for addressing the energy and climate crises, rising inequalities, and the EU’s fossil fuel dependency on Russia (Iacobuță et al., 2022).

The 2015 Paris Agreement (UN, 2015) provided the impetus for changes in the energy market that seek to introduce green energy sources and involve the transformation of fossil fuel-related industries. It also took note of the importance of safeguarding the creation of decent work and quality jobs for a just transition. The energy transitions may bring economic costs and involve rapid changes in the labour market, and existing literature sheds some light on changes in employment that may cause several difficulties, such as affecting household income and livelihoods through potential risks of increases in energy poverty (see e.g. Streimikiene et al., 2021), bringing potential unintended social consequences, such as economic inequalities and inequities (see e.g. Axon & Morrissey, 2020), or impacting gender-specific issues (see e.g. Walk et al., 2021). It may be the case that the transition to renewables will create an increase in demand for more advanced skills developed in new sectors and areas, such as energy and resource efficiency, or digital competencies (Akgüç, Arabadjieva & Galgóczi, 2022). Furthermore, this change would require from the workers wider, multidisciplinary knowledge due to the new business models and societal initiatives (Czako, 2020).

1.2 Policy instruments and initiatives supporting just transition – a regional perspective

Analyses of the impact of energy transition often operate at global (e.g. IDB, 2021; IRENA, 2019) and national (e.g. Oei, Brauers & Herpich, 2020) levels, whereas studies on regional-level impacts remain scarce (IRENA, 2020). Furthermore, analyses concentrating on regions face significant challenges due to the plethora of features specific to different regions (e.g. population density, historical disadvantages, or natural disasters) which hinder identification of causal mechanisms as well as the applicability of these studies in different contexts (FEPS, 2021).

The example of jobs directly and indirectly related to coal activities (i.e. mining and operating coal power plants) may depict the gravity of challenges facing certain EU regions undergoing the energy transition now and in the upcoming years. As the Joint Research Centre (JRC) report assessed, there is a significant risk of a loss of jobs related to coal activities especially in regions in Bulgaria (BG34), Germany (DEA2), Greece (EL53), Poland (PL21, but also PL22 and PL51 under the TYNDP coal

phase-out scenario) and Romania (RO41, RO42) in the decade of 2020–2030. During this period, Poland’s region of Upper Silesia (PL22) is particularly exposed to this risk, as it may be affected by the highest number of potential job losses – even up to 45,000 in total.¹ Overall, the report estimated that by 2030 total job losses in coal-fired power plants and mines in the EU could number up to 54,000 jobs under the NECP or even up to around 112,000 jobs under the TYNDP coal-phase-out scenarios² (Alves Dias et al., 2021).

Yet there is a range of potential for renewable energy and job creation across the coal regions. Overall, the European Commission estimates that if the appropriate policies were implemented, the green transition could result in a total of around 1 million additional high-quality jobs in the EU by 2030, and 2 million jobs by 2050 (in particular middle-skilled and middle-paid jobs; EC, 2021a). The case studies of regions that have accomplished a relatively successful energy transition (e.g. the Swedish region of Örnköldsvik or the German region of Lusatia) may serve as a source of good practices (see START team, 2021). In essence, tools such as policy mix (e.g. ILO, 2015) or stakeholders coordination (e.g. Oei, Brauers & Herpich, 2020) proved crucial in ensuring a just energy transition. Such transition engages various actors who should coordinate their efforts, and this task is particularly complex in the coal regions since these areas often do not exactly fit regional administrative boundaries (Yetano Roche, 2020).

Furthermore, research suggests that investing in skills, training and retraining is an important element of just transition. Also, better coordination between the energy sector and educational institutions is crucial for responding to the emerging trends in the educational needs of the energy sector and other sectors (identifying transversal skills may be considered one of the important tasks in this regard; IRENA, 2021). Other policy instruments that are needed to facilitate a fair energy transition may include social insurance programmes, temporary income support, unemployment support, community care programmes, labour market support (e.g. retraining, skills upgrading, and skills transferability), environmental rehabilitation and repurposing strategies (for more on this, see e.g. Beuermann et al., 2020; Krawchenko & Gordon, 2021). However, the ability to use these instruments varies across regions – not only because of the different resources and capabilities at a region’s disposal, but also the range of the regional authorities’ competences, as some of the potential measures may fall within the scope of the central government. The EESC, as expressed in its own-initiative opinion on “Energy Policy and the labour market: consequences for employment in regions undergoing energy transitions” adopted on 22 February 2023 (see: EESC, 2023), proposed prioritising connections between the issues of energy transition, labour markets and regional development as part of a renewed (economic, social and territorial) cohesion policy.

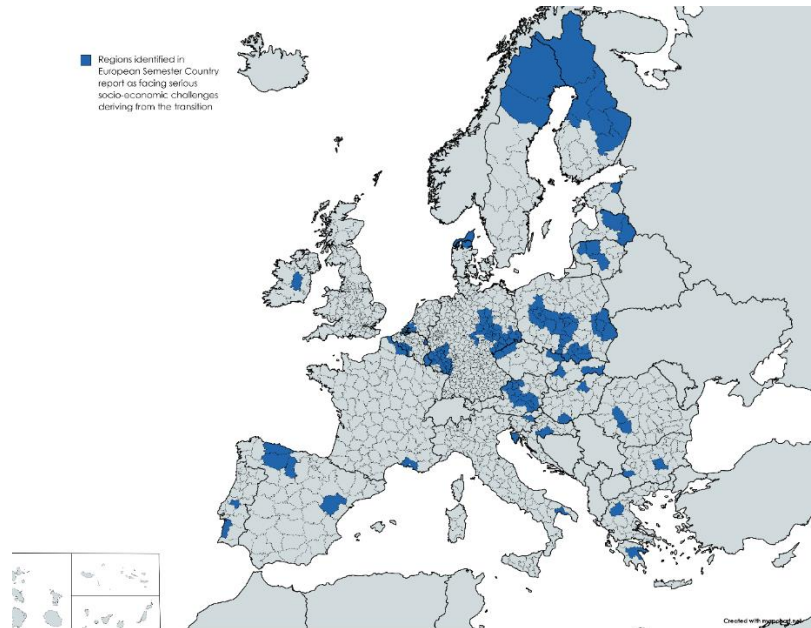
Overall, a just transition requires the engagement of various actors, at different levels, and an approach that includes many different policy instruments. In its opinion of 2020 on “Industrial transition towards a green and digital European economy: regulatory requirements and the role of social partners and civil society” (EESC, 2020), the EESC highlighted the important role of employers, entrepreneurs and private sector engagement in driving structural change. A holistic approach to the energy system, which requires

1 The JRC report also assessed that in the period of 2016-2020, Wielkopolska (PL41) together with the regions of Castilla y León (ES41), Düsseldorf (DEA1), Severozápad (CZ04), and Arnsberg (DEA5) was among those with “the highest number of jobs already affected by power plant decommissioning” (Alves Dias et al., 2021).

2 The National Energy and Climate Plans (NECP) and the Ten-Year Network Development Plans (TYNDP) coal phase-out scenarios.

working together with many stakeholders across different industries, may therefore be regarded as vital for a just transition. In essence, “a holistic policy framework encompasses industrial policies, labour market policies, social protection measures, diversity and inclusion programmes, and skills training and retraining strategies” (IRENA, 2021). Furthermore, in the midst of the energy crisis such an approach may also require taking energy security into account, as the EU may now strive to dovetail its climate action with reducing dependence on fossil fuels from Russia (see Friends of Europe, 2022).

Figure 1. Regions/locations in need of just transition, according to European Semester.



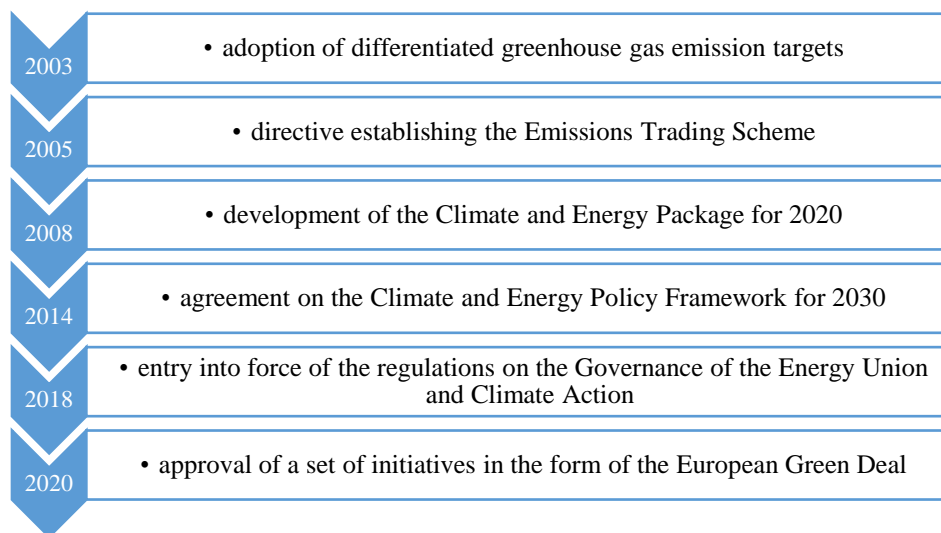
Source: own elaboration based on Fondation Robert Schuman (2020).

1.3 Overview of the relevant policies

1.3.1 EU policies and instruments

Linking the EU climate and energy policies gained impetus at the beginning of the 21st century and started a lasting evolution of approaches (Jordan, Oberthür & von Homeyer, 2021):

Figure 2. The evolution of approaches towards climate and energy policies in the EU.



Source: own elaboration.

In this context, special attention is given to such current flagship initiatives as the European Green Deal, the Just Transition Mechanism (along with the Territorial Just Transition Plans), and the “Fit-for-55” package. Along with these initiatives, several others also aim to facilitate a just transition. These include:

- the European Commission Green Paper, “A 2030 framework for climate and energy policies”,
- the European Globalisation Adjustment Fund for Displaced Workers,
- the European structural and investment funds,
- the Research Fund for Coal and Steel,
- the EC strategy “Going-climate-neutral by 2050”,
- an earlier (2018) EC strategy “A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy”.

In addition to adopting the policy mix approaches consisting of market, regulatory and procedural elements (see more Jordan, Oberthür & von Homeyer, 2021), the EU introduced specific measures that focus on facilitating the just transition on the ground, through financial means. These solutions should aim to implement specific programmes, policies, and initiatives. Among such measures the key role is played by the above-mentioned Just Transition Fund, and by the “Next Generation EU” plan, together with the Recovery and Resilience Facility.

In an opinion adopted on the occasion of the 150th plenary session of the European Committee of the Regions on 30 June 2022, it was noted that this EU advisory body points out that the programming of the most important EU funds aimed at supporting the green transition is carried out at the national level, and depends on central government guidelines. For this reason, relevant procedures for the greater participation of local and regional authorities (LRAs) should be put in place (European Committee of the Regions, 2022). To support the regions in the implementation of the EGD, the European Committee

of the Regions leads the Green Deal Going Local campaign, which strives not only to facilitate the LRAs' quest towards the transition (for example, through fostering their participation in the existing funding opportunities) but also to improve the effective implementation of the EGD at the EU policy-making level (European Committee of the Regions, 2021). The campaign includes, among other things, the development of a Green Deal Going Local Handbook dedicated to the LRAs responsible for the implementation of the EGD. The handbook focuses on providing them with information on financial aid and technical assistance (European Committee of the Regions, n.d.). In this context, such undertakings as the Just Transition Platform and the Initiative for Coal Regions in Transition are also relevant for the regions in transition (see more: EC, n.d.).

1.3.2 National and regional policies

EU Member States differ substantially in their progress towards energy transition and implementation of associated programmes. The Green Transition Index³ published in 2022 places such countries as the Netherlands, Denmark, and Estonia as the frontrunners in the EU, whereas Cyprus, Bulgaria, and Lithuania are ranked at the bottom (the EU Member States relevant to our study were placed in between, with Germany coming 7th, Poland 25th, and Slovakia 21st; Oliver Wyman, 2022). To navigate their transition efforts, plans and policies are prepared at national and regional level. These plans are drawn up by the central governments in cooperation with the local and regional authorities, and in dialogue with the European Commission – as in the case of the Territorial Just Transition Plans (EC, 2021b).

The energy transition programmes at the regional level engage different levels of governance and actors. Engaging various stakeholders operating at different levels of governance through social dialogue, as well as civil society involvement, is in turn crucial for the governance processes in coal regions in transition (Yetano Roche, 2020). For example, regional coordination of efforts proved important in supporting the diversification of the Ruhr area's economy (see Beuermann, 2020), and the establishment of one institution representing this coal region helped coordinate national funding (Oei, Brauers & Herpich, 2020).

Knowledge about the relatively successful energy transition in different regions of EU Member States could be beneficial for the regions analysed in this study (see more START team, 2021). Examples of such regions include the above-mentioned German region of the Ruhr area (see more: Oei, Brauers & Herpich, 2020), the Spanish region of Castilla y León (see more in the subsections below), and the Polish subregion of Wałbrzych. For instance, when the coalfield in the Wałbrzych subregion closed in the 1990s, it resulted in soaring unemployment and population decline. Yet Wałbrzych managed to successfully transform itself into a region that now generates a GDP above the national average and boasts an unemployment rate below the national average, which attracts investment and creates jobs. This was achieved mainly through the Wałbrzych Special Economic Zone, which contributed to the creation of 53,500 new jobs (Platform for Coal Regions in Transition, 2019).

The cases of two regions are presented in brief below: the above-mentioned Spanish region of Castilla y León serves as a relatively successful case of energy transition, while the second case considers the Austrian region of Steirische Eisenstrasse. Although the latter highlights certain interesting good

³ The Green Transition Index (GTI) is prepared by an international consulting company, OliverWyman. It considers progress in the field of emission reduction and transition towards environmental sustainability in 29 countries (EU27 + Norway and the United Kingdom). The index takes into account key performance indicators in such categories as economy, nature, manufacturing, utilities, transport, buildings, and waste. See more at: OliverWyman, 2022.

practices, it also offers a critical view of initiatives that are often perceived as promising, but have not led to significant economic impacts thus far.

Castilla y León

Coal production in Spain is concentrated in three main regions: Asturias, Aragon, and Castilla y León (see more: del Rio, 2017). As part of its just transition efforts, the latter is participating in the grant programme launched by the Spanish government in 2019, which aims to support employment-generating business projects that promote alternative development in mining regions (ITJ, 2022). This “alternative development” envisages actions that focus on, for example, improving and restoring degraded areas affected by mining operations (e.g. forestry recovery), creating technological development centres, providing or renovating telecommunication lines, or investing in energy diversification (La Moncloa, 2018). The region of Castilla y León was also supported through a programme of grants for small investment projects (see ITJ, 2022) and is one of 13 regions that signed a Just Transition Agreement (JTA) – an initiative of the Just Transition Institute. As the Institute explains, JTAs “focus on the actual area or region and are included in the Just Transition Strategy and the Law on Climate Change and Energy Transition. They begin with an assessment of potential job losses and formulate a series of commitments, with a final list of measures to maintain employment and population”. Today, Castilla y León is emerging as one of the leading regions in Spain in the areas of self-sufficient supply of electricity from photovoltaic solar power, domestic use of biomass installations, and installed solar thermal capacity per capita. The region also has a strong wind power manufacturing and maintenance industry, and with 25 facilities, it is “a leading region in terms of the number of manufacturing facilities for wind power components within the framework of carbon transition regions in Europe” (ISTAS, 2020). Furthermore, the Institute for European Environmental Policy (IEEP) estimates that in 2020 there were potentially up to 8,317 jobs in the renewable energy sector. Compared to the situation in 2009, this is growth of 38%. Overall, Castilla y León is considered “the region with the highest potential for job creation among the coal transition regions” in the EU (Culianez, 2021). This region’s experience in energy transition may be considered a source of inspiration for other regions in the EU that are facing similar transition challenges.

Steirische Eisenstrasse

For decades, the Austrian heavy industry region of Steirische Eisenstrasse was challenged with job losses, outmigration, and an aging population. This situation was especially noticeable in the case of the mining municipality of Eisenerz, which between 1981 and 2009 lost 48% of its population due to the decline of ore mining and the associated heavy industry, as well as the region’s peripheral location (Osebik, 2012). Yet Steirische Eisenstrasse strived to overcome this difficult situation through creating new economic opportunities and making an alternative use of its (post-)industrial features. This translated to the organisation of regular events such as the annual motocross Erzberg Rodeo, which takes place in an open-cast iron ore mining site, or the Rostfest, which is an innovative festival that links art with the cultural heritage of the town of Eisenerz. The Erzberg Rodeo created opportunities for the region, and was therefore included in the regional strategies of some of the local stakeholders, such as the regional LEADER management Verein Steirische Eisenstrasse e.V. (Harfst, 2015). Another development that took place in the Steirische Eisenstrasse region was the growth in the range of adventure sports opportunities and the creation of tourist attractions, some of which involved former industrial sites being converted into museums and other points of interest (START team, 2021). Yet, despite the efforts invested in industrial heritage tourism, the region has not managed to overcome the

structural disadvantages, and the economic impacts of such initiatives are not contributing significantly to sustainable regional development. Although these measures are bringing certain social benefits, such as a strengthening of internal identity and cohesion, which may be useful on the path towards future development, they are not sufficient in themselves (Harfst, Sandriester & Fischer, 2021).

1.4 Conclusion

Existing literature reveals that there is a strong link between the energy transition and the situation in the labour market. The energy and labour market policies often dovetail in the context of transition to a clean and sustainable economy. Energy transitions bring certain economic costs and involve rapid changes in employment patterns. Although these difficulties are expected to result in significant job losses across several regions in transition in the EU, the historical case studies of regions that have accomplished a successful energy transition may provide knowledge on solutions that could be suitable for regions undergoing this process. The policy mix of elements operating at different governance levels (EU, national, regional, and local) aims to facilitate a just transition, and could successfully mitigate the risks associated with this process in the area of employment. In this context, the regional level is regarded as suitable for working on improvements in employment. However, existing literature does not sufficiently explore the regional level impacts. Thus far, too little attention has been paid to analysing the changes in employment patterns resulting from the energy transition. More research is also necessary to examine which strategies may prove the most successful at the regional level and bring positive results. And such results could prove that moving from a fossil-based to zero-carbon energy sector does not only mean difficulties in the labour market, but may also bring social and economic opportunities (see more e.g. Grubb et al., 2021).

Chapter 2. Transformation of the lignite industry – case studies

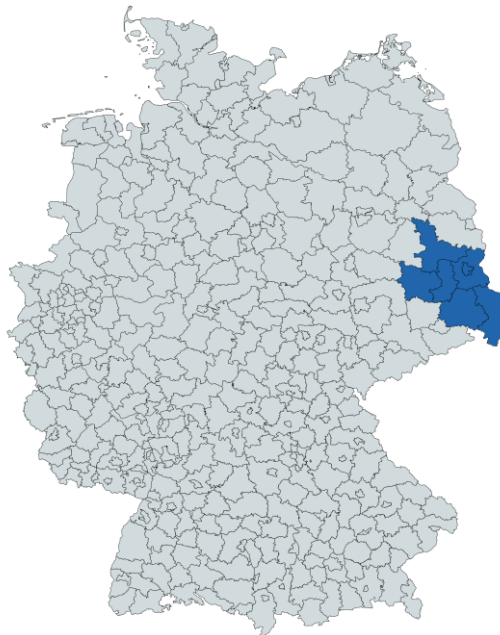
2.1. Lusatia, Germany

2.1.1 Definition of the region: basic characteristics

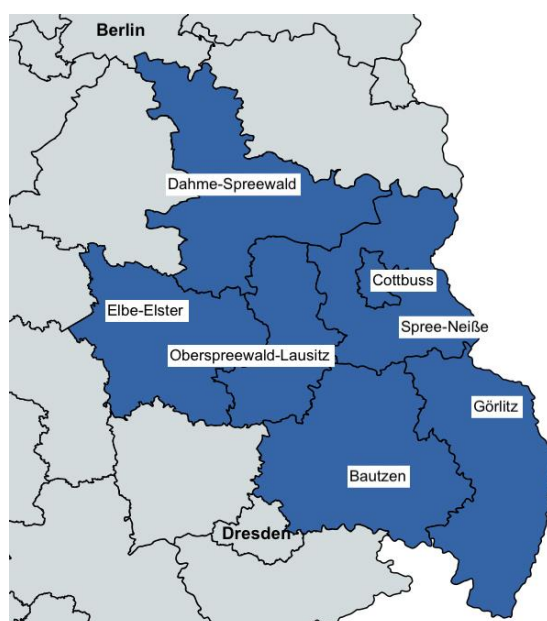
2.1.1.1. Location, area, population

The Lusatia region stretches across parts of the federal states of Brandenburg and Saxony in eastern Germany on the border with Poland, and – for a short section – with the Czech Republic. With an area of 11,727 km², Lusatia is four times the size of the federal state of Saarland. However, the population density of 99 inhabitants per km² is significantly lower than the national average of 230 (Zukunftswerkstatt Lausitz, 2019). Lusatia is a NUTS3 region constituting part of the NUTS1 Brandenburg and Saxony. In Brandenburg it embraces the districts of Dahme-Spreewald, Elbe-Elster, Oberspreewald-Lausitz and Spree-Neiße, as well as the independent city of Cottbus, and in Saxony – the districts of Bautzen and Görlitz.

Figure 3. The location of Lusatia in Germany.



Source: own elaboration based on Agora Energiewende (2018).

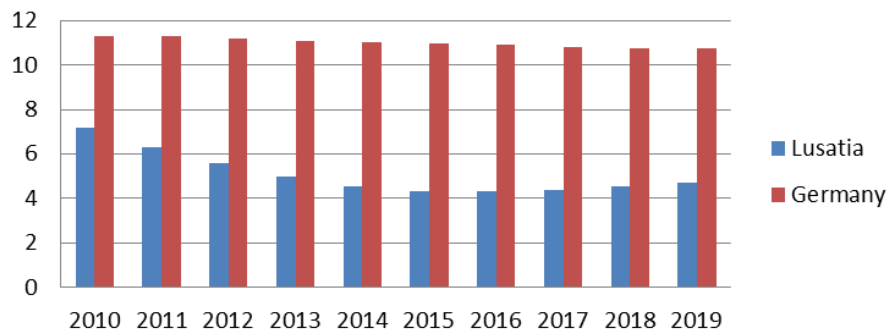
Figure 4. Map of Lusatia.

Source: own elaboration based on Agora Energiewende (2018).

The region has 235 municipalities with around 1.14 million inhabitants (BBSR, 2020). At this point, however, it is worth noting that the population was significantly higher in the 1990s. For example, in 1995 more than 1,430,000 people lived in Lusatia. It has therefore lost around 23% of its population in almost three decades. The population cohort aged between 18 and 65, which is particularly important for the supply of labour, has decreased by more than 220,000 people in the same period, which corresponds to a drop of 24%. With the exception of the district of Dahme-Spreewald (+4.5%), double-digit percentage declines were recorded in this age group. The district of Oberspreewald-Lausitz recorded the highest level (-36.0%), but other districts also had to cope with significant population shrinkage. The increase in the working-age population in Dahme-Spreewald can be explained by the population gains in regions close to Berlin. In eastern Germany (excluding Berlin), the potential labour force has declined by 18.1% since the mid-1990s, while in western Germany the level has remained unchanged (Seibert et al., 2018).

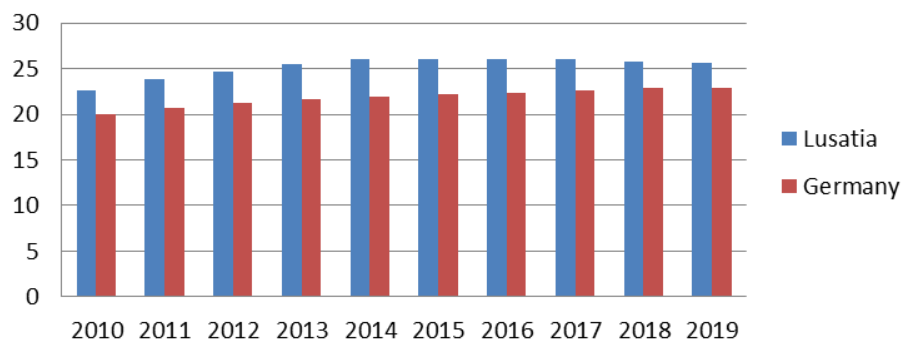
The demographic outlook for Lusatia shows that this negative trend will continue. Lusatia will have to prepare for high population losses unless unusually high migration gains compensate for the natural population decline. According to current forecasts, Lusatia will lose another 200,000 inhabitants by 2030 (a drop of 17%). Demographic change will have an even greater impact on changes in labour force potential. Here, the decline of almost 30% will be even more pronounced than for the overall population. In the period to 2030, the average age of the population in Lusatia will rise from around 48 to over 53, or in other words the region is experiencing an ageing population.

Figure 5. Changes in the age structure – inhabitants from 18 to under 25 years (%).



Source: own elaboration.

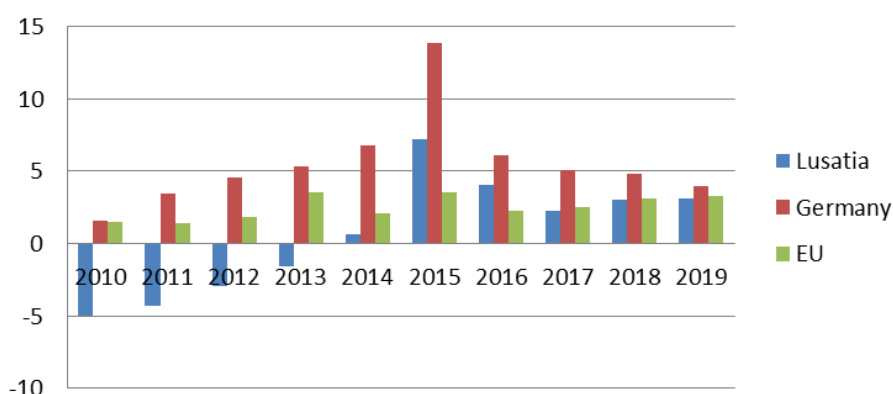
Figure 6. Changes in the age structure – inhabitants from 65 to under 70 years (%).



Source: own elaboration.

In the coming years, the number of people leaving the labour market will always be greater than the number of people entering it (Markwardt & Zundel, 2017). Since Germany’s reunification there has been a birth deficit in Lusatia, with the number of deaths exceeding the number of births. The negative migration balance is also a cause of the population decline: “The strong outflow of people of working age has hit Lusatia particularly hard in recent decades. The demographic change characteristic of large parts of eastern Germany is already [...] noticeable here” (Kluge et al., 2014a).

According to the population statistics of the federal and state statistical offices, the majority of Lusatian districts are suffering migration losses. Only the district of Dahme-Spreewald recorded more in-migration than out-migration in each year over the entire observation period from 1995 to 2015. In Cottbus, net migration has been positive since 2009, accounting for most of the in-migration and out-migration in the population stock. With the exception of the districts of Dahme-Spreewald and Spree-Neiße, all districts in the region have generally low population dynamics.

Figure 7. Changes in migration flow (per 1000 persons).

Source: own elaboration.

In Lusatia, lignite continues to be mined in the four active opencast mines of Jänschwalde and Welzow-Süd (in Brandenburg) as well as Nochten and Reichwalde (in Saxony). The operator of the four opencast mines is Lausitzer Energie Bergbau AG. The lignite mined there is used to supply the Jänschwalde, Schwarze Pumpe and Boxberg power plants of Lausitzer Energie Kraftwerke AG, among others. According to the Coal-fired Power Generation Termination Act (KVBG), lignite-fired power generation in the Lusatian mining area will end in 2038 (DEBRIV, n.d.).

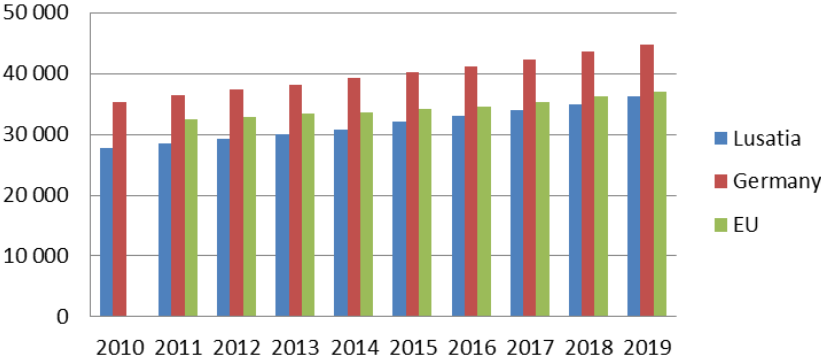
2.1.1.2. Economic structure of the region

With about 130,8 million tons of annual lignite production, Germany is still and by far the leading producer worldwide (Statista, 2023b). In 2021, 46.8 million tonnes of lignite were produced in the Lusatian mining area (LEAG, n.d.). Lusatia today is therefore the second largest lignite mining region in Germany after the Rhineland. With the lignite-fired power plants in Jänschwalde in Brandenburg and Boxberg in Saxony, Lusatia has two of the largest power plants in Germany. Together with the power plant in Schwarze Pumpe, they generate an average of 56 terawatts of net electricity per year (Kluge et al., 2014b).

The economic development of Lusatia in recent years can be described as thoroughly positive. Especially in comparison with the state averages in Brandenburg and Saxony, a number of economic indicators paint a positive picture for Lusatia. GDP per capita, for example, as a measure of the level of prosperity in Lusatia, is now above the Brandenburg and Saxony state averages.⁴ Compared to the national average, this indicator of economic performance has also increased significantly since 2010.

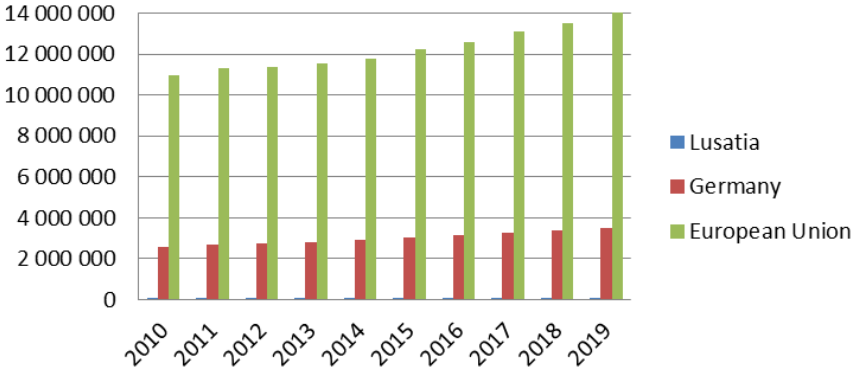
⁴ According to calculations by the Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI, 2018).

Figure 8. Change in the income level (EUR, total compensation per employee).



Source: own elaboration.

Figure 9. Regional GDP in relation to national and European (EU 27) GDP (EURm).



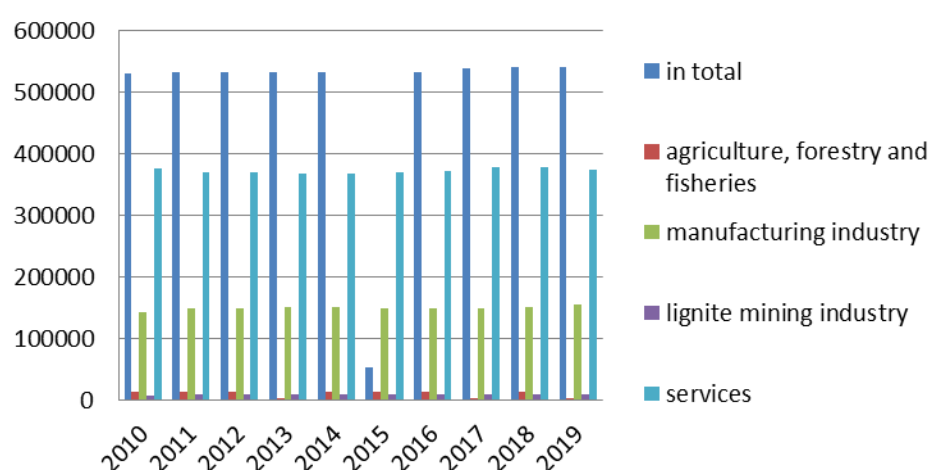
Source: own elaboration.

A similar picture emerges when looking at labour productivity. The data shows that labour productivity in the Lusatian coalfield has increased far more than the state and national averages in recent years. It is also noticeable that labour productivity in Lusatia is slightly above the eastern German average. The districts of Spree-Neiße and Dahme-Spreewald in particular have a significantly higher gross value added per person employed, which can be attributed primarily to the importance of the mining and quarrying and energy supply sectors (in Spree-Neiße), and the transport and logistics sector as well as financial, insurance and business services (in Dahme-Spreewald). The gross value added per person employed in the manufacturing sector in the Lusatia region is also above the eastern German average. The district of Spree-Neiße in particular contributes to this with more than twice the labour productivity of eastern Germany. The same applies to the districts of Görlitz, the city of Cottbus, and Oberspreewald-Lausitz. The major importance of the mining and quarrying, energy supply and manufacturing sectors in these districts is decisive.

The economy of Lusatia is strongly industrialised, its degree of industrialisation above the average for eastern Germany. Measured in terms of gross value added, this also applies when comparing with the national average. In terms of economic power, the mining and energy supply sectors make a particular contribution to the gross value added of industry in the Lusatia region compared to the eastern German average. For this reason, capital intensity is high in the industry in question (Bogai et al., 2017). Even though the mining and energy sectors still play a dominant role, the sector concentration or sector

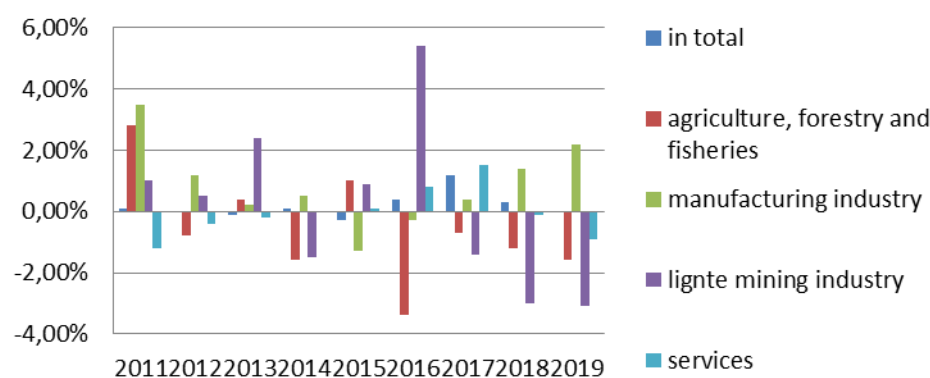
specialisation in Lusatia is below the average for the eastern German Länder. The industrial structure of Lusatia is more heterogeneous than the eastern German average (Kluge et al., 2014a). In particular, the chemicals and plastics, logistics, metal, mechanical engineering and tourism sectors are the other sectors that shape the profile of Lusatia. The heterogeneity of Lusatia's industrial structure can certainly be seen as an opportunity. On the one hand, there is a certain robustness of the Lusatian economy in the face of sectoral shocks and undesirable developments. Lusatia, presumably due to its small-scale business sector, not primarily oriented for export, was comparatively unaffected by the distortions resulting from the financial and debt crises. On the other hand, measures to increase regional innovative capacity can draw on a comparatively broad base.

Figure 10. Employees in Lusatia.



Source: own elaboration.

Figure 11. Employment changes in different sectors and coal related jobs between year x and x-1.



Source: own elaboration.

In terms of sectoral structure, measured by gross value added (hereafter GVA), the sector of public and other services, education and health is the largest economic sector with a share of 26% of the total GVA of the Lausitz region. This is followed by financial, insurance and business services as well as real estate and housing (23.5%), and trade, transport and storage, hotels and restaurants, and information and communication (17.3%). Manufacturing follows in fourth place, with 14.8%. Mining and quarrying, energy and water supply, and waste management are in fifth place, and construction is in sixth place with 6.9% (BMWK, 2020).

A study by the Ifo Institute (Kluge et al., 2014a) shows that almost all districts in Lusatia have a “typical” specialisation pattern (compared to Germany as a whole). Mining and energy are structurally dominant above all in Spree-Neiße and Oberspreewald-Lausitz, and are also significant in Cottbus. In the other districts of Lusatia, this sector no longer plays a significant role:

- In Cottbus, apart from the mining and energy sector, only the public sector is a significant employer.
- The Elbe-Elster district is more agricultural (including the food industry). Otherwise, the metal industry is still strongly represented there.
- The district of Oberspreewald-Lausitz has a disproportionate share of employment in the chemical and glass industries.
- The district of Spree-Neiße has significant shares of employment outside the mining and energy sectors only in the paper and glass industries.
- The district of Bautzen is relatively diversified, with a focus on the textile and plastics industries.
- The district of Görlitz also has a quite diversified economic structure; particular focal points are the textile industry, the glass industry and mechanical engineering.

Similar to many other eastern German regions, Lusatia also has a very small-scale corporate sector. Measured by the number of employees and turnover, eastern German companies are smaller on average than their western German counterparts. In particular, eastern Germany lacks large companies and especially corporate and group headquarters. Due to the small-scale nature of the business sector in Lusatia, the focus is particularly on scientific research institutions and the question of their expansion, as well as the possible establishment of further research institutions.

A very small sector with business entities does not equate to poor economic performance relative to other regions. The graph below shows the economic dynamics with regard to the development of gross domestic product for Lusatia and several comparison regions. It is not difficult to see that the development dynamics in Lusatia during the period under review hardly differed from those in the comparison regions or in Germany as a whole. Due to its lower dependence on foreign countries, the economic region of Lusatia coped somewhat better with the financial crisis of 2008. With regard to the development dynamics of the GDP, Lusatia is therefore not structurally weak (Berger et al., 2019).

Real economic growth in Lusatia (and in its districts) expressed in GDP remained significantly behind the corresponding values for the states of Brandenburg and Saxony from 1991 to around 2005. Only thereafter can a (temporary) catching-up be observed. Within Lusatia, the two Saxon sub-regions achieved similarly high growth as the Free State of Saxony as a whole; the Brandenburg sub-regions, on the other hand, lagged behind the dynamics in the state of Brandenburg as a whole. Within Lusatia, the increase in GDP per employee in the district of Spree-Neiße is particularly striking. The sole decisive factor here is the statistically reported productivity development in the mining and energy sector (Berger et al., 2019).

2.1.1.3. Regional labour market

The average wage in Lusatia is €2,420 per month. The average salary in Germany is significantly higher, at €2,994 per month. Compared to Germany as a whole, the unemployment rate in Lusatia in turn is only slightly higher. The federal unemployment rate for March 2023 was 5.7%, the same as in February, while the rate in the region was 7.6% (Bundesagentur für Arbeit, 2023). In January 2023, 7.1% of employable persons in Lusatia were still unemployed, in December 2022 6.6% (Sächsische DE, 2023).

However, this growth is seasonal. Thanks to comparatively dynamic economic development in Lusatia, unemployment is falling sharply; a comparison of the years 2004 and 2014 reveals that the number of unemployed has more than halved from around 71,500 to slightly less than 33,000. Measured against the usual benchmarks of the labour market, the picture differs significantly across the region.

Especially the districts of Elbe-Elster (-13.8%), Spree-Neiße (-14.6%) and the city of Cottbus (-14.5%) show worse development in the number of employed persons. Only the district of Dahme-Spreewald (+15.6%) recorded gains in employment. While the number of employed persons increased in Germany overall (+9.1%), and in Saxony (+1.7%) and Brandenburg (+1.1%), the districts of Lusatia now have a significantly lower number of employed persons. The scale of the decline in employment ranges from 8.9% in the district of Görlitz to 14.6% in the district of Spree-Neiße. Compared to the figures for Brandenburg and Saxony, the relative loss in the number of employed persons in Lusatia is even greater, since Lusatia, as part of two federal states, negatively influences their average figures.

Unemployment in Lusatia has decreased significantly since the peaks in 2004 and 2005 (Berger et al., 2019). However, just as with the volume of people employed, there were also noticeable regional differences in unemployment rates between the Lusatian counties. For example, in some districts the rate is almost twice as high as in Dahme-Spreewald (4.7%). With the exception of Dahme-Spreewald and Bautzen, the unemployment rate in the districts in Lusatia were above the rates in the comparison regions. The very positive development of unemployment in the two districts just mentioned can be attributed to their proximity to the economic areas of Berlin and Dresden respectively. The districts of Görlitz (9.2%), Oberspreewald Lausitz (9.2%) and Elbe-Elster (8.1%), as well as the city of Cottbus (8.8%), still have unemployment rates that are well above Saxony's average.

The fact that unemployment has fallen in Lusatia as well as in the states of Brandenburg and Saxony is due on the one hand to demographic relief (more people retiring than young cohorts leaving the education system and entering employment) and on the other hand to the current good state of the economy. The increased number of retirements and the continuing economic growth, accompanied by a slightly rising employment rate, ensure high demand for labour in almost all sectors.

Despite the positive overall development, long-term unemployment (unemployed people who have been out of work for a year or more) remains a problem. Within Lusatia there are clear regional differences in the number of long-term unemployed, which can justify different regional pressures for action. In the districts of Elbe-Elster (47.0%), Bautzen (46.3%) and Görlitz (45.5%) in particular, the proportion of long-term unemployed as a percentage of all unemployed is still very high, although the total number has fallen sharply.

Since long-term unemployment remains an issue in Lusatia, it is worth showing at this point what the role of the trade unions is. The strongest trade unions and at the same time the most prominent in Lusatia are the IGBCE and ver.di. However, also active in the region are IG Metall, Industriegewerkschaft Bauen-Agrar-Umwelt, NGG and EVG (DGB, n.d.). In order to exert political influence, Lusatian trade unions rely above all on their mobilisation potential. In the 1990s they repeatedly and successfully called for mass demonstrations against social grievances and unpopular state and federal policy decisions. In collective bargaining disputes and sometimes also in the case of decisions by the Treuhandanstalt,⁵ they

⁵ A German institution set up after the German economic and monetary union in 1990 to rationalise and privatise East German state-owned firms (Knight, 2021).

often called for strikes in order to put pressure on companies and politicians through the economic consequences of work stoppages. In addition, they organised several large-scale demonstrations on issues such as the climate levy or the pending sale of Vattenfall's lignite division in 2014.

Apart from the trade unions, the presence of other civil society groups was remarkably rare in the structural policy discourse. Occasionally, citizens' initiatives formed against the demolition of villages, where as a rule the need to preserve regional culture was used to argue for the preservation of the homeland (Lausitzer Rundschau, 1990b). From time to time, groups such as the Tenants' Association or the Unemployed Association of the GDR also demanded a better position for their members using the frame of social security (Lausitzer Rundschau, 1990a). Environmental groups in particular only very rarely expressed their views on structural policy issues, and usually followed lines of argument related to environmental policy lines (Lausitzer Rundschau, 1990c). Arguments that emphasised, for example, the employment policy aspects of environmental protection were mainly put forward by Bündnis 90/Die Grünen. It should be noted here that there was initially a strong overlap in personnel between local environmental groups such as the Green League and Bündnis 90/Die Grünen (Schuster, 2017).

In subsequent years, i.e. from 2000 onwards, the advancing polarisation regarding the issue of coal in Lusatia led to an intensification of civil society activity. Mobilisation mostly occurred when citizens were personally affected. The future of lignite became the central point of controversy in Lusatia's structural policy. The debate intensified and the Lusatian population became more divided between coal opponents on the one hand, and coal supporters on the other. During this phase, a number of citizens' initiatives and associations were founded, each of which could be clearly attributed to one side. They tried to influence politics primarily through means such as demonstrations and petitions. The association "Pro Lausitzer Braunkohle" and the "Traditionsverein Lausitzer Braunkohle Senftenberg", for example, demanded the long-term preservation of the Lusatian lignite industry (Lausitzer Rundschau, 2014). The line of argumentation was very similar to that of state policy, the coal industry and trade unions, but in addition to jobs and the regional importance of the coal industry it put stronger emphasis on the approach of preserving regional culture. For example, the association "Pro Lausitzer Braunkohle" argued that Lusatia had been a mining region for over 100 years, and postulated that "a homeland worth living in needs value creation from lignite" (Müller, 2017; Pro Lausitzer Braunkohle e.V., 2011; Ragnitz et al., 2022).

However, in place of the jobs associated with lignite, after a certain period of time new jobs had to be created naturally, as it were, in other sectors. A representative of the Ministry of Economics, Labour and Energy of the State of Brandenburg tackled this problem of new jobs created by the shift away from lignite coal during an interview conducted for this study. He stated that, to this end, the German government had set aside funds of billions of euros. Among other things, one and a half billion euros would flow into Lusatia for German railway construction. It is already happening that young people, with their up-to-date training, are being transferred there. A good solution has been found for older employees, involving a good regulation in the law with an adjustment allowance – for those who are at least 58 years old. A Ministry representative also underlined that in the Brandenburg part of Lusatia the process of structural change was supported by dedicated units dealing with the recruitment of skilled

workers and organising workshops⁶. They also have the task of discovering new employment options or even developing additional qualifications.

As regards new employee qualifications, a representative of the Ministry highlighted cooperation between companies (among others the German railways and BASF) as an important point in the context of educating employees for new qualifications. They mentioned the operation of a joint training centre as an important activity in this area.

A representative of the trade union IG Bergbau, Chemie, Energie (District Lusatia) underlined that it is necessary to verify which qualifications are still needed when creating new jobs. At the same time they emphasised the availability of new government money for the new qualifications, due to which employees have very good salaries. This makes it more difficult for them to be motivated to move to other jobs or companies in the future, where remuneration is not so good.

A representative of the Dresden Chamber of Industry and Commerce pointed out significant differences between Sachsen and Brandenburg in dealing with the energy transition. They added that as a resident of a city in Saxony, they looked a little enviously at the Brandenburg side of Lusatia because of the neighbouring region's better handling of the changes in the labour market. They pointed out that the transition from lignite to renewable energies in the labour market would not be a simple undertaking. In this regard, they claimed that after 2039 there would be a need for a large connecting industry in which the job structure would be determined for Lusatia. Moreover, they concluded that building up parallel structures now, while coal extraction and power generation continue, and hoping that personnel will already switch from one area to the other, is not realistic.

Looking ahead, the same representative of the Dresden Chamber of Industry and Commerce referred to the good prospects in Lusatia for photovoltaic storage technologies. They stated that this is a good business model for the region in terms of energy production for the future. However, it is expensive to implement and requires an adequate workforce, the size of which cannot yet be accurately estimated. Speaking about the lignite exit scenario, they mentioned that company surveys had been conducted in this area. They are aware that the region will experience a domino effect with the end of coal mining and power generation. This will also mean the end of many small and medium-sized companies in the eastern Saxon region, because they are closely interconnected. They believe that the firms will be able to compensate for this by tapping into new customer groups in the time remaining.

Representatives of the Cottbus Chamber of Industry and Commerce also gave their opinion on the effects of the energy transition on the labour market. They pointed out that the first upheaval took place in the region in 1990, when many jobs were lost. In this respect, they underlined that the goals the regional authorities have set themselves are identifying how to create a new economic structure and discouraging young people from leaving. In their opinion the issue of skilled workers plays a completely different role now than it did in 1990. This is due to the fact that it is becoming more difficult to retain these specialists. In addition, they indicated that Lusatia's population is aging faster, which means that many people will retire in the near future. The challenge therefore is to provide enough skilled workers for the newly created economic structures and for the economy in general.

⁶ The International Talent Service of the WFBB, the IQ Netzwerk Brandenburg, the Betriebliche Begleitagentur, the Fachstelle Migration und Gute Arbeit and the central foreigners authority in the district of Dahme-Spree-Wald offer a wide range of counselling services for employers as well as skilled workers and employees with regard to taking up and accompanying employment in Brandenburg (Land Brandenburg (2022c).

A representative of the Cottbus Chamber of Industry and Commerce referred to the issue of the exodus of the younger generation. She recalled that in the 1990s there was a large and strong exodus particularly of former East Germans to western Germany. In her opinion, the new authorities have to make sure that this does not happen again, which means that policies should work towards keeping the people who are already in the region, and generating an influx of others from elsewhere. From the point of view of labour market policy, this would be one of the major challenges, because in the nineties the proportion of younger people was much higher than it is now. Today Lusatia is confronted with the issue of an ageing workforce – meaning there are fewer young people having to help pay for more older people.

The issue of institutions creating new jobs in Lusatia was also raised during the interviews conducted for this study. It was underlined that public institutions, which usually also provide well-paid jobs, are being attracted to the region. The regional hospital currently being converted into a research hospital was given as an example. A good illustration of the process in this area is also the Brandenburg University of Technology, which is being developed into a research centre. Besides this, the railways are entering cooperative ventures in order to transfer jobs. The chambers of commerce and the relevant authorities, such as the employment agency, are also doing great work together.

One representative of the Cottbus Chamber of Industry and Commerce referred to the effects of the transition on the labour market. They pointed out that the goal of the transformation process has been to create replacement jobs that generate comparable added value. At the same time, they added that municipalities also receive tax revenue from the added value, which justifies the creation of new jobs.

The academic viewpoint on labour market developments in Lusatia is also extremely important. Referring to the issue of job losses following the phasing out of lignite, Professor Stefan Zundel from the Brandenburg University of Technology made it clear that employees in mining are very proud workers who identify very strongly with their job. In other words, the closure of mining and power generation is perceived as a personal loss of meaning. He perceives this as all the more true because lignite mining in Lusatia was very important for securing energy for the entire GDR before 1990. Moreover, an important element helping to explain the negative attitude of Lusatia residents towards structural change is the exodus of people from rural areas to western Germany. A third explanation has to do with the fact that socialism before 1990 also left its mark on the minds of those who stayed. In summary, it should be stated that in line with his understanding of the matter, the mood in Lusatia is much worse than the actual situation; after all, unemployment is low and income is rising. In his view, it should be made clear that everything is due to people's mentality. For the record, however, this state of affairs must be attributed to the fact that in categories of services of general interest (for example, in the transport sector), people are not experiencing any real improvement in relation to the communist era.

In response to the question raised about population groups disadvantaged in the energy turnaround, Professor Zundel reported that employees in the mining and coal-fired power generation sector are the most important. They are privileged, because they earn 2 to 3 times the average in Lusatia. In this context, he added, this loss of jobs will be more than compensated for by industrial settlements, especially by Tesla.

As for the matter of teaching new qualifications, Professor Zundel gave an example of an industrial settlement. He indicated that he had in mind a maintenance plant to be opened for the German Federal Railways, requiring about 1200 employees. This joint company was founded in Cottbus by two firms: LEAG and German Federal Railways. Its objective is to provide appropriate qualification training for

people who want to make a transition to the Federal Railways, or to train young people who will then be junior staff in Lusatia, especially in electrotechnical professions. He emphasised that this qualification society also trains beyond the needs of the Federal Railways and LEAG, such that small and medium-sized enterprises in the region also have something to gain from it.

In terms of employment policy, Professor Zundel underlined that LEAG and its employees put a lot of pressure on the energy transition, which understandably they did not want to carry out or wanted to delay as much as possible. They did so in solidarity with the Mining and Chemical Workers' Union, IG Bergbau und Chemie. However, he pointed out that there has been some change here, because LEAG is increasingly endeavouring to use its land for renewable energies and the construction of storage facilities. It also provides workers with employment prospects after the energy transition. In this respect, this is – in his opinion – a forward-looking solidarity.

In response to a question about employment policy, he added that the problem is that Lusatia has too few residents: if Lusatia is to fill the jobs that have been announced, there must be massive immigration to the region. He noted that the region has 3000 new jobs on offer in industry alone, while in science there are another 3000, and at the top is Tesla, with 20,000 jobs. In this context, the interviewed representative of Dresden Chamber of Industry and Commerce stressed that attracting the relevant specialist staff is necessary but will not be easy, especially in the area of research. Convincing the relevant experts to relocate, perhaps even with their families, and work in Lusatia is an issue in itself.

In contrast, according to Dr Gunther Markwardt,⁷ preserving jobs in the public perception is a very important point, which is why politicians have taken it up. He believes they want to maintain high-quality industrial jobs in Brandenburg and create new, parallel jobs. On the other hand, they have also raised the social fear that the old coal miners working in the power plants will lose their jobs. This, he feels, stokes fears of mass unemployment. However, he also pointed out that the regional authorities could simply opt for a procedure to retrain people in this situation.

With reference to labour market support schemes for workers, Dr Gunther Markwardt stressed that in general a lot of support is still being provided by the Chamber of Industry and Commerce, in the form of further training and qualification measures. Employment agencies are also very active in this area, helping older miners and people who worked in the power plants.

When it comes to the results of the energy turnaround, a representative of the Cottbus Chamber of Industry and Commerce indicated that some of the economic goals are still being readjusted. They added that the goal is, of course, to continue to maintain an economically strong region – based on concrete individual business areas as well as people. Regarding the consideration of social protection in the transition to green energy, they underlined that the responsible employment agency has had in mind from the very beginning that when workers leave large companies, they should be placed in good work again as quickly as possible. In their view, social protection must correspond to the overall economic development. That is why it was so important to create adequate new jobs. As regards the training opportunities, they pointed out that the chamber of industry and commerce has long been making the available apprenticeship places known to young people. Due to their knowledge, there are also special initiatives, such as a training agreement between LEAG and the German railways, where the latter have

⁷ Academic staff member at Brandenburg University of Technology (BTU, n.d.).

just said they will need more staff. They underlined that the topic of how to design training in order for as many young people as possible to enter the labour market is definitely being considered.

Summing up, due to the dramatic labour market situation after the reunification of Germany, the social flanking of transformation-related structural change through active labour market policy was a core component of structural policy. Of particular importance were measures to reduce the labour supply through early retirement, and measures to provide qualifications for the workforce and to create jobs.

In addition, there was the instrument of short-time work to bridge the short-term drop in demand for labour. In this respect, labour market policy can be classified primarily as “aftercare structural policy”.

These measures made a considerable contribution to easing the burden on the labour market. However, when evaluating their success there must be some ambivalence. The socio-political function was undoubtedly important, because it was hard for many unemployed persons to integrate into the regular labour market, as a result of distortions in the transformation process. The measures contributed significantly to income security and prevented the income distribution in the states of former East Germany, and thus also in Lusatia, from widening even further. However, if the primary goal of active labour market policy measures is the transition to regular employment, they have largely failed. A number of evaluation studies on job creation schemes (ABMs)⁸ conclude that participation barely improved employment chances if at all.

There are substantive reasons for these rather negative findings. On the one hand, the economic recovery lagged behind the initial optimistic forecasts, so the demand for labour was weaker than expected; in other words, there were too few jobs available overall. On the other hand, expectations of successful reintegration into the regular labour market were often based on the stabilisation of work skills and qualifications. Due to the design of the employment measures, it is often questionable as to what extent these targets could have been accomplished. For example, the specific funding conditions ensured inefficient and rather labour-intensive ABM production methods, and incentives were set for using outdated technology. In addition, at least in some areas, the ABMs may have displaced regular employment.

In this respect, it was quite logical that these “classic” active labour market policy measures were increasingly restricted from the turn of the millennium onward, and were almost completely replaced by other, more incentive-oriented instruments with the labour market policy reforms of the then second legislative period of the Social Democratic-led government (“Agenda 2010”).

Active labour market policy made a positive contribution in the sense of a post-care structural policy to cushion social hardship. However, it did not serve as a forward-looking instrument for managing structural change (Ragnitz et al., 2022).

2.1.2 A brief history of mining in the region

Lignite mining in Lusatia has a centuries-old tradition. The first lignite was found near the present-day town of Lauchhammer as early as 1789 (Heitmann, Fiedler & Müller, 2010). Over the following decades, this type of coal gradually replaced wood and peat. From the 19th century onwards it contributed to the industrialisation of what had previously been a predominantly agricultural region. This domestic

⁸ An ABM – short for *Arbeitsbeschaffungsmaßnahme* (job creation scheme) – was for temporary employment of the unemployed. In this way, they were able to do something productive instead of, for example, only receiving Hartz 4 benefits (Arbeitslosenselbsthilfe.org (2023).

energy source became increasingly important for the supply of heat and electricity (Öko-Institut, 2017). Over the years, classic underground mining was replaced by more efficient and cheaper opencast mining, and the excavators and conveyor bridges were developed that have shaped the image of lignite mining in Lusatia today (Heitmann, Fiedler & Müller, 2010).

In the GDR, lignite covered about two thirds of primary energy demand between 1975 and 1990 (Öko-Institut, 2017). As the only domestic energy source, it enabled the GDR to build up heavy industry in Lusatia (Wolle, 2020). As the country's largest lignite region, Lusatia experienced strong population growth during this period, with many people finding work in the lignite and heavy industries (Wolle, 2020). The GDR thereby became the largest lignite producer in the world. In 1988, at the peak of lignite production in Lusatia, over 200 million tonnes of the energy source were produced. At that time, almost 80,000 people were working in the opencast mines in Lusatia (Stognief et al., 2020).

By 2021, around 7350 people were working in the lignite mining sector, with Lusatia's lignite production at 46.8 million tonnes. The lignite mines currently operating in Lusatia are managed by Germany's second largest electricity producer, LEAG. Lausitz Energie Bergbau AG owns four Lausitz opencast mines: Jänschwalde and Welzow-Süd in Brandenburg, and Nochten and Reichwalde in Saxony. It is currently converting the Cottbus-Nord opencast mine, which completed mining operations on schedule in 2015, into a lake, the future Cottbus Baltic. The opencast mines in Lusatia supply the nearby lignite-fired power plants of Jänschwalde, Schwarze Pumpe and Boxberg, as well as the Schwarze Pumpe refining plant. The lignite is transported there by the company's own central railway operations (LEAG, n.d.).

2.1.3 Policies and reasons behind the transition

Because of the finite nature of fossil energy sources, Germany began a few decades ago to fundamentally change its energy supply to renewable energies. This change was given an additional boost by the reactor catastrophe in Fukushima in 2011, which also led to the decision to phase out nuclear power in Germany. At the World Climate Conference in Glasgow at the beginning of November 2021, the approximately 200 participating countries agreed for the first time to at least reduce the use of coal. The German government decided to have renewables accounting for 40 to 45% of energy sources for electricity generation by 2025. By 2030, this should increase to 80%. The share of renewable energies in gross electricity consumption in Germany was around 42% at the end of 2021. Ten years earlier, the renewable energies' share was significantly less than half this, at 16.9%.

The Renewable Energy Sources Act (EEG) is a central instrument of the energy transition. Since 2000, it has regulated the promotion of renewable energies through guaranteed feed-in tariffs and feed-in priority. To achieve the 65% target, the German government has passed an amendment to the Renewable Energy Sources Act. This also enshrines the goal of making the generation and consumption of electricity greenhouse gas neutral by 2050. In the meantime, this target has even been brought forward to 2045. The law specifies the speed at which individual technologies, such as wind and photovoltaics, are to be expanded over the next few years so that the 65% target can be achieved by 2030. Every year, a stringent monitoring process checks whether renewable energies are actually being expanded at the desired rate. The new Renewable Energy Sources Act 2021 also creates the instruments enabling adjustment at short notice at any time if obstacles become apparent (Bundesregierung, n.d.).

Moving from the federal level to the regional level, it should be emphasised that the structural change in Lusatia triggered by the change of system from a planned to a market economy was mainly

characterised by strong deindustrialisation. This was due to the fact that existing (industrial) companies were no longer competitive under market conditions, and also affected the Lusatian lignite industry to a great extent. The number of employees shrank from 80,000 at the end of the German Democratic Republic (GDR) to about 7,000 now. Numerous open-cast mines and power plants were closed, and for a large proportion of the employees there were no re-employment opportunities in Lusatia, as other sectors also shrank sharply in the course of the transformation process. At the same time, the development of new companies and economic sectors only got off to a slow start (Ragnitz et al., 2022).

As for the reasons behind the transition to green energy, a different view was taken by participants in the interviews conducted for the purpose of this study. According to representatives of the federal government, trade unions, and regional chambers of industry and commerce, as well as scholars, the most relevant factors in this regard were the 2015 Paris Agreement and the European Green Deal, which was signed in December 2019 by Ursula von der Leyen; the transition from a centrally planned economy to a market economy did not have much to do with energy transition or the alleged difficulty of lignite mining companies finding their way in the new economic system. Both the EU and environmental as well as political factors were decisive in the transition from coal power to climate-neutral energy. This point of view might be supported by the fact that initially coal deposits in Lusatia were to be closed by 2045 in connection with the reduction of greenhouse gas emissions. However, the Bundestag and Bundesrat decided on a ‘statutory’ acceleration by 2038 due to political pressure, and in effect it was also mainly economically driven, because the basis for the business model of coal production and coal-based power generation was simply determined by the geological conditions (according to the person interviewed, the lignite deposits were running out). In the opinion of the IHK representative, it is actually more of a regional factor that lignite mining is also associated with the resettlement of people. This is conditioned by the fact that extraction of lignite destroys large agricultural areas for the duration of the mining, and today requires the resettlement of entire villages with a total of several thousand people, many of whom belonged to the traditional core settlement area of the Sorbs (Budde, 2017). The other representative of the Chamber pointed out in turn that the EU has set 2050 as the target for climate neutrality, and Germany then tightened it up again – taking 2045 as the year of transitioning away from coal. The setting up of the transition was facilitated to a large extent by the formation of the so-called Coal Commission, comprising scientists and representatives of the federal government, the business community and trade unions.

An important aspect of government activity was that the transitional programme set up €14 billion for Lusatia amid fears that the AfD⁹ would get a large share of the vote in both Saxony and Brandenburg. This funding was a consequence of the fact that the German parliament had adopted a law governing support payments for mining regions (BfJ, 2020). The coal states will receive a total of €14 billion until 2038 for direct investments in the regions, and the federal government will provide another €26 billion to implement “further measures” to strengthen local economies (Wettengel, 2020). The energy transition programme in Germany is regularly reviewed, and the Lusatia region has been identified as lagging behind the climate targets, which has significantly increased the pressure on the coal phase-out.¹⁰

The pressure to implement the energy transition has been building up in Germany for over 20 years and this process basically began with the so-called Renewable Energy Sources Act. This Act, which entered

⁹ Alternative for Germany (German: Alternative für Deutschland, AfD) is a right-wing populist political party in Germany.

¹⁰ More on the subject in these papers: REBOOST (2020); Agora Energiewende (2018).

into force in 2000, is a key driving force for the expansion of renewable energy in Germany. It built a platform for the expansion of renewables, enabling them to become one of the mainstays of Germany's power supply (BMWK, n.d.-b).

Social factors have played rather a minor role in the transition, however the unions have carried out many demonstrations on the issue of coal phase-out. They were organised to draw attention to the social repercussions of the transformation. Despite the existence of an employment mono-structure in Lusatia, the trade union protests were less about the appropriate replacement of jobs and more related to the fact that the environment had to be protected.

The loss of cultural landscapes and the demolition of villages as a result of structural change also has its consequences, and has partly divided civil society along with entire village structures. However, there is also the other side of the coin; there are many people who are very happy that the loss of their old home has resulted in super-modern, comfortable housing in a new settlement structure.¹¹

The social side of the transformation was also reflected during interviews with the staff of the institution representing the interests of the economic spheres. In response to a question about mechanisms crucial for the smooth implementation of the energy plan in Lusatia, the representative of the Cottbus Chamber of Industry and Commerce stated that it would probably not be possible to answer this question reliably until 2030 at the earliest. In this context, she pointed out that a strong networking of the actors engaged in structural change in the region is very helpful in order to make progress on individual issues. Another interviewee from the Cottbus Chamber of Industry and Commerce also addressed this problem, and mentioned the very good mix of mechanisms at hand. They include innovation for future energy, economic incentives and scientific settlements, and strengthening the university as a nucleus. In the context of the importance of the mechanisms determining the success of the energy transition, the relevance of providing financial resources for the region together with the political will was also emphasised by all interviewees.

As regards mechanisms that were crucial for the smooth implementation of the plan, Professor Zundel stated that at the federal level it was certainly the Coal Commission. At the state level in Brandenburg, it is the Lusatia economic region with its Werkstatt trade union's workshop process. With reference to one of the more important objectives, i.e. social protection, he pointed out that for employees of the Lusatia region, this objective is simply summarised in "not to become unemployed". In this regard, he stressed that nine companies that are settling in Lusatia will be covered by collective agreements. According to him, the exception here may be Tesla, as its owner is known to dislike unions.

2.1.4 Lignite mining in the region in times of transition

Until the end of the GDR, the central function of Lusatia was the extraction and conversion of lignite into electricity for half of eastern Germany. With at least 80,000 direct employees, coal set the economic, social and even cultural framework for several generations. When, as a result of the collapse of the GDR and its economy, over 90% of coal workers were laid off and numerous power plants and opencast mines were shut down, there was a breakdown in routine and security. Within four years, the production quota in the Lusatian mining area halved by about 50%. Whilst 1991 saw the production of 116.8 million

¹¹Since the beginning of the 20th century, more than 370 villages with a total population of about 120,000 have been relocated in Germany due to open-pit lignite mining. The planning of the relocations largely reflects the social, economic, and political changes in post-war Germany, as well as developments in town planning and architectural concepts. (Ess, 2019).

tonnes of lignite, in 1994 the figure was only 75 million tonnes. In the long term, production quotas of between 40 and 60 million tonnes were expected (Friedrich Ebert Stiftung, 2001). Indeed, in 2022, 48.5 million tonnes of lignite were produced in the Lusatian mining area (Jänschwalde 11,1, Welzow-Süd 10,4 Mio., Nochten 14,5 Mio., Reichwalde 12,5 Mio.). The fact that the remaining power plants and opencast mines are fuelling the conflict over ecological compatibility and the consequences for people and the countryside has become an additional problem. After all, among the ten most emission-intensive industrial plants in Europe are all three lignite-fired power plants in Lusatia (BPB, 2021).

The reduction in lignite mining has of course translated negatively into industry employment figures. While around 52,000 were employed in Lusatia lignite mining in 1990, there were around 19,000 in 1995, only about 10,000 in 2002, and then in 2020 it was only 7,800 (Statista, 2023a). And in 2021 in turn, approximately 7,400 people (including employees in the general lignite-fired power plants) were employed in lignite mining in Lusatia.

The closure of the mines has also translated into a kind of exodus of young Lusatia residents. Thousands of people, often young and well-educated, have moved away since the 1990s: thereby the average age rose from 37.9 years in 1990 to 46.3 years in 2020 (Gürtler, Luh & Staemmler, 2020; Pollmer, 2020; E3G, 2015). At this point, it is worth making it clear that the last decades have been marked not only by a large population outflow, but also a lack of immigration. The few young people who have remained in Lusatia are particularly ambivalent about the coal phase-out: their everyday lives are often closely linked to the coal industry, yet they see no future in it.

According to the researchers, regional structural change is characterised by enormous forces of inertia. They consider it particularly problematic that the key words of sustainability, civil society and participation are not specified in the draft legislation that the federal government has presented for the coal phase-out (as of September 2019). Thus the change is being delayed, and important concerns are losing importance and credibility. Many people are left with only the hope of another large-scale industry, for example the Tesla factory planned in the north of the region (Herberg, Gürtler & Löw Beer, 2020).

2.1.5 Transformation of the region in public policies

The German government sees the structural change in the coal regions, among others in Lusatia, as an integral part of a comprehensive transformation process towards a largely greenhouse gas-neutral economy and society in Germany by the middle of the 21st century. Only in this way can the national and international climate goals be achieved. The German government has already outlined the national implementation framework with the Energy Concept 2010, the German Sustainability Strategy 2017 and the Climate Protection Plan 2050. In particular, implementation of the Climate Protection Plan 2050 will further accelerate structural change in many regions and economic sectors, including in the area of energy production, by ending the generation of electricity from lignite and hard coal.

Against this backdrop, in summer 2018 the Federal Government set up the commission “Growth, Structural Change and Employment”, which in its final report of January 2019 proposed a concrete plan for the gradual reduction and end to coal-fired power generation by 2038 at the latest. In addition, the Commission adopted proposals for economic, social and structural accompanying and support measures. The federal states and regions concerned were intensely involved in the preparation of the proposals, thus creating a broad consensus on how to overcome the structural challenges in the coal regions.

The Federal Government has taken up the Commission's structural policy proposals with the adoption of the “Cornerstones for the Implementation of the Structural Policy Recommendations of the Commission ‘Growth, Structural Change and Employment’ for a ‘Structural Strengthening Act for Coal Regions’” of 22 May 2019, and has created a content-related and financial framework for structural assistance for the affected regions until 2038. On this basis, the Federal Government has drafted the “Structural Strengthening Act for Coal Regions” in the form of a comprehensive funding and expenditure act (BMWK, 2019b).

Structural change in the coal regions, among others in Lusatia, is viewed by Germany’s government as part of the transformation process envisaged in the United Nations' Agenda 2030 and the global Sustainable Development Goals (SDGs), whose national implementation framework it adopted with the German Sustainability Strategy in 2017. The Federal Government's Climate Protection Plan 2050 from 2016 describes the step-by-step path towards a largely greenhouse gas-neutral economy and society in Germany by the middle of the century. Germany’s government is thereby pursuing the target triangle of security of supply, environmental compatibility and economic efficiency. The assumption is that consistent implementation of the Climate Action Plan 2050 will create new jobs and new value chains in many regions and economic sectors (BMWK, 2019a).

The above measures of the German government, which are anchored in international strategies, have found their concretisation in laws at the federal level. The transformation of Lusatia at a federal level is provided by the Coal Phase-out Act (KAG) and the Structural Strengthening Act (StStG). On 3 July 2020 the Bundestag approved the coal phase-out, which had been much discussed for years. The Act regulates the path and timeframe for Germany to phase out coal-fired power generation. Following the recommendation of the Commission for Growth, Structural Change and Employment – known as the Coal Commission – the year 2038 was set as the target. If the situation allows, this phase-out can be brought forward three years. On the way to a coal-free electricity mix, the legislature has set checkpoints: every three years, the phase-out is to be critically reviewed for its effects, for example on the security of supply. The Structural Strengthening Act is attached to the phase-out law. This regulates how the affected regions are to be supported in the structural change.

As regards the Structural Strengthening Act, €17 billion have been earmarked for Lusatia, distributed over the years until the coal phase-out. On the one hand, the regions were able to apply for structural support for specific projects, and on the other hand they are working on models and ideas for a future economic structure. Among other things, the infrastructure is to be expanded, the Carl-Thiem-Klinikum Cottbus is to become a university hospital with medical training, the BTU Cottbus-Senftenberg is to play a stronger role in the transformation process, and other projects are in the works. There is agreement that the future of the region should lie in a mix of industry, research and tourism. A major investor who would absorb jobs previously in the coal industry is not in sight at the moment.

At the European level, the principles of the European Union’s Green Deal policy will be incorporated into the implementation of structural development. Throughout the process, there will be continuous coordination between the lignite states and the federal government. Coherence between federal and state measures is to be ensured within the framework of the federal-state agreement in accordance with § 10 StStG. In addition, the state level is responsible for coordination with state policy objectives and regional and municipal development plans. To this end, the necessary implementation and accompanying structures are being established or further developed (Lausitz-Beauftragter des Ministerpräsidenten, 2020).

On the other hand, at the regional level, the development strategy Lusatia 2050 has been elaborated. It forms a coordinated framework for shaping a sustainable and liveable Lusatia, and is an important basis for structural development – since only with such regional guidelines for the future will aid from the federal government and the European Union be granted. The cross-state strategy also serves as a guide for district and urban development concepts and for inter-municipal projects (ZWL, 2020).

Energy transition has affected institutions at regional level. Mayors and district councils in particular are facing challenges, because they are worried that large shares of their business tax revenues will disappear. For example, according to the district administrator of Görlitz, Bernd Lange, the loss of the lignite industry will lead to lower tax revenues for the district (Saechsische DE, 2021). However, according to research these fears are unfounded, because a study by the Institute for Ecological Economy Research (IÖW) and the Brandenburg University of Technology Cottbus-Senftenberg (BTU) in the project “Decarbonisation in Lusatia (DecarbLau)” shows that “the energy transition can bring numerous jobs and tax revenues to Lusatia” (IÖW, 2022).

There is no consensus as to who has been playing a leading role in the transformation process. The important role here of the Coal Commission, which was set up by the federal government, was stressed by some interviewees. Others in turn, including trade union representatives, underlined that the decisive role was played by the federal government and the corresponding coal-producing countries, so China, India, Indonesia, the United States, Australia and Russia. The activity of many mayors in Lusatia, displaying scepticism and not wanting an early coal phase-out, is also not without significance (Kluge, 2021).

Taking into account the interaction between social partners in the development of energy and employment policy, a representative of the trade union IG Bergbau, Chemie, Energie (District Lusatia) made it clear during the interview conducted for this study that the interaction of trade unions with employers worked very well. In their opinion, the self-organisation of workers in trade unions provides a space to have a say in legislation or the coal commission. Furthermore, the IG BCE trade union also consulted the authorities in all the districts of Lusatia in this respect. Among other things, contact was made on this matter with Ms Herrntje, the mayor of Spremberg and spokesperson for the mayors’ group. The aim was to strengthen the region and discourage people from moving away.

The Coal Commission, involving all relevant actors, i.e. trade unions, science, economic enterprises and politics, had an important role. Its full name was the Commission “Growth, Structural Change and Employment”, and it was an advisory body to the Federal Government. In particular, it was tasked with drawing up a plan for the gradual reduction and termination of coal-fired power generation in Germany, and to submit concrete proposals for growth and employment in the affected regions. The Commission was appointed by the Federal Cabinet on 6 June 2018. It met under the chairmanship of Matthias Platzeck, Ronald Pofalla, Professor Barbara Praetorius and Stanislaw Tillich, and had 27 other members (BMWK, n.d.-a). The results of the Coal Commission’s work were underpinned regionally – for example in the state of Brandenburg the energy strategy from the Ministry of Economics sets the exact timetable (when renewable energies should be expanded, and when the corresponding CO₂ emissions should be reduced).¹²

¹² In August 2022, the Energy Strategy 2040 was adopted by the state government of Brandenburg, replacing the Energy Strategy 2030 (Land Brandenburg, 2022b).

The final report of the Commission for “Growth, Structural Change and Employment” – the so-called coal compromise¹³ – and the Coal Phase-out Act passed on this basis in July 2020, provide for an earlier end to lignite-based power generation in the Lusatian region by 2038 at the latest. The aim is to cushion the negative impact on employees and prevent redundancies. However, the vote of the Coal Commission for a phase-out has met with a divided response among the workforce. While works councils emphasise the compromise nature of the proposals, other respondents see the agreement as a deterioration. The greater the proximity of the respondents to the shop floor level, the more negative their assessment. Some employees welcome the “coal compromise” in principle. They even consider it to be a particularly clever solution, because the region will now receive state subsidies that would not have been at all certain in the amount promised in the event of an imminent exit.

In addition to the above-mentioned political dimension of the energy transition in Lusatia, the role of the trade unions remains important. Germany’s most important trade union organisation, DGB (The German Trade Union Confederation – an umbrella organisation for eight German trade unions) has taken a position on the issue of energy transformation. It did so during the 18th Lusatia Conference of the German Trade Union Confederation on 1 September 2022 in Cottbus, through the publication of the so-called policy document (Grundsatzpapier). The paper states that the coal phase-out law and the structural strengthening law are good foundations for structural change in the interests of the workers, even in the face of the changing times. “Structural change can only succeed with reliable framework conditions for the economy and opportunities for workers to participate,” said the DGB at the said event. What is needed now is sustainable and rapid relief for the population in the face of galloping inflation and energy costs. As a consequence of Russia’s war against Ukraine, consumer prices in Europe’s largest economy rose by 7.9% year on year, according to data from the Federal Statistical Office. Consumers in Germany had to pay 87% more for heating oil on average last year than in 2021, and natural gas became 64.8% more expensive. Electricity prices rose by 20.1%. Car drivers paid 26.8% more at the petrol station than the previous year’s average (RND, 2023). The position of the DGB trade unions is that, among other things, those profiting from the crisis should be required to pay, commuters should be supported, energy prices should be capped for basic consumption and stabilised for municipal companies and public utilities (DGB, 2022).

In this context of the significance of trade unions in Lusatia in structural change, the Revierwende project also plays a huge role. It supports the trade union activities of the DGB and its member unions in the course of structural change (Revierwende, n.d.). The Revierwende project is the central contribution of the trade union movement for ensuring worker participation and representation of their interests in the process of phasing out coal mining and coal-based energy production. It was created with the support of the Federal Ministry of Economics, and was launched in October 2021. The project’s main goals are:

- Strengthening employee participation in the structural development of the coalfields
- Providing an inclusive approach with outreach beyond trade unions and work councils and the core energy sector
- Enabling knowledge transfer of good practices across the coal regions and beyond

Six Revierwende offices are being opened across Germany as part of the project, in coal regions massively affected by structural change; they include two offices in the Lusatian coalfield. As the deputy

¹³ On 16 January 2020, as part of a federal-state agreement on the coal phase-out, the so-called coal compromise was worked out and the basis for a coal phase-out law was laid, which is to regulate the end of coal-fired power generation by 2038.

chair of DGB Saxony Anne Neuendorf stated, the trade unions are important actors in the structural change in regard to shaping the transformation. They ensure that the interests of workers are adequately taken into account in the socio-ecological transformation. The Revierwende offices in Görlitz and Cottbus for Lusatia are central points of contact in matters of structural change. They actively shape the changes on the ground and bring in the ideas and suggestions of workers in the coal regions. With regard to the acceleration of the coal phase-out planned by the traffic light coalition, Anne Neuendorf insisted that the expansion of renewable energies, gas-fired power plants, grids and storage facilities must be accelerated. Only then would the conditions be right for a possible earlier phase-out. In her opinion, an accelerated energy turnaround and an affordable, reliable electricity supply are just as necessary as securing and locating jobs that are co-determined and subject to collective bargaining agreements, as well as safeguarding employees in the coal and energy industries. She stated that after lengthy talks concerning new perspectives for the coalfields, the authorities now have to get down to implementing and doing. As she perceives matters, speed is required in the implementation of reforms in order to open up prospects for employees, and especially the region's young. For this, the trade unions are on the spot as contact persons, providers of ideas, mediators and drivers (DGB, 2021).

The transition is supported by local and regional programmes and schemes of cooperation between various important stakeholders. They include the following:

Regional Investment Concept for Lusatia

The aim of the Regionale Investitionskonzept (RIK) Lausitz is to “cushion structural change (...) in small-scale measures or larger joint projects” (BMWK, 2018). The RIK is thus a first approach to a coordinated development process for the entire Lausitz region, but not an integrated regional development strategy.

The author of this project is the Federal Ministry for Economic Affairs and Energy, while its legal basis is the Directive on the Promotion of Structural Adjustment Measures in Lignite Mining Regions under the Federal Model Project “Unternehmen Revier” of 1 November 2017. The guidelines for the promotion of measures for structural adjustment in lignite mining regions within the framework of the Federal Model Project “Unternehmen Revier” are valid until 31 October 2027. With the federal model project “Unternehmen Revier”, the Federal Ministry of Economics and Climate Protection supports innovative projects that can serve as models for the economic region of Lusatia, but also for other regions, in terms of structural change on a social and economic level. Project approval runs through a two-stage procedure. After the “RIK Lausitz” project outline form has been submitted, selected participants are invited to submit a formal application following an evaluation procedure. The funds are provided as cost-sharing grants, and amount to a maximum of €200,000 per applicant or individual project, and a maximum of €800,000 per collaborative project (Wirtschaftsregion Lausitz GmbH (2022)).

The analytical part of the RIK refers, among other things, to regional challenges in connection with demographic change (shrinkage and ageing of the working population), the incipient shortage of skilled workers, as well as changes in qualification and competence requirements in the course of the economic structural transformation and advancing digitalisation. Against this background, “qualification and securing skilled labour” is seen as an important target area of regional development. The RIK Lausitz identifies the following possible approaches to this:

- qualification of employees against the background of evolving activity profiles,

- cross-border promotion of training and further education to support SMEs and the bundling of existing skilled labour initiatives in the core competence fields,
- sustainable and specific support for structural change, e.g. development of new business areas with new fields of activity for employees,
- networking of regional actors on the issue of regional skilled labour security,
- initiation of transnational skilled labour campaigns,
- strengthening inter-company initiatives.

Lusatia Economic Initiative (WiL)

The Wirtschaftsinitiative Lausitz e.V. (WiL) sees itself as a regional action and networking platform in Lusatia. It was founded in 2009 by Lusatian companies and has offices in both Brandenburg (Cottbus) and Saxony (Weißwasser). The WiL brings together companies, institutions, chambers of commerce, and local authorities in the region to strengthen Lusatia as a business location.

The work of the WiL is based on three thematic focal points, which are implemented in concrete projects and events. The most important founding idea of the WiL is the qualification and securing of young people and skilled workers for the regional economy. According to those managing the initiative, strategic human resources planning as well as qualification and further training opportunities are essential for keeping skilled workers in the region or attracting them from elsewhere. The stronger networking of the regional economy with the Lusatian universities is another important focus of the WiL's work. The aim here is to respond to the actual needs of local small and medium-sized enterprises in the future. The third task area is the holistic marketing of Lusatia as a business location – across sectors and national borders (Landkreis Elbe-Elster, n.d.).

With this focus in mind, the WiL and its members have carried out or are supporting the following projects in particular:

Qualification counselling for small and medium-sized enterprises

The counselling approach was tested as part of a pilot project in five model regions throughout Germany from 2009 to 2012, and Lusatia was one of these regions. In 2009, companies in the region founded the initiative and joined forces with the Bautzen Employment Agency and the Cottbus Employment Agency. This is how – as one of five pilot projects nationwide – a regional qualification network came into being. In this network, the needs of individual companies are combined and, together with regional training providers, further training is made possible. The core of the services provided comprises qualification counselling by the employment agency (INQA, n.d.). After successful testing, the qualification counselling for SMEs was included nationwide in the regular range of services of the Federal Employment Agency in 2013.

West Lusatia Skilled Workers Alliance

The idea of a “Westlausitz Alliance of Skilled Workers” (Wagner, 2020) was launched in 2016 as part of a specialist conference on career guidance, and comprises well-known representatives from politics and business. This includes members of the municipalities and authorities as well as universities, companies and chambers of commerce, who work in a steering committee and a project team.

The Fachkräfteallianz Westlausitz aims to achieve the political implementation of pre-defined guidelines for vocational orientation. On the other hand, it is building on existing practical examples and making them available to schools and companies.

To this end, the RWK Westlausitz commissioned the WiL to carry out the project “Vocational orientation of secondary schools and grammar schools in the Westlausitz economic region” (Wirtschaftsregion Westlausitz, 2022). It was launched, as was the initiative as a whole, in 2016 – and continues to this day. In addition to recording and compiling vocational orientation activities, organisational variants for a sustainable, comparable vocational orientation among pupils from seventh grade up to grammar school were to be developed. In order to establish the focus on vocational and study orientation in the corresponding curricula, a basis for a legal text should be drawn up. In terms of structural change in Lusatia, this project plays a very important role. According to Roland Pohlenz, mayor of Lauchhammer and spokesman for the RWK Westlausitz, “a well-trained workforce is a location and economic factor that should not be underestimated. That’s why we, as a growth core, support the skilled workers’ alliance and the topic of vocational orientation in order to best prepare our young people for the start of a successful professional life at home here in Lusatia”. The project is funded by the cities of Finsterwalde, Großräschen, Lauchhammer, Schwarzhöhe and Senftenberg as well as by the federal government and the state of Brandenburg as part of the joint task “Improvement of the Regional Economic Structure (GRW) Infrastructure”.

TuWaS! - Technology and Natural Sciences in Schools

The educational project TuWaS! was founded in 2007 as an initiative of the Free University of Berlin and the Berlin-Brandenburg Academy of Sciences and Humanities. Its goal is to get primary school pupils interested in MINT subjects (Mathematics, IT, Natural sciences, Technology). TuWaS! enables pupils to experiment with modern teaching materials in close connection with targeted teacher training. This project is particularly important in the face of structural change, as it prepares pupils for the new professions that will replace those associated with lignite.

The project has so far been implemented in four federal states. In Brandenburg, TuWaS! was initiated in the 2016/17 school year in cooperation with the Brandenburg Ministry of Education, Youth and Sport (MBJS). TuWaS! Was set to begin in the first five schools in the Brandenburg part of Lusatia in the first half of the school year 2019/2020, with plans to expand the programme to other schools and to the Saxon part of Lusatia in the following school year.

2.1.6 Funding of transformation

In summer 2018, the Federal Government appointed the Commission “Growth, Structural Change and Employment”, which in its final report of January 2019 proposed a concrete plan for the gradual reduction and termination of coal-fired power generation by 2038 at the latest. In addition, the commission adopted proposals for economic, social and structural policy and accompanying support measures. This created a broad consensus for overcoming the structural policy challenges in the coal regions. These proposals were implemented in the Coal Regions Structural Strengthening Act (StStG).

As part of the StStG (the new parent law), the Coal Regions Investment Act (InvKG) came into force on 14 August 2020. With this law, the federal government supports regions affected by the coal phase-out in coping with the resulting increased structural change. This concerns both lignite regions and locations of hard coal-fired power plants.

The so-called first pillar comprises financial assistance from the federal government for particularly significant investments by the Länder and their municipalities and associations of municipalities in the lignite mining regions. Project selection and implementation is the responsibility of the Länder. A total

of up to €14 billion is available to the Länder until 2038. With the federal-state agreement that came into force on 27 August 2020, federal support for the affected coal regions has begun. The second pillar of support includes measures under the responsibility of the federal government. Here, the lignite regions are supported with up to €26 billion until 2038 (BMWK, 2021).

According to the above classification, the so-called Arm 1 funds are granted for projects that are presented in the workshop process¹⁴ of the Lusatian economic region. In addition, there are also the so-called Arm 2 funds, which are for projects that the federal states have proposed or are still proposing to the federal government, but which are disbursed under the supervision of the federal government (these funds are intended for a list of roads and railway connections that are to be built in Lusatia).

The Government of Germany alone is providing within the two cash flow streams €40 billion to shape structural change, out of which €17.2 billion is for Lusatia alone (StSG, §3). Funds from the Coal Regions Investment Act (InvKG) will be disbursed via two funding arms. Up to €3.2 billion have been allocated to the Saxon part of the Central German Mining Region. Via arm 1, the Länder can call up financial aid totalling €7.14 billion for projects (BB: €3.612 billion; SN: €2.408 billion for the Lusatian and €1.084 billion for the Central German mining area = €3.492 billion for the two Saxon mining areas).

The basis for the implementation of structural support in Brandenburg is the “Lusatia Programme 2038” (Lausitz-Beauftragter des Ministerpräsidenten, 2020), which sets out the funding priorities and implementation procedures. The Wirtschaftsregion Lausitz GmbH (WRL) – a company of the state of Brandenburg and the affected districts and the city of Cottbus – manages a transparent workshop process. Projects for structural change are submitted here by the Lusatian stakeholders, and go through a joint qualification process of five thematic workshops. Up to June 2022, 57 projects had been submitted in this way and approved by the Inter-ministerial Lusatia Working Group (IMAG Lusatia)¹⁵ as worthy of support (total investment: €1.25 billion). 14 projects have been approved, and applications for the other projects are being submitted in coordination with the Brandenburg Investment Bank (ILB).

In Saxony, a “programme of action”¹⁶ was drawn up as a basis for funding, providing concrete recommendations for action with the involvement of the municipalities and interest groups. A regional monitoring committee was also set up in the Lusatian and Central German coalfields to select and prioritise the measures to be carried out by the municipalities. A total of 90 municipal projects (59 in the Lusatian mining area and 31 in the Central German mining area) have been submitted to the federal government for confirmation. In addition, 26 state projects have been submitted to the federal government for review. With these municipal and Land projects, financial assistance from the federal government amounting to €1.397 billion has been provided for in the planning.

With Arm 2, the federal government is pushing ahead with its own projects for Lusatia. More than €6.7 billion have been earmarked for the Brandenburg part of Lusatia until 2038 – primarily for

¹⁴ The state of Brandenburg is organising the phase-out of lignite and the associated transformation process in the form of a comprehensive workshop process (Werkstatt-Prozess). Part of this process comprises five thematic workshops (Werkstätten), which began at the beginning of 2021. Researchers from the IOER have observed and analysed the establishment and initial work steps of these workshops as part of the “Transformation Lusatia” project (Heer, 2021).

¹⁵ IMAG Lusatia steers the structural development process at the state level. It confirms projects’ eligibility for funding, and once a positive decision has been given the project promoters can submit funding applications to the granting authority, the Investitionsbank des Landes Brandenburg.

¹⁶ Action programme for the implementation of the Structural Strengthening Act for Coal Regions of the Federal Government in the Saxon lignite mining areas (Staatsministerium für Regionalentwicklung, 2020).

measures in the fields of business, science and infrastructure. These include projects in Brandenburg such as the new ICE maintenance plant of Deutsche Bahn in Cottbus, the planned university medical centre in Cottbus, the development of the Lusatia Science Park, the Hybrid Electric Flying technology initiative, and important transport infrastructure measures. 55 measures have already been approved, committing some €4.17 billion for Brandenburg.

In the Free State of Saxony, the funds available in Arm 2 (€4.141 billion in the Saxon part of the Lusatian mining area and €2.071 billion in the Saxon part of the Central German mining area) have already been almost completely covered by measures that have been decided upon. Examples of this are the large-scale research centre planned in Lusatia, the new branch office of the Federal Office of Economics and Export Control (BAFA) in Weißwasser, and the Saxon share of the expansion of the Berlin–Görlitz railway line.

In addition to dry data on financing the energy transition in Lusatia, it is worth showing opinions on the functioning of these mechanisms. These mechanisms include the relationship between the states and the federal government, in which respect it is worth mentioning that one interviewee stated that, concerning structural change, “federal states then just negotiated with the federal government and the federal government probably had a bit of a bad conscience and said, yes, I’ll give money”. In effect, federal states have partly transferred this issue internally to the municipal actors, i.e. to the municipalities. Ultimately the German government, as the higher federal level, is actually limited in its role to that of donor, and hardly makes any initiatives of its own.

A representative from the Cottbus Chamber of Industry and Commerce in turn pointed out that it would become clear in the future to what extent government projects contribute to supporting the structural change in the region, although in their opinion the contribution will be significant (some of the funds that have been made available have also been used for example for the Bahnwerk project). Their perception of the case suggests that funding from the government does not go primarily to companies, but also to a large degree to public bodies.¹⁷

Another representative of the Cottbus Chamber of Industry and Commerce confirmed that many of the Lusatia projects that have now been initiated are being financed from federal funds. As they pointed out, the hope is that the federal government’s funding will have the effect of creating even more jobs.

Professor Zundel, in turn, underlined that in the Structural Reinforcement Act,¹⁸ which is the legal basis for the allocation of financial resources, the regions – among others Lusatia – were required to describe what their development goals should be. In this regard, he mentioned that the middle management of companies drew up a strategy called Lusatia Strategy 2050.¹⁹ In parallel, the State Chancellery in Brandenburg has set up Lusatia Programme 2038, the purpose of which is to establish funding priorities

¹⁷ For example, in 2022 the federal government and the state provided almost €3.7 million to network Lusatians as comprehensively as possible and to promote a diverse Lusatian civil society (Land Brandenburg, 2022a).

¹⁸ The Structural Development Act (Strukturstärkungsgesetz) for coal-mining regions provides a binding legal framework for structural-policy support for the affected regions. It guarantees financial assistance for investment and other measures up to 2038. The German Bundestag and the Bundesrat passed the “Structural Strengthening Act for Coal Regions” on 03 July 2020 (German Bundestag, 2020).

¹⁹ The “Lusatia 2050 Development Strategy” was unanimously adopted by the steering committee of the Lusatia Future Workshop (ZWL) on 29 September 2020. It forms a coordinated framework for shaping a sustainable and liveable Lusatia and is an important basis for structural development. The cross-state strategy also serves as a guide for district and urban development concepts and for inter-municipal projects (ZWL, 2020).

for federal money.²⁰ He also pointed to one institution that is playing a significant role during the energy transition, the Wirtschaftsregion Lausitz,²¹ which by a decision of 23 June 2020 has been commissioned as the state structural development company for the Brandenburg part of Lusatia for its organisation and management. The aim is to strengthen and develop the competitiveness of Lusatia. Work is being carried out in five workshops²² on the fields of action for structural development. Municipal project ideas are coordinated, initiated and qualified with the involvement of the municipal family and experts from science, administration and business as well as technically responsible associations and civil societies.

With so much money going into structural change in Lusatia, as described above, it seems absolutely right to look whether government subsidies have been effective. The federal government is spending €17 billion on the Saxon and Brandenburg side for structural change in the Lusatian mining area alone. But the effects have so far been rather meagre: the two large research institutions supposed to be established in Saxony – “Deutsche Zentrum für Astrophysik” and “European Research Institute for Space Resources” (MDR Wissen, 2022) – only exist on paper so far, and such is also the case with many other projects. The problems with structural change in Lusatia are contributing to the reluctance to accelerate it. Federal Economics Minister Robert Habeck (Greens) wants to talk about ending coal mining there before 2038. After initial reactions from Lusatian politicians, it is clear that he will not be welcomed with open arms for talks on a coal phase-out in 2030.

An enquiry from state parliament member Antonia Mertsching (Die Linke) to the Saxon state government revealed that only 14 structural change projects will actually be implemented by autumn 2023, in addition to four state projects. The district administrator of Görlitz, Stephan Meyer (CDU), specifies that, for Lusatia, around €600 million in funding had been applied for as of January 2023, around 100 million had already been approved, yet only €1.4 million had so far been paid out. In view of this interim balance, Antonia Mertsching speaks of a “structural stumble”. The deputy head of the Institute for Economic Research in Dresden, Joachim Ragnitz, is also critical of previous use of tax money for structural change: “Actually, the way the Structural Strengthening Act is set up already proved wrong because business investments are not promoted but instead many soft location factors²³ are, which, however, do not bring jobs” (Kahls, 2023)

²⁰ These financial priorities fall within the following framework of the German government. The federal government is providing the state of Brandenburg with a total of €3.612 billion in financial assistance until 2038 to promote municipal and regional projects for structural development in the four Lusatian districts of Elbe-Elster, Oberspreewald-Lausitz, Spree-Neiße and Dahme-Spreewald as well as the independent city of Cottbus. The first funding period runs until 31.12.2026. Brandenburg has around €1.42 billion in federal funding available within this first funding period. The financial assistance is part of the total of around €10.32 billion provided by the federal government for structural strengthening in Brandenburg's Lausitz region (Land Brandenburg, 2021).

²¹ By decision of 23 June 2020, Wirtschaftsregion Lausitz GmbH (WRL) has been commissioned as the state structural development company for the Brandenburg part of Lusatia for its organisation and management. The aim is to strengthen and develop the competitiveness of Lusatia. Work is being carried out in five workshops on the fields of action for structural development. Municipal project ideas are coordinated, initiated and qualified with the involvement of the municipal family and experts from science, administration and business as well as technically responsible associations and civil societies (Wirtschaftsregion Lausitz GmbH, 2020).

²² Trade unions, civil society and employers are involved in these meetings, but there are also representatives of the state government, i.e. the ministries.

²³ The so-called soft location factors include, for example, the existing bureaucracy, the image of the region and the available medical care (Immoscout24, n.d.).

2.1.7 Conclusions

Summarising the case of Germany, it is important to note that the initiators of the energy transition can be identified at EU, federal or regional level. However, the European Green Deal seems to have taken priority here in terms of its impact on political areas within Germany itself.

The structural change brought about by the systemic shift in Lusatia has mainly involved substantial deindustrialisation due to the fact that existing industrial enterprises were no longer competitive under market conditions. The impact of Lusatia's switch from lignite to renewable energy was painful for the local labour market. As one academic pointed out, employees in mining are very proud workers who identify very strongly with their job. Thus, even if they were given the opportunity to retrain, it did not fully meet their expectations. Although the withdrawal of lignite has had a negative impact on the labour market, the authorities at the federal level have undertaken measures to strengthen Lusatia's competitiveness. To this end, the Lusatian Economic Region (WRL) was established. The thematic workshops functioning under the umbrella of this organisation are responsible for the allocation of structural change funds for projects.

The government has allocated substantial financial resources for structural change. Germany's central authorities have provided €40 billion to shape structural change in the country as a whole, out of which €17.2 billion was for Lusatia alone. Thanks to this funding the region can expect the creation of more jobs. To date, however, the effects have been limited: around €600 million had been applied for as of January 2023, while around €100 million had already been approved and only €1.4 million already paid out. As one of the Members of the Saxon Parliament noted, we are dealing in this case with a "structural stumble".

Funding applications for the redevelopment of a former coalfield go through many stages, and at the end the approval process takes a long time. Before an application for support can be submitted to the federal government, the project has to convince one of the specially established regional monitoring committees, in which mayors and district councillors have a decisive role. The approval of such an application usually takes between eight and twelve months.

Although the disbursement of funds is not entirely efficient, interview participants generally agreed that support for those in the labour market affected by mine closures is performing well. Employment agencies are very active in the area of re-training and qualification measures to help the miners.

The Coal Commission and Werkstatt trade union were important in the successful implementation of structural change. Thanks to the activities of the Coal Commission, the so-called "Structural Strengthening Act for Coal Regions" was passed. According to statements by the Minister Presidents of Brandenburg and Saxony, Dietmar Woidke and Michael Kretschmer, thanks to this legal act the following initiatives have emerged: expansion of cross-border infrastructures, and the creation of new high-quality industrial jobs. They jointly declared that the coal phase-out law with the target date of 2038 is and remains a good compromise, and is exemplary for transparency and participation in the procedures (Land Brandenburg, 2022d).

Despite this optimistic statement, there is no consensus on this issue in the region. In 2023 regional representatives of Lusatia renewed their rejection of an earlier coal phase-out. On the occasion of a visit by Robert Habeck, Economy and Climate Protection Minister, to the eastern German coal region, the issue of closing lignite mines resurfaced. The Minister held consultations on the transformation of eastern Germany's largest energy company, LEAG, which operates power plants and opencast lignite

mines in Brandenburg and Saxony. This was met with a firm response from Harald Altekrüger, district administrator of Spree-Neiße, who stressed that “a hasty end to lignite-fired power generation means massive cuts and that calls into question the planned implementation of the entire structural transformation” (Zeit Online, 2023). The transition to renewable energy in Lusatia was also discussed during this visit. LEAG’s head, Thorsten Kramer, stressed the need to ensure the expansion of renewable energy and a backup power plant park. So far this has taken the form of LEAG’s “Gigawatt Factory” project, which looks to develop an energy centre consisting of photovoltaic and wind power plants with capacity of 7 gigawatts on former mining sites, as well as the building of a hydrogen-ready power plant. A subsidy on the part of the government, of around €28.5 million, is also anticipated for the construction of a hydrogen storage power plant at the Schwarze Pumpe power plant (Kyllmann, 2023).

According to a survey among LEAG’s largest suppliers, the positive sides of the transformation process in Lusatia for the companies operating there encompass their response to structural change through innovation, and the opening up of new markets. However, the comparatively weak regional innovation system must be stimulated in order to generate a sufficient number of new projects and business ideas for the region. If a critical mass (new industrial cores) is to be achieved, then additional funding within the framework of a conversion programme geared towards innovation would also have to be ensured (Markwardt & Zundel, 2017).

2.2. Wielkopolska region, Poland

2.2.1. Definition of the region: basic characteristics

2.2.1.1. Location, area, population

The Wielkopolska voivodeship is a NUTS2 region constituting a part of the NUTS1 North-western macroregion (Makroregion Północno-Zachodni). Wielkopolska region is divided into 31 poviats and 226 municipalities. With an area of 29,800 m² it is inhabited by around 3.5 m people (around 8% of Poland's population) and is the third biggest region in Poland in terms of population, and second in terms of territory (Polska w Liczbach, 2021). The voivodeship has five urban agglomerations, each having its own characteristics, and they are Kalisz-Ostrów Wielkopolski (aglomeracja kalisko-ostrowska), Poznań (aglomeracja poznańska), Kalisz Industrial Area (Kaliski Okręg Przemysłowy), Konin Lignite Basin (Konińskie Zagłębie Węgla Brunatnego) and Poznan Industrial Area (Poznański Okręg Przemysłowy).

The region under analysis, the Konin Lignite Basin, is situated in the eastern part of the Wielkopolska voivodeship, in the Konin, Turek and Koło counties (poviats), with its main towns being Konin and Turek (Zarząd Województwa Wielkopolskiego, 2021) (Figure 13). In 1994 the power plant complex was transformed into a state-owned company called ZE PAK (Zespół Elektrowni Pątnów Adamów Konin, in English the Pątnów-Adamów-Konin Power Plant Complex). Public documents and strategies refer to the region as Eastern Wielkopolska (Wielkopolska Wchodnia), and therefore for the purpose of this study we will use this term interchangeably with Konin Lignite Basin.

Figure 12. The location of Wielkopolska voivodeship in Poland.

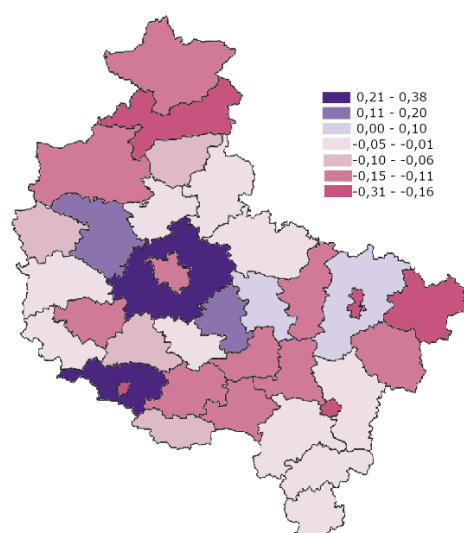


Source: own elaboration.

Figure 13. The location of Konin Lignite Basin in the Wielkopolska voivodeship.

Source: own elaboration based on Regional Statistical Office in Poznan (n.d.).

Similarly to the overall situation in Poland, the population in the Wielkopolska voivodeship is ageing and the region is slowly depopulating. The most recent forecasts show that by 2050 the region's population will have decreased by around 10% (National Statistical Office, 2014). Some poviats within the voivodeship will depopulate quicker than others due to a higher rate of emigration and due to the region being less attractive. In 2019, the Konin Lignite Basin experienced one of the highest net negative migrations in the whole voivodeship. On the other hand, the Poznan agglomeration proved to be the most attractive to migrants (Figure 14).

Figure 14. The migration attractiveness rate in 2019.

Source: Regional Statistical Office in Poznan.

On top of that, the birth rate in Eastern Wielkopolska is much lower than in the voivodeship as a whole (Konin Lignite Basin -0.6% in 2019; Wielkopolska 0.9%), which puts the subregion at risk of relatively greater depopulation than the rest of the region.

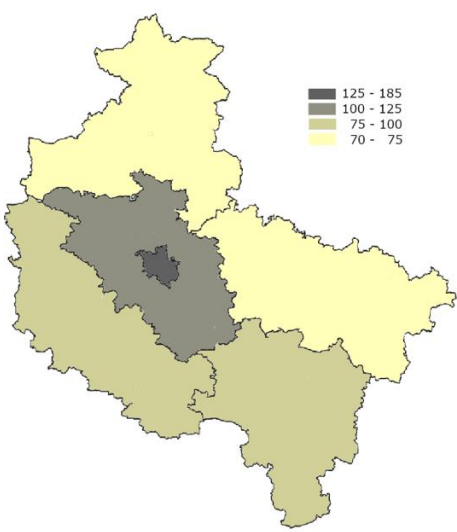
2.2.1.2. Economic structure of the region

Wielkopolska is a diversified region, with its central parts providing significant added value to Poland’s GDP through innovative and technological businesses, and the eastern parts of the voivodeship lagging behind and requiring in-depth transformation and investment.

The region is characterised by a high degree of industrialisation, high technological level, and openness towards foreign markets. There are six Special Economic Zones in the region (Walbrzych, Łódź, Kamienna Góra, Kostrzyn-Słubice, Pomeranian, and Słupsk), and five Industry and Technology Parks (Nickel Technology Park, Poznan Science and Technology Park, Poznan Technology-Industry Park, Novel Tower, Invest Part Srem/Zbudzewo) as well as two Incubators: Kalisz Technological Incubator and Turek Entrepreneurship Incubator (PAIH, 2020). Konin Lignite Basin constitutes a part of the Łódź Special Economic Zone, established in 1994 (SSE Łódź, 2022), while the majority of the Industry and Technology Parks are concentrated in the Poznan agglomeration, close to highways or scientific institutes. Turek Entrepreneurship Incubator is partly situated in the Konin Lignite Basin. It was created only in 2004, as an element of the agreement between the town of Turek, Turek powiat, ZE PAK S.A., KWB Adamów SA and Turek Chamber of Commerce (Turek Izba Gospodarcza), its goal being to increase investment in the region and in new economic activities (SSE Łódź, 2022).

Although balanced in its economic development, the region is territorially diversified in terms of economic structure. The Poznan urban area constitutes the main source of economic development, and is home to the majority of production, services, business, science and culture entities. GDP per capita, when compared to the voivodeship’s average, is highest in the city of Poznan, followed by the Poznan agglomeration, whereas the lowest index values were observed in the eastern subregion of the voivodeship, where the lignite mines are located. In 2018, GPD per capita in these regions was at PLN 35-40,000, compared to the Polish median of PLN 60,000 (Figure 15).

Figure 15. GDP per capita in relation to the voivodeship’s average, 2018.

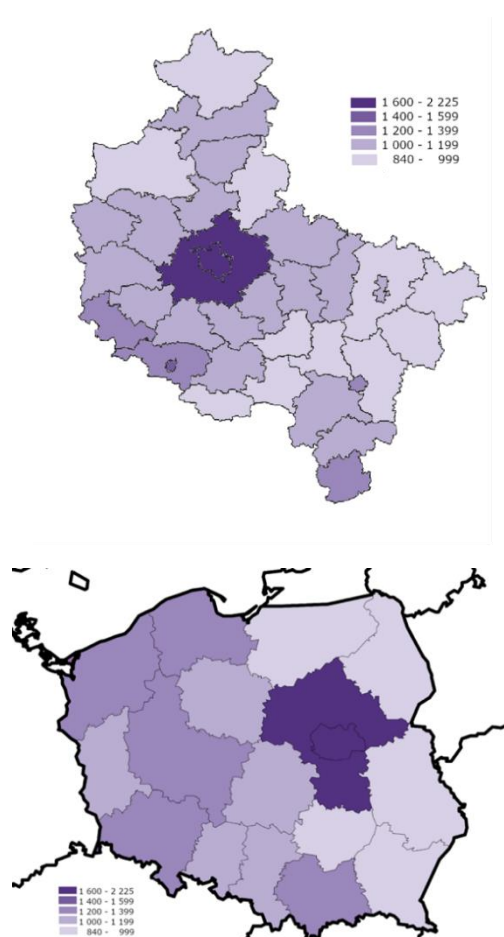


Source: Regional Statistical Office in Poznan.

For almost two decades now, economic polarisation in the Wielkopolska voivodeship has been growing. Its richer southern and south-eastern parts specialise in food, textile and clothing, and electrical machinery, and the south-western areas – in the development of agri-food processing based on the high productivity and efficiency of domestic agriculture. The poorer eastern parts of the voivodeship are mainly involved in the production of lignite-based fuel and the energy sector. Northern Wielkopolska is well-known for its landscapes and natural assets, which favour growth in tourism (Zarząd Województwa Wielkopolskiego, 2021).

The Wielkopolska voivodeship accounted for almost 10% of all companies in Poland in 2020, employing 8.3% of the country's entire working population. The region accounted for 9.2% of national GDP in 2018 (Zarząd Województwa Wielkopolskiego, 2021). In 2020 the entrepreneurship index, estimated according to the number of entities per 10,000 of the working-age population, was highest in the Poznan agglomeration, and lowest again in the eastern parts of the voivodeship, this including the Konin Lignite Basin (Figure 16) (Zarząd Województwa Wielkopolskiego, 2021).

Figure 16. Business entities per 10,000 population in 2020.



Source: Regional Statistical Office in Poznan.

2.2.1.3. Regional labour market

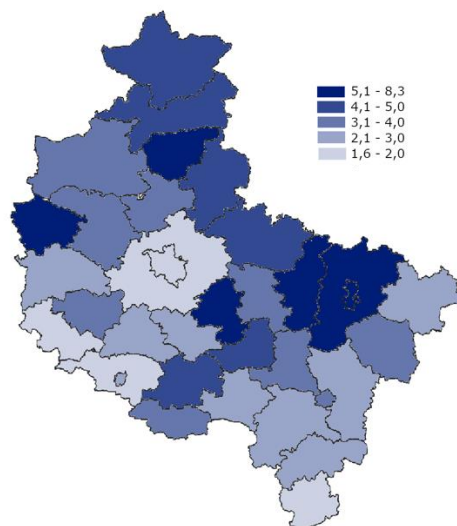
The regional labour market in Wielkopolska is one of the best performing markets in Poland. Since the transition it has always been a region with one of the highest activity rates (just behind the Mazowieckie region), one of the lowest unemployment rates (always below the national average) and one of the

highest productivities (Statistical Office in Poznan, 2016). Similarly to global trends, regional differences are well observed within the region. Cities, urban agglomerations and districts located around the towns perform much better in terms of labour market activity rate and unemployment rate than do remote regions or those featuring a high share of the agricultural sector.

Despite its proximity to the prospering Poznan agglomeration, the performance of Eastern Wielkopolska's labour market has always been below that of the voivodeship as a whole.

In 2021 the labour market activity rate in Wielkopolska (USP, 2021) was slightly higher than the corresponding rate for Poland, amounting to 60% compared to the national average of 58% in 2021 (National Statistical Office, 2022). As with the Polish average it has also been steadily increasing over the last decade. At the same time, we are observing a constant decrease in the region's unemployment rate, again in line with the overall situation in the country. The unemployment rate in Wielkopolska voivodeship stood at 3.1% in 2021, which is 2.3 pp below the national average (Figure 17). Eastern Wielkopolska has the highest level of unemployment, ranging from 5 to 8% compared to 1.6 to 2% in the Poznan agglomeration, as well as the lowest proportion of employed persons compared to the rest of the voivodeship.

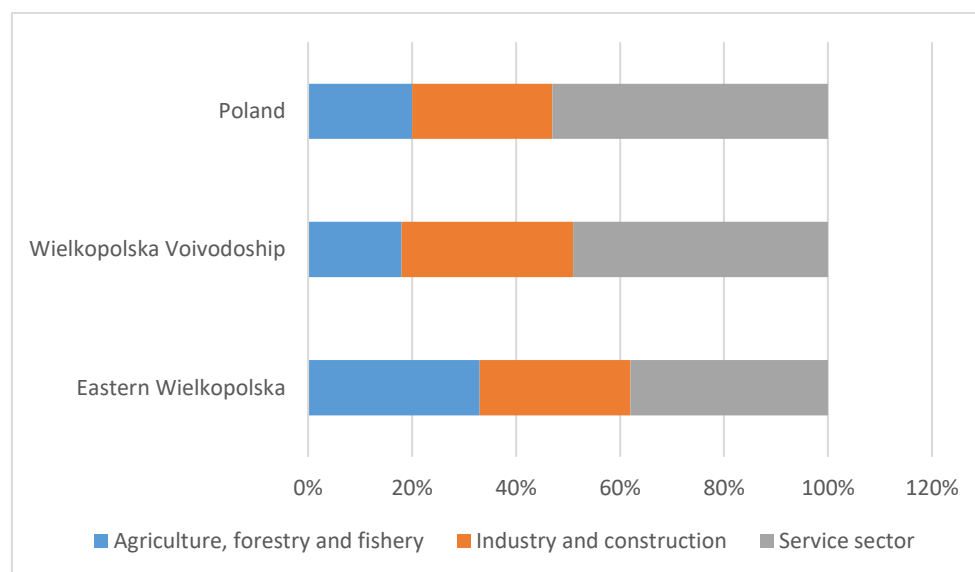
Figure 17. Unemployment rate in 2021 (in %).



Source: Regional Statistical Office in Poznan.

The eastern parts of Wielkopolska differ significantly from other parts of the region in terms of economic structure. The employment structure of Eastern Wielkopolska is characterised by a high share of workers in the agricultural sector (every third resident works in agriculture, which is twice as many people as in the rest of the voivodeship). The share of employees in services is lower than both the Wielkopolska and national average.

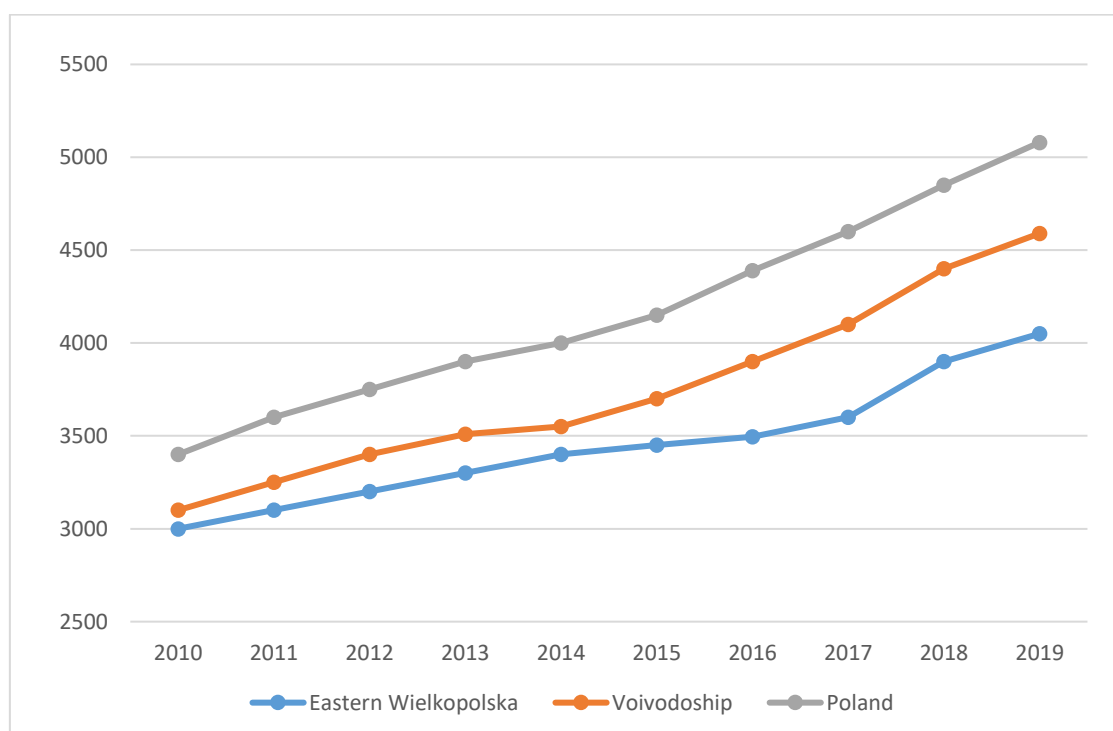
Figure 18. The employment structure in Eastern Wielkopolska, Wielkopolska voivodship and Poland in 2018.



Source: Regional Statistical Office in Poznan.

Over the last two decades the average salary in Eastern Wielkopolska has been persistently lower than the voivodship average as well as the national average. What is more worrying is the fact that the regional differences are diverging in this respect. While in 2010 the average wage difference between Eastern Wielkopolska and the Wielkopolska region was 3%, this had risen to 15% by the end of 2019.

Figure 19. Average salary in Eastern Wielkopolska, the Wielkopolska voivodship and Poland in 2010–2019.

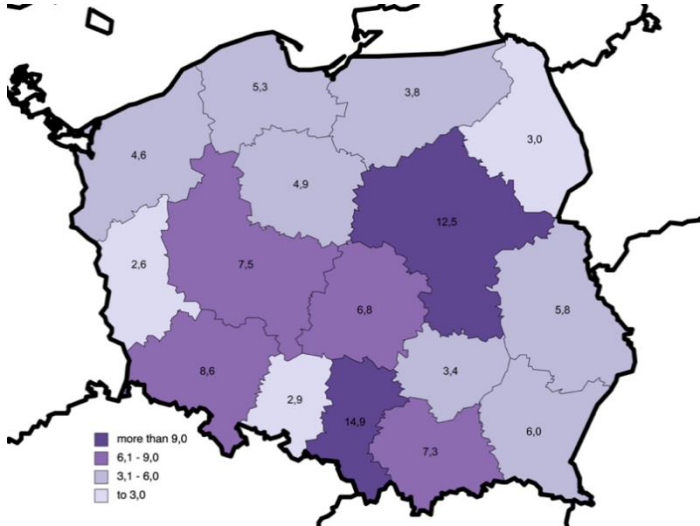


Source: Regional Statistical Office in Poznan.

Poland does not collect annual official figures on trade union membership, but the most recent statistics – for 2018 – show there to be around 1.5 million trade union members in the country. According to the available data, trade union density in Poland is low, at around 12% of all employees (GUS, 2018). It has decreased significantly from the 28% of the early 1990s, as a result of privatisation and an increase in the number of small companies in the private sector; since then, it has never regained its initial level (Figure 20). Around 7.5% of Trade Unions are registered in the Wielkopolska region (the fourth largest share in Poland).

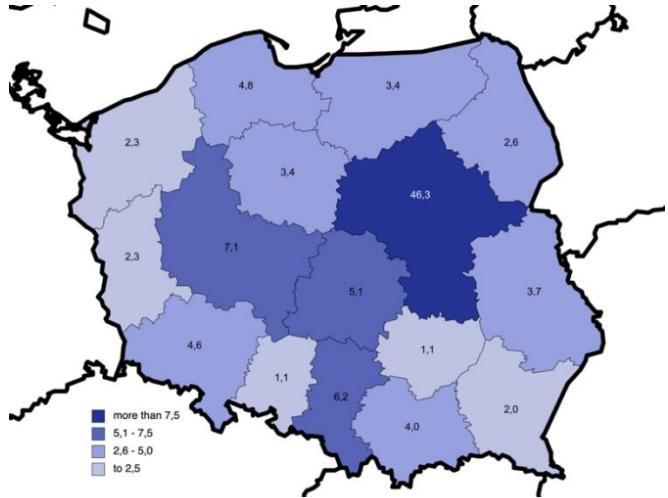
The number of employers’ associations increased by 10% from around 300 in 2014 to 400 in 2018. Significant inter-regional differences exist in this respect (Figure 21). Over 46% of employers’ associations in Poland were registered in Mazowieckie voivodeship. The Wielkopolska region is second for share of employers’ associations (7.1%).

Figure 20. Trade unions registration density by voivodeship in Poland in 2018 (in %, Poland = 100%).



Source: National Statistical Office, 2018.

Figure 21. Employers’ associations registration in Poland by voivodeship, 2018 (in %, Poland = 100%).



Source: National Statistical Office, 2018.

2.2.2. A brief history of lignite mining in the region

The first lignite mining activities in the region commenced back in the 18th century, but only after World War II was the mining transformed into intense industrial activity (Kasztelewicz, 2008). Large-scale mining started after 1955, and annual output was approximately 20 million tonnes. The Konin Lignite Basin was a lignite basin that comprised the Adamów Lignite Mine and the Konin Lignite Mine, as well as the Pątnów–Adamów–Konin Power Plant Complex created between 1958 and 1967. Construction of the Adamów Lignite Mine began in 1959 and the first tonne of lignite was extracted from its open pit in 1964. The mine consisted of four open-pit mines: Bodałów (1977–1991), Adamów (1964–2021), Koźmin (1991–2016), and Władysławów (1977–2012).

For almost the entire period of its operation, the mine supplied coal to the 600 MW Adamów power plant. The last Adamów open-pit mining site was closed in 2021 – two years after the closure of the Adamów power plant in 2019. In total, the mine excavated almost 217 million tonnes during its existence, or 7% of all the brown coal extracted in Poland since 1945.

Construction of the Konin Lignite Mine began in 1945, and the first extraction of lignite started in 1947 (Tajduś, Czaja & Kasztelewicz, 2010). During the years of its existence, the Konin Lignite Mine has had 9 open-pit mine sites: Morzysław (1945–1953), Niesłusz (1953–1961), Gosławice (1957–1974), Pątnów (1962–2001), Kazimierz (1965–2011), Józwin (1971 – closure planned for 2022), Lubstów (1982–2009), Drzewce (2006–2022) and Tomisławice (2010 – now). ZE PAK was planning to open a tenth open-pit mine in Ościsłowo, but due to social and environmental protests the company withdrew from this project in 2020 (KWB Konin, 2020). In 2022, two of the open-pit mines were still in use. Józwin open-pit mine began winding down its operations in 2022, whereas the future of the Tomisławice open-pit mine is still an unknown. The initial plan was to close it in 2030, but in August 2022 the president of ZE PAK, the owner of the mine, announced that due to the negative environmental impact of exploration as well as the unprofitability of the mining, the last open-pit mine of Konin Lignite Mine would be closed six years earlier, i.e. in 2024 (OKO Press, 2022). The old and decommissioned open-pit sites have been filled with water, creating reservoirs.

The closure of the mines is coupled with decommissioning of the power stations of the Pątnów–Adamów–Konin Power Plant Complex. On 1 January 2019, after 50 years of operations, the Adamów Power Plant was closed down. This was the first closure of such a big power plant in Poland (Wysokie Napięcie, 2018). Built in the 1950s, the power plant still had sufficient potential to operate for the next 3 to 4 years. However, due to the new EU IED Directive and BAT conclusions (EC, 2022d), imposing limits on the emission of harmful pollutants such as sulphur dioxide, nitrogen oxides or dust into the atmosphere, the investors decided that it was not profitable to restructure the power plant to the new standards for such a short time and therefore took the decision to close it (Brauers & Oei, 2020). The rapidly increasing prices of CO₂ emission allowances also led to the decision that new open-pit mine sites would not be continued.

As of October 2022, all other power stations of the Pątnów–Adamów–Konin Power Plant Complex were in operation, with the aim of closing the other two lignite-fuelled power plants by 2024. The plan is to restructure the existing power plants to operate using new energy resources (biomass, or possibly nuclear) (Energetyka24, 2022).

2.2.3. Policies and reasons behind the transition

From the early 90s, i.e. the transition from the communist system to a market economy, lignite was perceived in Poland as an important source of energy in the overall optimal energy policy mix for the coming decades. The country's lignite mining sector consisted of five main lignite mines (Adamów, Bełchatów, Konin, Turów and Sieniawa) and five power plants using this source of energy. Two of them were located in the Wielkopolska region covered by this case study (Adamów and Konin). They belong to the Konin Lignite Basin and are managed by ZE PAK – the Capital Group of the Pątnów–Adamów–Konin Power Plant Complex (Grupa Kapitałowa Zespołu Elektrowni Pątnów–Adamów–Konin).

The national strategy for the 21st century of the Polish policy makers was to enable optimal use of the lignite while investing in the most innovative technologies enabling the optimal capturing and sequestration of CO₂ from the air (Kasztelewicz, 2010). In addition, surplus mined lignite was supposed to be subjected to chemical treatments to produce hydrogen. Given the fact that the resources in the region were expected to end around 2023–2030, there were plans for moving the mining to other regions of the country where lignite is widely available (Bielikowski, 1992). Also, the projected growth in demand for energy from 2015 was supposed to be covered by the increase in capacity in the new power plants in Poland.

During the first decade of the 21st century the older power plants were indeed modernised to some extent (reducing employment in the lignite mining sector from 27,179 people in 1991 to 9,074 in 2016) (Ministerstwo Energii, 2018), and equipped with flue gas desulfurization systems, resulting in lower NO₂ emissions and high-efficiency dust collection. However, the plans to use the surplus coal for hydrogen production, and investments in new coal mines, were not implemented.

The 2018 Programme for the lignite mining sector in Poland, presented by the Ministry of Energy, assumed that the new National Raw Materials Policy (Dz.U., 2016), which was supposed to be drawn up, would give indicators on how to extrapolate new sources of lignite coal to secure Poland's energy efficiency. In 2016 the Council of Ministers appointed a Governmental Attorney for national raw materials policy, with the aim of conceptualising the National Raw Materials Policy, and implementing and monitoring it, but the said Policy was only created and accepted by the Polish government in March 2022 (Monitor Polski item 371, 2022).

In the meantime, the draft of the 2018 Energy Strategy up to 2040 prepared by the Polish Ministry of Energy highlighted that the National Power System in Poland should be changed so as to respond to the challenges related to the climate changes through a reduced dependency on coal in the energy mix and investment in renewable energy sources. The Strategy was a direct response to EU Directive 2009/28/WE (the so-called 3 x 20 package; EUR-Lex, 2009).

The final Energy Policy of Poland until 2040 (PEP2040) was accepted by the Council of Ministers only in February 2021 (Ministerstwo Klimatu i Środowiska, 2021). It sets out the objectives of a low-emission energy transition with the long-term target for a zero-emission energy system. It is assumed that while demand for lignite falls, new deposits are held in a reserve in case the development of new technologies allows for its low-emission extraction and usage. The existing mines are going to be closed gradually, and the regions transformed in such a way that “no one is left behind”.

To sum up, the Polish national energy strategy has been strongly affected by the EU policies and instruments developed since 2003 and the need to deliver EU climate neutrality by 2050. The Energy Policy of Poland adopted in 2021 was the first policy clearly aiming for the decarbonisation of the coal

and lignite mining regions, the closure of the lignite mines, and the implementation of the transformation processes.

2.2.4. Lignite mining in the region in time of the transition

As discussed above, the energy transition of moving entirely from coal-fired power plants to a zero-emission economy was not part of Poland's national plans for the energy policy mix until 2021. Consequently, the reconstruction of the Lignite Mining Complex was always aimed at modernising the mining methods, minimising the pollution and looking for new open-pit mine sites. The modernisation proceeded in line with the reduction of employment in the mining sector, but with no direct support for re-skilling. All stakeholders declared that social partners were fully involved in the transformation processes, but this was rather chaotic and lacked any binding long-term solutions.

When the prices of the CO₂ emission allowances started increasing in 2016, and the costs of implementing innovative methods of lignite utilisation and processing soared, it turned out that further reconstruction was no longer profitable. ZE PAK then took the decision to close one of its lignite power plants – before the introduction of the Just Transition Plan, and without the support of any national reconstruction programme for the subregion.

The structural changes, that is the closure of the biggest Adamów Lignite Power Plant (ALPP) in 2019, the closure of the Adamów lignite mining in 2021, and the decision in October 2020 to terminate the lignite mining and processing and to substitute coal energy with green power by 2030, were made with almost no financial or policy support from the public authorities.

The stakeholders interviewed highlighted that the market situation at that point in time was favourable, and the job cuts did not cause an increase in the subregion's unemployment, since demand on the labour market was exceeding supply. Many of the laid-off workers found employment in nearby mines or in one of the still-open power plants. Representatives of Public Employment Services (PES) stated that the ALPP was prepared and ready to support the unemployed, but ex-employees were not interested in public support. The reasons they indicated included that the redundant workers very quickly found employment elsewhere, but also some of them were not interested in taking on any other job.

In fact, as stated by ZE PAK stakeholders, the majority of those being laid off were close to their retirement age, so with the financial benefits being paid out at their discharge they would be able to support themselves while waiting for the relatively generous pensions for miners.

In 2022 there were still three active open-mine sites in the Konin region: Drzewce, Józwin and Tomisławice. The decommissioning of their activities was anticipated for 2022, 2023 and by 2030 respectively. Two lignite power plants are still in operation:

- Konin Power Plant – equipped with three boilers with a nominal thermal power of 391 MWt, including a biomass boiler with a nominal thermal power of 169 MWt, and other reserve coal-fired units of 111 MWt each;
- Pątnów Power Plant – which consists of two parts: Pątnów I Power Plant, scheduled for closure in 2024; and Pątnów II Power Plant – equipped with a power unit with nominal thermal power of 1,080 MWt, and which is planned to cease operations in 2030.

In order to diversify the energy mix in the existing operational units, ZE PAK undertook a number of initiatives and investments. In October 2021 a new power plant fed by photovoltaic power stations with

capacity of 70 MW was created on the post-mining areas of the Adamów lignite mine. In Konin Power Plant, a hydrogen production installation is under construction with plans for extending its capacity twice in the future. Nevertheless, the lack of public support is making the transformation more long-lasting and too expensive. According to the stakeholders, despite the ambitious targets hydrogen production will not occur in the near future. The interviewees stated that the production process is complicated, and no method has yet been created to commercialise it. In the regional strategic documents, it is assumed that hydrogen will power buses, the production of which was planned for Konin and Poznan. However, the stakeholders believe that, due to delays in constructing the hydrogen power plant, the bus production will have to be moved to other parts of Poland. Another long-term plan is to develop onshore wind farms in Konin region by 2030. Overall, diverse stakeholders are identifying significant questions, doubts, and divergences in approach when it comes to the credibility and actionability of the proposals. This is mainly because of the lack of long-term detailed planning, inaction, and the expectation for EU funds to be paid out, while their disbursement is at significant risk and experiencing delays.

Similarly to the situation in the past, the proposed and discussed potential changes have involved close collaboration with social partners, but – also as in previous cases – no binding decisions or actions have been taken as follow-up measures. The stakeholders admitted that they were always invited to the dialogue process, but the negotiations “were useless, since they did not lead anywhere”. Some of them said that “this overall situation was tiring and discouraging, since structured progress was never made”. Trade Union members became tired of the continuous discussions about the energy transition, and “at some stage they just wanted to be sure of the next steps rather than discussing the same points”. The lack of action, or lack of policy success, was not a consequence of poorly performed social dialogue. On the contrary, the social dialogue was carried out properly with the extensive engagement of all parties. The lack of success in the negotiations, or the strategies, was due to there being no binding follow-up activities on the part of the public authorities, while the implementation of rapid *ad hoc* approaches was not satisfactorily supported by funds or mitigation measures.

As a result, the regional energy transformation has until now seen limited involvement by the public authorities in supporting laid-off workers in any way. Since 2020, almost 23% of the employees (which corresponds to over 1000 people) have lost their jobs in ZE PAK and received no public support.

In the opinion of the majority of stakeholders, mining sector employees as well as their families should receive not only financial support, but also some kind of motivational assistance, raising awareness. These people come from families strongly grounded in a tradition whereby men are the main family providers, working in the mining sector and earning a decent salary, while women are economically inactive. Very often this is the first and only work these men have known, and they have never gained any other skills or competencies. The women, on the other hand, have very often had no employment, staying at home and looking after the children. They perceive the energy transformation as a very unstable and stressful situation for several reasons. Firstly, the lack of a structured timeline with dates for the final closure of the mines, plus the absence of a clear strategy for the redundancy processes, brings insecurity and unpredictability to their lives. Secondly, the unknown of whether they are going to receive any financial support or benefits makes the situation financially unbearable and stressful. Thirdly, these people are not becoming accustomed to the changes. They are very often sceptical about switching occupations, or changing their place of living if required, and they are not ready for any transition. They very often do not understand it, and think about the energy transition as an unnecessary process since the coal secures the production and delivery of energy to their local communities. What is

more, they prefer working until retirement and then simply becoming economically inactive rather than expanding their skills, changing occupations, and working for longer.

Most of the stakeholders believe the top priority in the transition process is not only to secure individuals' wellbeing and career counselling, but also to build trust in the transition and raise awareness about its environmental added value and about other secure energy-efficient options.

Approximately 50% of the employees at ZE PAK are aged 50 plus. Therefore, as our stakeholders have confirmed, the initial assumption of the transition process was that the company would cut employment gradually, by laying off those reaching retirement age. This was also the preference of the trade unions. However, with the transformation process speeding up around half of the workers will not reach retirement age before their employment is terminated. As representatives of ZE PAK have stated, around half of the workforce are 50+, and the rest are in their 40s, so they will have to be made redundant. This is another example of how initial agreements in the social dialogue have been broken, and why social partners become sceptical in its effectiveness. The rapid changes to the plans are not followed by any supporting activities from the public authorities.

2.2.5. Transformation of the region in public policies

The first Development Strategy of the Wielkopolska Voivodeship was implemented in 2000 with the aim to set up the main directions for the newly established voivodeship (following the administrative reform of 1999). In 2005 the new Strategy focused on Poland's accession to the European Union and the new opportunities that it brought to the region. The subsequent Strategy of 2012 concentrated on strengthening innovation and competitiveness in the region, while taking into account further development in energy efficiency and the introduction of renewable energy sources (Zarząd Województwa Wielkopolskiego, 2012). Back then, the regional authorities planned to modernise the Konin Lignite Basin to make the mining more efficient in terms of the methods used while also exploring new open-pit mine sites. The Strategy was in line with the 2009 Document of the Polish Ministry of Economy on Energy Policy in Poland until 2030, where coal and energy from mining were taken as an essential stabiliser for Poland's energy security (EUCO 169/14).

The national assumptions that energy security would be provided by coal were gradually modified in line with the European Council Agreement on the 2030 climate and energy policy framework of October 2014 (EUCO169/14). This document, together with the Paris Agreement (UN Climate Change, 2021), gave impetus to further changes in the energy market that seek to introduce green energy sources and involve the transformation of fossil-fuel related industries.

Guidelines towards the implementation of a low-carbon energy transition policy in Poland only began showing up in drafts of national documents around 2018. Poland's Energy Policy until 2040 (Ministerstwo Klimatu i Środowiska, 2021) was one of the first national documents, anticipating a just energy transition and the creation of a zero-carbon energy system while at the same time assuring the country's energy security.

In line with the national strategies, the public authorities of the Wielkopolska voivodeship started collaborating with regional stakeholders on territorial development strategies and policies aimed at shifting towards a low-emission economy. In February 2021 the Council of the Wielkopolska Voivodeship adopted the Strategy for Eastern Wielkopolska that aimed for climate neutrality by 2040 (Strategia na rzecz neutralności klimatycznej Wielkopolska Wschodnia 2040). The consultation process

inaugurated by the Regional Development Agency – Transformation (a daughter organisation of the Regional Development Agency, and joint-stock company with a local government unit the main stakeholder) engaged 90 regional and national stakeholders from different sectors and industries (ARR Transformacja, 2021). The result of the joint efforts was the drawing up of the Concept of the Just Transition for Eastern Wielkopolska.

Given the specific role of the region in supplying energy at the local and national level, the aim of the strategy is to transform the eastern parts of Wielkopolska into a national leader in the green economy by 2040. The plan is to build the region's development on the circular economy, using local manufacturing capacities based on environmentally friendly technologies. The economy is expected to become resource-efficient, zero-emission and energy-efficient, using innovation and advanced technologies and providing attractive jobs. The Just Transition Strategy identifies aims and activities, as well as potential funds helping to mitigate social, economic and environmental impacts of the transition to a climate-neutral economy. Three aims are identified for achieving the overall objectives of the JTP:

- 1 Building a zero-carbon circular economy – to shape the future of Eastern Wielkopolska by making the region more competitive and innovative. This embraces an increase in entrepreneurship resulting in the creation of new jobs, support for workers losing jobs in the lignite mining sector, support for young people, and adaptation of the educational system to the new regional market requirements.
- 2 Ensuring an integrated high-quality environment by improving the functionality of the space that people live in, and in order to provide attractive opportunities for the economy.
- 3 Active society – which is seen as a major driving force in the successful transformation of the region. Its implementation is aimed at reducing negative socio-economic impacts of the transformation, negative demographic changes (such as depopulation), the risks of existing social inequalities, and increased mental disorders (such as mental crises, addictions, or depression). The activities being proposed aim to counteract the social exclusion of families of those becoming redundant, to raise awareness among local residents about the energy transformation, and to improve the quality of life.

The planned activities include:

- Professional employment activation for unemployed people and job seekers, including support for those affected by the transition and their relatives;
- Professional support for people employed in ZE PAK: career counselling, reskilling, legal and psychological assistance, support for starting up their own business;
- Start-up support, including business incubators; development of technology hubs, investment in R&D infrastructure;
- Activities supporting vocational education tailored to regional market needs, the development of educational and vocational counselling in schools and educational institutions, and projects for the development of higher education tailored to market requirements;
- Projects in the area of social inclusion, the creation of new social enterprises focusing on the negative consequences of the energy transition, and projects raising awareness in the field of the green economy and energy transformation;
- Supporting large companies' investments in production: building a production line for hydrogen buses, establishing a high-tech factory for electrolyzers, and constructing a cooling module factory.

This is just a preliminary list of ideas and initiatives planned for the potential implementation, which in fact has been put on hold due to a lack of funding from the JTF. However, the energy transition processes

are already taking place in the region, and no activities are listed in the above-mentioned strategy. No alternative national funds have been allocated for the purpose. Again, the agreements made during the social dialogue have been broken, since the transition is taking place irrespective of the plan.

External circumstances such as the war in Ukraine and the increasing prices of CO₂ emission allowances, as well as stricter EU regulations on greenhouse emissions, have forced ZE PAK managers to speed up the process of decommissioning the lignite power plants in the region. Without clear and comprehensive strategic decisions on how to support workers in the lignite mining sector, the company needed to seek solutions that would satisfy employees' expectations and their wellbeing. According to ZE PAK representatives, the company has decided to undertake at least some initiatives supporting their employees using their own limited available funds.

The main initiatives are presented in the box below.

Box 1. ZE PAK initiatives supporting their employees in the energy transition.

- In October 2020 ZE PAK organised two training sessions for the coal miners to learn the skills for becoming photovoltaic installers. The sessions were organised in collaboration with the Regional Development Agency in Konin. 50 employees attended the training, and 14 of them found employment.
- ZE PAK started collaboration with the municipalities of Kazimierz Biskupi and Rychwał, making a commitment to co-finance the employment of their ex-workers in the Municipalities and Councils if they would maintain their employment for a period of 24 months. 7 people were interviewed, and 3 started a new job. According to the interviews, the ex-miners did not find this offer attractive due to the relatively lower salaries in the public sector compared to the coal sector.
- In February 2021 all 11 trade unions at ZE PAK, and in collaboration with ZE PAK itself, prepared a project entitled: "Increasing the qualifications and supporting labour market activation among ZE PAK employees". The assumption behind this project was that 2,356 out of 3,843 workers would be laid off, and the project aimed to keep the workers on the labour market. The project has been submitted for public support to the Regional Development Agency in Konin, Wielkopolska Voivodeship Office, Polish ministers and the European Commission, but as of November 2022 no decision about finding a path for financing the project had been taken. According to the interviewees, the initiative was undertaken in order to look for funds supporting employment transition in the region, without focusing on any particular programme. It was mainly about highlighting the challenge emerging in the region. The respondents said that even if the initiative has still not received any financing, the European Commission has perceived it as an exemplary model of collaboration at the level of industrial relations.
- In January 2022, a new pilot programme was initiated by ZE PAK. The company signed a contract with the employment agency JobFirst, committing itself to support leaving miners in gaining new skills and competencies and helping them finding new employment. According to the ZE PAK representatives, at this stage it is crucial to provide ZE PAK workers with counselling activities in order to modify their perception of the change and encourage them to find new employment.

Source: own elaboration on the basis of interviews.

Within the industrial relations the social contract is being processed, in order to obtain additional funds for the energy transformation. During the 25 years after transformation the mining companies received various forms of donation and subsidy to support their activities financially. Among others, the subsidies were earmarked for ongoing activities and restructuring, as well support for mining sector employees' social security contributions. Direct support for the mining sector (hard coal and lignite mining included) between 1990 and 2016 is estimated to have totalled around EUR 20 bn (81 bn zł) (WISE, 2017). In May 2021 the Ministry of State Assets signed another agreement with sectoral trade unions. Unfortunately, the social contract encompasses hard coal miners only, but does not refer to lignite miners (Ministerstwo Aktywów Państwowych, 2021). It envisages that during the decommissioning period for hard coal mining and energy related companies, workers ineligible for pensions will be granted the right to a one-off financial benefit equal to 12 months of their salary. On the top of it they will be eligible for 4 years' paid holiday. Representatives of ZE PAK claim that representatives of the lignite mining sector also wanted to join the negotiations, but it was not possible. Nevertheless, they are still trying to become part of the contract. According to the ZE PAK representatives, if the company was able to benefit from this social contract, then around 35% of ZE PAK employees (1255 people) would get extra support and compensation. As of November 2022, the Ministry of State Assets has still not provided final feedback on whether ZE PAK is eligible for inclusion in this contact, and neither has it provided any reason for its silence.

2.2.6. Funding of transformation

The financial support for mining activities was closely related to the national policies and strategies in place. During the 25 years following the economic transformation, Polish public institutions were regularly supporting the mining sector and mining companies. The financing mainly encompassed subsidies and grants for ongoing operational activities and restructuring, but also covered unpaid social security contributions and pensions. Direct support for hard mining and lignite mining together totalled around EUR 20 billion during the years 1990–2016 (WISE, 2017).

Programmes aimed at restructuring mining in Poland focused mainly on hard coal. The restructuring of employment was secured financially by companies' own funds plus national budget donations. Laid-off employees were eligible for post-mining cushioning benefits, employment activation and adaptation funds, retraining grants, as well as loans for starting their own businesses. According to the interviewees, the structural transformation of employment in the lignite mining sector was also provided for, but never in a planned and structured way (Dz.U., 2003).

The first strategic document that clearly identifies the sources of funds being used to support the energy transition is the Regional Eastern Wielkopolska Strategy published in 2021 as part of the Just Transition Plan. Due to the fact that the regional Eastern Wielkopolska strategy is broad in scope, the assumption is that it will be financed from diverse sources involving public and private capital. The financial framework is built on the assumption of diversification, with the following financial sources identified for covering the costs of investments:

- Public funds: the state budget, the regional budget of the Wielkopolska voivodeship, local budgets of municipalities;
- National strategic programme funds, such as the budget of the National Energy Advisory System, “My electricity programme” for 2019-2025, “Solar roof programme”, and the “Clean Air Programme”;

- EU funds, such as European Funds for Wielkopolska 2021–2027, and European Green Deal;
- International public funds, such as European Investment Bank funds, and the Norwegian Financial Mechanism;
- Private funds, in particular to secure the co-financing for EU funds, with a particular focus on public-private partnership.

No more details have become available in 2023, since the JTP has not been activated. The interviewees who were asked about the funds stated that without the funds' official approval or a clear declaration of when the money would be released, it was difficult to plan detailed activities in advance. The energy transition in Eastern Wielkopolska is already taking place. ZE PAK is attempting to provide security for employees looking for funds and opportunities from different sources. Given the fact that the transition is an ongoing process, it is not possible to make a precise assessment as to which part of the transition the money will be used in. The subregion is about to receive EUR 415 million for its plan to move away from lignite mining and lignite power plants. The assumption is that EU funds will support the development of the circular economy and diverse forms of energy efficiency improvements or thermal modernisation of buildings. Other support will be given for the training and retraining of 5,500 lignite workers.

One of the interviewees indicated that extra money was being used from the European Social Funds from the Wielkopolska Operational Programme 2014–2020 within a special project provided by the Dar Edukacji Foundation. The funds were aimed at reskilling and upskilling people at risk of losing employment, or those who had already been made redundant, with support provided for 248 employees of ZE PAK and companies related to the mining sector. The activities anticipated include vocational counselling, job placement, and training, including in improving entrepreneurial skills.

2.2.7. Conclusions

Wielkopolska is a region prospering relatively well, performing above the Polish average in all economic indicators. The Eastern Wielkopolska subregion, on the other hand, is the most vulnerable territorial part of Wielkopolska, with the highest inactivity rate, highest unemployment, lowest wages, and the highest rate of depopulation, an ageing population and out-migration. The close proximity of one of the most highly developed subregions in Poland might be seen as potential for the transforming Konin Lignite Basin, but could also be seen as a threat, resulting in the area becoming a depopulated, unattractive and remote part of the voivodeship. It should therefore be of utmost importance for all social partners, and public authorities in particular, to invest in the region in order to make it an attractive and competitive part of the Wielkopolska voivodeship.

The energy transition process in Poland, aiming for a zero-carbon energy transition, started relatively late, in 2018. National strategies preceding it were aimed at enabling the optimal use of lignite while investing in the most innovative technologies enabling the optimal capturing and sequestration of CO₂ from the air. During the first decade of the 21st century the older power plants were modernised to a certain extent (reducing employment in the lignite mining sector from 27,179 people in 1991 to 9,074 in 2016). Only in 2018 did guidelines towards the implementation of the low-carbon energy transition policy in Poland begin showing up in the drafts of national documents aiming for a fair energy transition and the creation of a zero-carbon energy system in the long term.

The energy policies were drawn up with the close collaboration of social partners at all stages of planning, and they embrace both employment and reskilling. Nevertheless, during the interviews two

types of challenge appeared: the breaking of settlements reached in the social dialogue, which led to uncoordinated energy transition activities with no proper public support; and, in consequence, the absence of tailor-made solutions that would respond to regional challenges and allow the region's potential to be strengthened.

Firstly, as demonstrated, the agreements reached through social dialogue were, in the majority of cases, never truly implemented. The role of social partners in the creation and implementation of energy transition policies for the Wielkopolska region was significant. They were always invited to participate in the dialogue, and responded proactively and with engagement. Nevertheless, the results of the negotiations led nowhere, as they were frequently broken. The planned restructuring processes were changed or speeded up, and compromises agreed upon were abandoned and not adhered to. The implementation of energy transition processes was in the majority of cases the result of external factors enforcing them, such as EC Directives, the war in Ukraine, or rising prices of CO₂ emissions, rather than the result of the actions initially planned. At this point social partners highlighted the fact that because of the green transition speeding up significantly due to the war and the unprofitability of producing energy from lignite, the plan proposed in 2018 was abolished and not delivered. The employees were left to deal with the challenges by themselves. Any detailed talks were refused due to the lack of funds from the JTF, and national funds were offered only to a very limited extent. At this stage the social partners applied to be included in the social contract being proposed and negotiated within the industrial relations for hard coal mining. As of November 2022, their requests had not been taken into consideration.

Secondly, and as a consequence, in the opinion of the majority of stakeholders the measures and initiatives planned at the strategic level were not present in the employment policies. If proposed, they seemed not properly tailor-made. PES representatives argued that the policies were in there, but due to the very good labour market situation, low unemployment rate, huge labour demand and the lack of people showing interest, they were never made optimum use of; other stakeholders, however, claimed that this was not the case. Social partners and employees' representatives highlighted that the situation in the region is rather unique, and the people there have specific attitudes towards the transition; their living habits are traditional and very much grounded in their routines. They argued that the labour market policies should be more addressed towards activities raising awareness and encouraging a higher level of labour market participation, only then followed by training for reskilling and upskilling.

Summarising the different opinions and perceptions from the interviews shows that four types of support were mentioned for being delivered to the local community:

- Awareness-raising campaigns, showing the relevance of the energy transformation from the local, national and European points of view, explaining the harm being caused by the coal industry from numerous perspectives and the added value of the zero-emission energy market. As reported by stakeholders, the local communities, whose activities had for years been built around coal, have very limited knowledge of or interest in alternatives;
- Raising and changing awareness of and support for social and economic engagement, aimed at increasing people's willingness to change. As reported, local communities in the region are rather hermetic and attached to the family model of the man working and the woman remaining economically inactive and looking after the children. Such an approach limits the community's potential, keeping it closed, and makes the transition more difficult. People are scared of any

change, and it is difficult for them to benefit from the training, reskilling, or support opportunities, even if available;

- Assuming that there is an economic plan for the region, a demand and supply analysis should be carried out for future skills, and proper educational courses offering reskilling activities should be proposed. Despite being mentioned in the national documents, the majority of social partners said that this stage was not properly implemented. Some ideas have been proposed, such as the production of hydrogen and the subsequent production of hydrogen-powered buses, that would make the region a pioneer in renewable energy production, or the introduction of nuclear or biomass power plants. However, this is insufficient for foreseeing skills and responding with a tailor-made reskilling programme.
- Lastly, the need for short-term support from the public authorities was also identified as partly missing. Although social dialogue negotiations were long and intensive, they did not bring the expected results. It had to be an employer making the efforts to provide short-term support for discharged workers (or in the form of ad hoc training or financial benefits).

To sum up, given the proximity to economically developed regions, there is quite strong potential in the successful implementation of the phase-out of coal mining and adaptation of the Eastern Wielkopolska labour market. In the short term, the economic and social trends – with the very low unemployment rate in Poland and high demand on the labour market – are creating positive conditions for the transformation. People can easily find employment, and there is little interest in the ALMP for reskilling. On top of that, around 50% of coal-mining sector employees are aged 50 plus, the rest mainly in their 40s. The phasing-out of coal will therefore not result in mass unemployment in the region. A significant part of the total employee cohort will retire or apply for early retirement. Nevertheless, the region is exposed to other potential risks of stronger and quicker depopulation and economic slowdown due to long-term negative trends.

In the long term, the risk of negative demographic trends that may limit the region's further development is realistic. Without proper investment in the labour force by using state-supported policies, subsidies and incentives, the region will experience difficulties in attracting FDI or EU funds. They play a key role in the process of regional development, assuring societal and economic convergence within the voivodeship.

Therefore, in order not to allow the region to become a remote region lagging behind others, policy makers should reconsider the significance of the role of interplay between the labour market and energy policies in an efficient energy transition. Short-term stability on the labour market, with low unemployment rate and rising salaries, is not an indicator that the energy transition is being implemented effectively or that the strategies are successful. A long-term strategy view is required, one that reconsiders regional potential, positions the region in the voivodeship as a whole, and encompasses societal and cultural challenges. While existing strategies seem to answer all these points in a generic manner, a detailed look at the activities seems not to support the commitment to fulfil it. While the social dialogue is being implemented properly, the worked-out agreements should be abided by and not changed. Public authorities, by activating public funds from different sources, should support the planned aims and corresponding activities. Only a long-term perspective on the transition might create positive conditions for transformation and support the labour market.

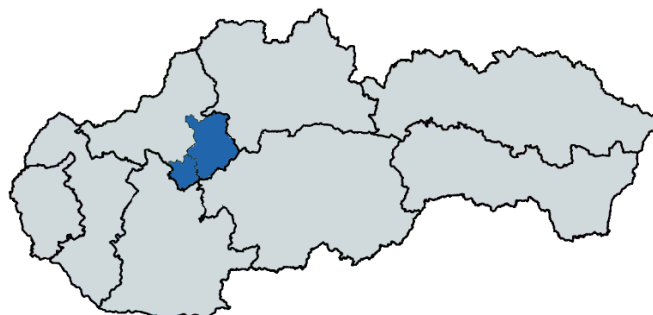
2.3. Upper Nitra, Slovakia

This part of the study deals with the process of transformation of the Slovak region of Upper Nitra between 2017 and 2023. A gradual decline in lignite mining and employment in the sector has been taking place in the region since 2000. In 2007, the government decided to “save” the mining industry by giving direct financial support for the burning of domestic coal in a regional heating plant in Nováky. The crucial year was 2017, when the government decided to discontinue its financial support for mining, which is to end in 2023. The year 2017 formally marked the beginning of the transformation of the coal region. Although the Upper Nitra region is relatively small compared to other European coal regions, and mining does not play a large role in the national economy, it had a relatively strong position in the context of regional and local economies until quite recently. The phasing-out of coal mining and domestic coal burning will have a significant impact on the state of the environment, both regionally and nationally, and on the achievement of broader environmental policy objectives.

2.3.1. Definition of the region and basic characteristics

The Upper Nitra is a functional region consisting of two districts (level LAU 1): Partizánske district and Prievidza district. The Upper Nitra is part of the NUTS 3 Trenčianský region and NUTS 2 Západné Slovensko (Western Slovakia). The area of the Upper Nitra is 1,261 km², which is 2.8% of the total area of Slovakia. In 2021, the region had 175,400 inhabitants, representing 3.22% of the total population of Slovakia. The administrative and economic centre of the region is Prievidza, with 44,000 inhabitants, making it the 11th most highly populated town in Slovakia (Filčák et al., 2019b, SO SR, 2021).

Figure 22. The location of Upper Nitra in Slovakia.



Source: own elaboration.

2.3.1.1. The economic structure of the region

Regional economic performance is lower than the national level. The gross domestic product (GDP) in the Trenčín region was EUR 17,300 in 2020 (per capita, purchasing power standard–PPS). In Slovakia overall it was EUR 20,900, and in the EU 27 this indicator stood at EUR 29,900. The Trenčín region therefore achieves 83% of national economic performance, and only 58% of the EU 27’s economic performance (EUROSTAT, 2022, see Table 1). The relative economic level of the Trenčín region in 2010 was 67% of that of the EU 27: one can therefore talk of economic divergence.

Table 1. Gross domestic product (GDP) at current market prices (2010–2020).

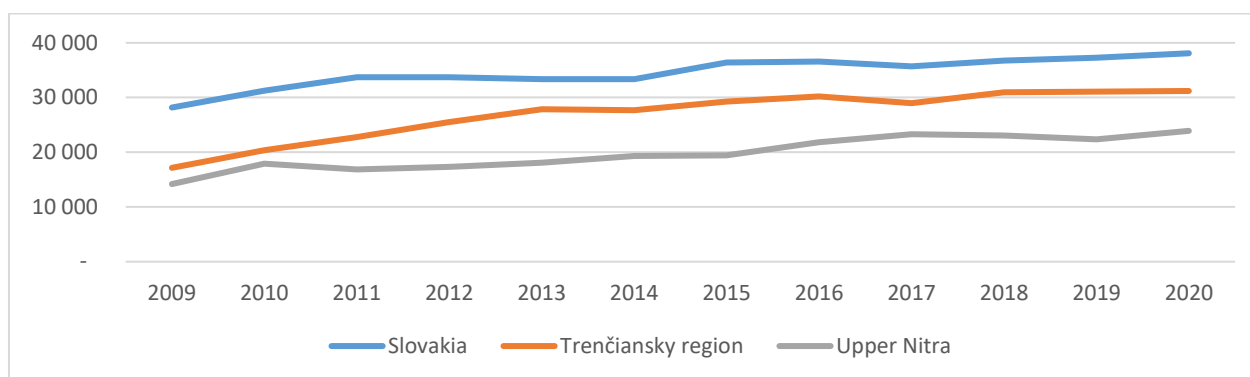
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EUR per inhabitant	EU	25, 600	25, 800	26, 000	26, 600	27, 500	28, 200	29, 300	30, 300	31, 300	29, 900
EUR per inhabitant	SK	13, 200	13, 600	13, 700	14, 000	14, 700	14, 900	15, 500	16, 400	17, 200	16, 900
EUR per inhabitant	TR	11, 500	11, 800	11, 700	12, 000	12, 600	12, 400	12, 600	13, 600	14, 000	14, 000
EUR per inhabitant in % of the EU	EU	100	100	100	100	100	100	100	100	100	100
EUR per inhabitant in % of the EU	SK	52	53	53	53	54	53	53	54	55	56
EUR per inhabitant in % of the EU	TR	45	46	45	45	46	44	43	45	45	47
GDP in PPS, per inhabitant	EU	25, 600	25, 800	26, 000	26, 600	27, 500	28, 200	29, 300	30, 300	31, 300	29, 900
GDP in PPS, per inhabitant	SK	19, 500	19, 900	20, 100	20, 700	21, 500	20, 600	20, 600	21, 200	21, 800	20, 900
GDP in PPS, per inhabitant	TR	17, 000	17, 300	17, 200	17, 700	18, 500	17, 200	16, 700	17, 600	17, 700	17, 300
GDP in PPS, per inhabitant in % of the EU	EU	100	100	100	100	100	100	100	100	100	100
GDP in PPS, per inhabitant in % of the EU	SK	76	77	77	78	78	73	70	70	69	70
GDP in PPS, per inhabitant in % of the EU	TR	66	67	66	67	67	61	57	58	56	58

Source: EUROSTAT (2022) [nama_10r_3gdp]; note: EU – European union; SK – Slovakia; TR – Trenciansky region.

After 2000, there was a partial diversification of the industrial base in the region; the automotive, chemical, rubber, footwear and engineering industries now hold a larger share. Direct foreign investments have played an important and growing role in the industrial diversification of the region (Filčák Baláž & Jeck, 2018; Filčák, 2019b; Filčák & Jeck, 2020).

Today, the Upper Nitra is a traditionally industrial region in which the mining industry still plays an important role, although it is not the only industrial sector. In terms of employment structure by economic activity, 35.6% of the total employed in the region work in the manufacturing industries (the average for the years 2016–2021). Employment in manufacturing industries is disproportionately higher than in Slovakia as a whole, with a share of 24.5% (the average for the years 2016–2021). If we consider, in addition to the manufacturing industries, sectors such as mining, quarrying and energy supply industries, the share of employment increases to 44% (in Slovakia overall this share is 27.5%). The region's weakness lies in its low labour productivity. The added value in the industry per employee reached only 63% of the national level in 2020, and has been at this level for the last decade (see Figure 23) (COLSAF, 2022; SO SR, 2021).

Figure 23. Labour productivity in industry*.



Source: SO SR (2021); *-value added in industry / average registered number of employees in industry.

Foreign direct investment (FDI) was a keystone in the successful transformation of the Slovak economy and regional development after 2000. Increasing labour productivity in major manufacturing industries in the region through new investments in capital, education and modernisation is, therefore, a top priority in public policies. Foreign direct investments and large foreign investors prefer the metropolitan districts in Slovakia (regional centres of the NUTS 3 regions). In 2019, the Upper Nitra region had EUR 2,827 of FDI per inhabitant, compared to EUR 8,977 in the national economy. Thus the region's share of FDI stock reached only 32% of Slovakia's level overall. However, the uneven FDI distribution outside of non-metropolitan areas is a wider problem throughout Slovakia; the Upper Nitra is one of the non-metropolitan regions with a higher share of FDI (NBS, 2022). Foreign direct investments are also visible in the Upper Nitra, and foreign companies such as Nestlé Slovakia, GeWiS Slovakia, Carcoustics Slovakia Nováky, Brose Prievidza, MAKS-D Nováky, and Honeywell Safety Products Slovakia participated in the economic transformation and diversification of the regional economic structure. Their arrival was determined by the sufficient supply of well-qualified and cheap labour. Similarly, the implementation of state-supported policies, tax subsidies and incentives to attract FDIs played an important role (Filčák, Baláž & Jeck, 2018).

The economic specialisation of the region developed around the broader specialisation of Slovakia's economy (export-oriented manufacturing industries, including activities in the automotive sector, machinery, and the manufacture of plastic). Its relative economic advantage is its geographic location. The region is located in the western, industrially developed part of the country, in relative proximity to metropolitan centres and their geographical intersection (level NUTS 3 administrative centres: Nitra, Trenčín, Žilina and Banská Bystrica). The region may benefit from the activities of two large automotive companies and their subcontractor networks, which are located in the wider area: Jaguar Land Rover is located in the Nitra district (81 km) and Kia Motors in the Žilina district (62 km). One of the important regional development priorities is the modernisation and completion of the transport infrastructure and regional connection to trans-European transport networks. (Filčák, Baláž & Jeck, 2018). The region already has experience with the departure of a large employer and mass layoffs. The most recent case of regional disinvestment was that of Yazaki Slovakia (producer of wiring systems for the automotive industry, with 1,200 mainly female workers). It was located in Prievidza in 1994, but closed down its production plant in 2011 (Rusňáková, 2010).

In terms of entrepreneurial activity, the region lags behind the rest of Slovakia. In Upper Nitra, on the one hand, there were 2.4 businesses (legal persons) per 100 residents in 2020, which is 56% of the Slovak average (there were 4.3 businesses per 100 inhabitants in Slovakia in 2020). On the other hand,

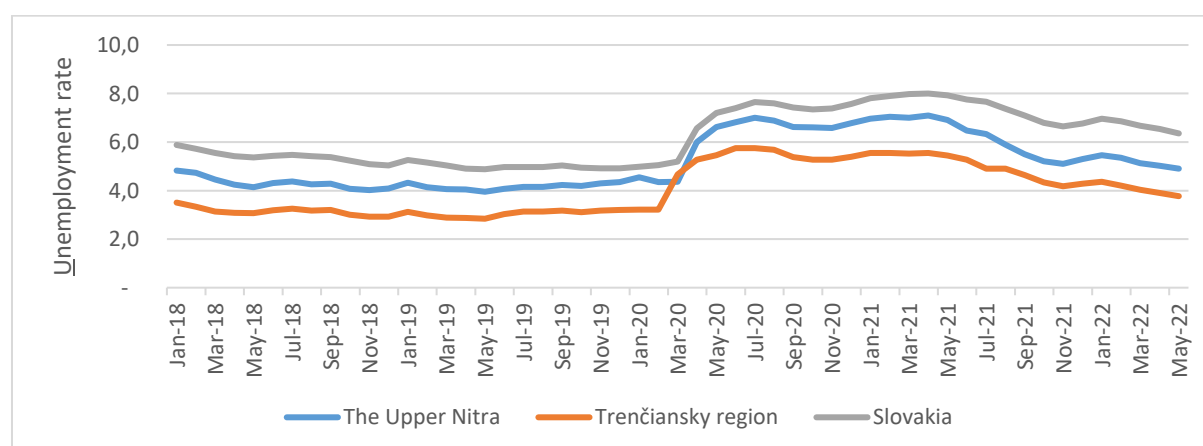
in the entrepreneurial activity of individual entrepreneurs (natural persons), the level is comparable to the country's average; in both the region and Slovakia's economy as a whole, there were 6.2 individual entrepreneurs per 100 employees in 2020 (SO SR, 2021). The development and support of innovative small and medium-sized enterprises is among the critical determinants in the context of regional transformation and labour market adaptation.

2.3.1.2. Regional labour market

After 2000, the Upper Nitra experienced a population decline. This was caused by the low birth rate and high out-migration. In 2020, the population decrease in Prievidza district was -4.7% , and in Partizánske district -3.97% (overall in Slovakia, the rate of population decrease was -0.45%). The region suffered a long-term negative net migration balance. In 2020, the value of this indicator in Prievidza district was -1.53% and in Partizánske district -0.37% (the value in Slovakia overall was 0.8%). However, the real rates of out-migration are likely higher than the official figures reported by the Statistical Office of the Slovak Republic. Many Slovak migrants residing in cities and suburban regions (mainly in the Bratislava region) tend not to change their permanent address. In general, the main factors behind the negative migration balance in the majority of Slovak regions are socioeconomic determinants such as inter-regional differences in wages, new job opportunities, family and relatives, and looking for new or better housing. These determinants have played a crucial role in out-migration from the Upper Nitra region. Young people were the first to out-migrate from the region (Filčák, Baláž & Jeck, 2018). Overall, since 2000, the Upper Nitra region has faced population decline due to a combination of low birth rates and the negative migration balance.

The initial studies and strategic documents related to the transformations of the Upper Nitra already pointed to the fact that the adaptation of the regional labour market to the closure of coal mining would not be a fundamental economic or social problem. Growth in the total annual unemployment rate in the Upper Nitra from 2016 was positive, but lower than the Slovak average. After 2014, new and existing businesses in the region experienced growth. Employers reported a shortage of workers and, unless there were to be another economic crisis, it was highly likely that the labour market would be able to cope with the consequences of mine closure (Filčák, Baláž & Jeck, 2018; Filčák, 2019a). Developments since the beginning of the transformation confirm these conclusions. Since 2018, the unemployment rate in the region has been below the national average (see Figure 24).

Figure 24. Unemployment rate (%) January 2018 – May 2022.



Source: Own computation by COLSAF (2022).

The average monthly unemployment rate for the last five years was 5.1% in the Upper Nitra (compared to 6.1% in the national economy). Developments are also favourable in the Trenčín region (NUTS 3), where the average unemployment rate is 3.9%. The current favourable situation of the labour market in the broader region is also documented by the fact that the Trenčín metropolitan region has had one of the lowest unemployment rates in Slovakia since the beginning of 2022 (COLSAF, 2022).

Given the age structure of those employed in the mining industry (more than 40% are at least 50 years old), some of the miners are likely to opt for retirement or early retirement. The Slovak social system allows employees to retire at the age of 55 if they have been employed for at least 25 years, of which at least 15 years in mining, their regular place of work underground in deep mines. The challenges for the regional labour market in 2022 were the influx of Ukrainian refugees, their absorption into the labour market, and the rapidly rising energy prices. From the point of view of Ukrainian migrants, Slovakia is more or less a transit country, and fewer migrants stay in the country than in neighbouring countries such as Poland or the Czech Republic. In 2022, Slovakia recorded an increased share of Ukrainian workers in its labour market. In January 2022, 19,300 Ukrainians were working in Slovakia; by August 2022 it was already 30,800 (COLSAF, 2022). The proportion of foreign workers in the Slovak labour market (as in the Upper Nitra) is still low, and complicated and demanding administrative procedures are among the biggest barriers to employing foreigners. High energy prices will have a greater impact on the labour market. The Slovak economy, as well as the economy of Upper Nitra, are energy intensive. A sharp increase in energy prices may result in a partial or complete cutback in enterprises' production, as well as a decrease in employment. From a long-term perspective, the labour market situation may be negatively impacted by unfavourable demographic trends (Filčák, Baláž & Jeck, 2018; for ageing population indices see Table 2).

Table 2. Selected demographic indicators in 2020.

Area	Agens index (%)			Mean age (years)			Life expectancy at birth (years)		
	Total	Men	Women	Total	Men	Women	Period	Men	Women
Slovakia in total	107.34	83.76	132.12	41.26	39.65	42.79	2020	73.47	80.17
Trenčiansky region	134.68	108.27	162.35	43.01	41.50	44.47	2018-2020	74.62	81.34
Partizánske district	151.62	119.03	185.97	43.81	42.03	45.52	2018-2020	74.33	82.37
Prievidza district	145.91	119.36	172.86	43.65	42.24	45.01	2018-2020	74.57	81.35

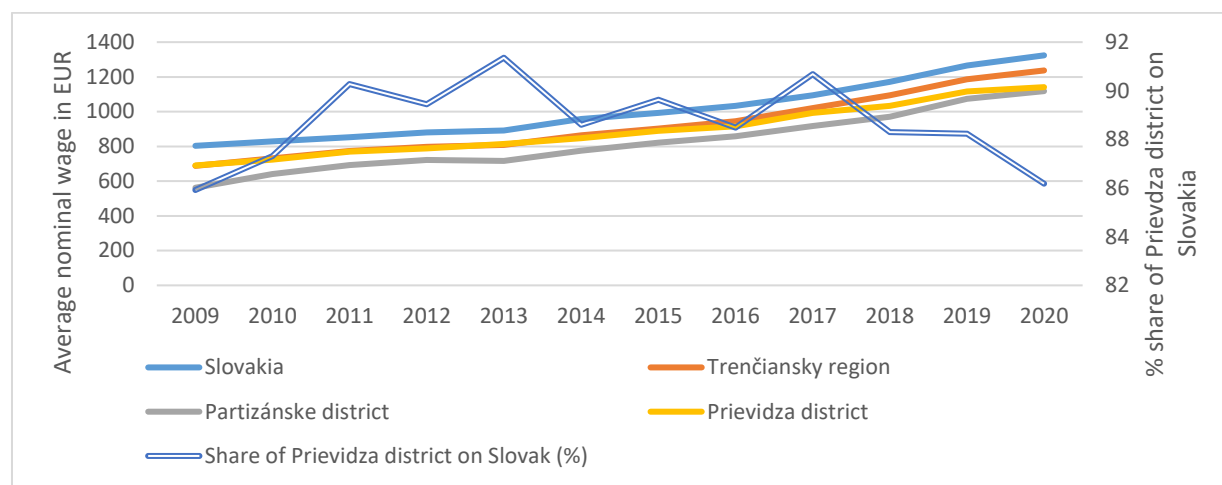
Source: SO SR (2021).

The mining industry's high share of the regional economy in the past has had an impact on the health of the regional workforce. In 2021, the disability rate in the Prievidza district was 46% higher than the national average. The ratio of disability pension recipients to the economically active population in this district is 13.3%, while the average in Slovakia is 9.1% (COLSAF, 2022). A higher rate of disability is a characteristic of mining regions in Slovakia, and the Upper Nitra rate is among the highest in Slovakia. These facts will require increased attention in the area of social and health infrastructure and active labour policy measures. In terms of job applicants, the regional market shows some variations compared to the national average. There are fewer long-term unemployed in Upper Nitra (27% of the region's unemployed have been registered for more than 12 months, compared to 35% nationally). There are

more disabled job applicants than in the economy as a whole (5.2% and 3.7% respectively) (COLSAF, 2022).

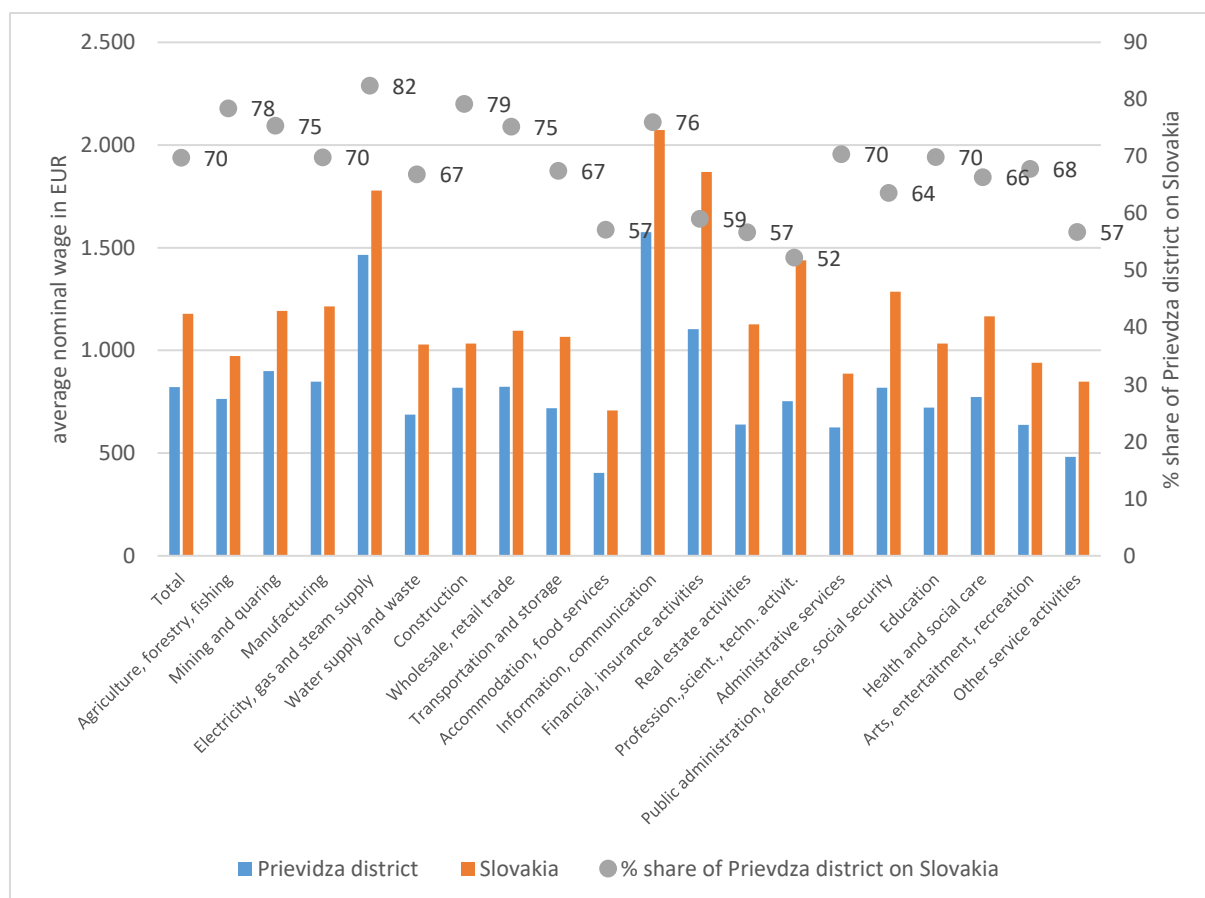
The average monthly nominal wage in the region is lower than in Slovakia. In 2020, it was EUR 1,141 in the Prievidza district compared to EUR 1,324 in the country as a whole. This represents only 86% of the national level. Although the region's wage lag has been changing slightly year by year since 2012, we cannot speak of wage convergence (see Figure 25). The sectoral average nominal wage is presented in Figure 26.

Figure 25. Average nominal wage 2009–2020.



Source: SO SR (2021).

Figure 26. Sectoral average nominal wage in Prievidza district and the Slovak economy (average 2016–2020, EUR).



Source: SO SR (2021).

Convergence is at the highest level in the electricity, gas and steam supply sector, at 82%, and lowest in the professional, scientific and technical activities sector, at just 52% of the national level. In the manufacturing sector, which is now the most important for the region’s economy, wages are 70% of the national level (see Figure 26), and lower regional wage levels may contribute to labour out-migration.

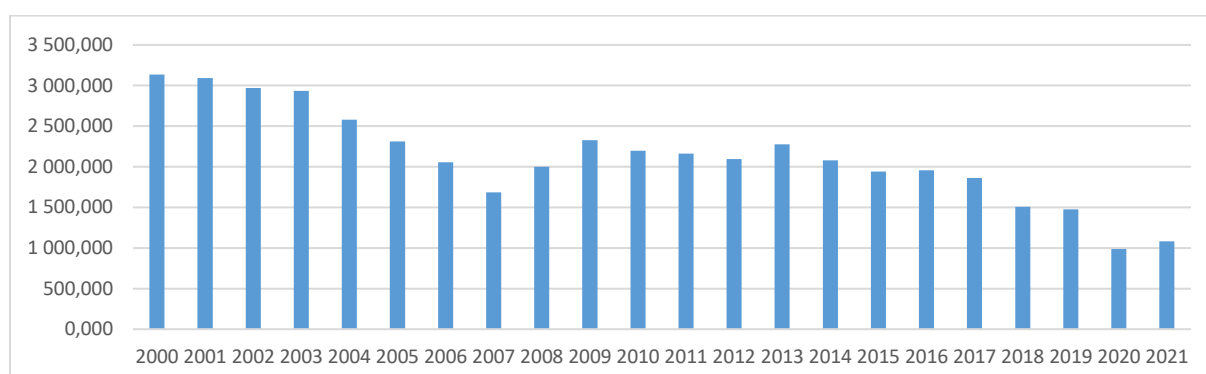
The population forecast (up to 2040) indicates that the age structure of the Upper Nitra region will undergo dramatic change (Filčák, Baláž & Jeck, 2018). It is expected that the proportion of older adults (65+) in the population will increase to 33.0% and 34.9% in the districts of Prievidza and Partizánske respectively. Demographic developments were responsible for about a quarter of the overall decline in the unemployment rate in the period 2012–2017, and this trend continues. This region will face a further and rapid decline in the working-age population over the next two decades, characterised by a low birth rate and high out-migration (Filčák, 2019b).

2.3.2. A brief history of lignite mining in the region

Systematic mining of lignite began in the region at the beginning of the twentieth century, and the peak of mining can be considered to be the decades of the 1970s and 1980s. Coal mining became a key industry in the second half of the twentieth century. Pulverised lignite was mined underground, and used for heat and electricity in the thermal power plant in Nováky city, which is also located in the region. However, there was a gradual decline in coal mining; in the period of 2000–2021, the peak of

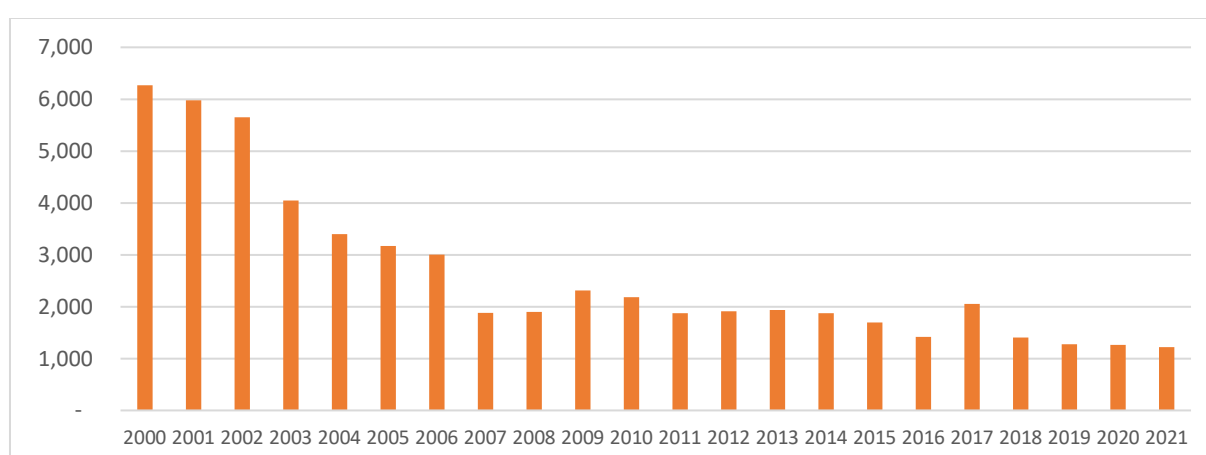
employment and coal production was between 2000 and 2003 (see figures 27 and 28), but by 2003 production and employment had decreased significantly.

Figure 27. Production of lignite in the Upper Nitra (tons).



Source: MMO (2022).

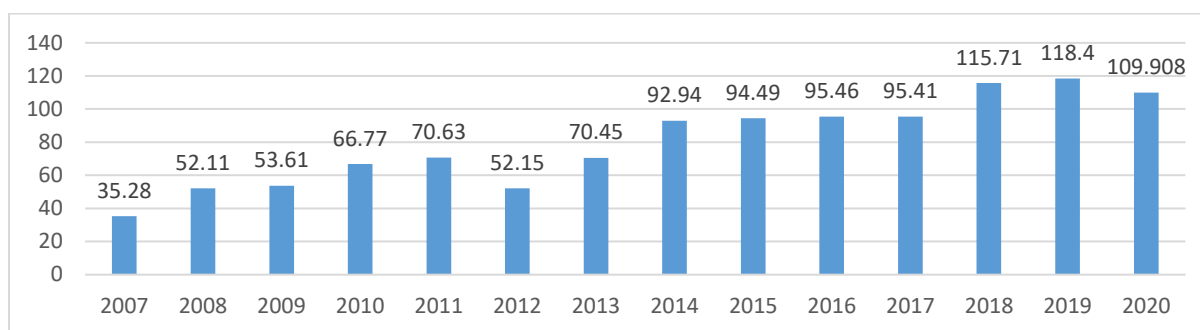
Figure 28. Number of mining company employees in the Upper Nitra.



Source: MMO (2022).

An important turning point was 2007, when the government began supporting the consumption of domestic coal through feed-in tariffs and direct subsidies (see the growth in this support in Figure 29). After that, both production and employment stabilised. In the last two years of this period, 2020–2021, we saw coal mining drop to around 1 million tons, while employment levelled out at approximately 1,200 workers. Government support for domestic coal consumption ends in 2023. This year can be considered as marking the end of mining in the region of Upper Nitra, and given that it is the only mining region in the country, it also marks the end of coal mining in Slovakia.

Figure 29. Feed In Tariff for Domestic Lignite 2007–2020 (EUR million).



Source: OECD (2023).

The only company that carries out mining in the Upper Nitra is Hornonitrianske bane Prievidza a.s., a private joint-stock lignite-mining company. The company used to be the biggest employer in the region, and that for a long time. However, in 2021 it had only 1,221 employees (MMO, 2022; for the number of employees in 2000–2021 see Figure 28). Its importance declined due to the reduction in mining production as well as the arrival of new foreign investors to the region. In the process of preparing for the transformation (after 2017), it has been among the key actors and will probably remain a strong economic regional player even after 2023, with smaller, but much more diversified economic activities.

Long before the announcement of the transformation, the region had already begun to feel the gradual decline of mining. The first big wave of drops in employment occurred in the 1990s, followed by another at the beginning of the millennium. No support programmes were implemented at the time, but the region managed to cope, in principle, despite all the difficulties. Currently, according to local government representatives, no crisis is expected in terms of unemployment. This is due to the fact that all important employers in the region are reporting labour force shortages, and because low- or medium-skilled laid-off workers tend to be easily employable in regional and sub-regional manufacturing industries. The largest downturn is expected to occur in late 2023 (approx. 1,000 workers are expected to be discharged); representatives of local municipalities are unable to estimate what the effects of the next wave of layoffs might be, but they are not expressing major concern about sudden unemployment growth, primarily due to the above-mentioned reasons related to the overall economic outlook of the region and the transferability of miners' skills. Laid-off miners who are entitled to early retirement might also choose this option. Discharged miners are also entitled to relatively generous social help under the current legislation. In 2019, an extra act²⁴ was passed guaranteeing a compensation allowance to miners who were made redundant due to the decline in mining activity. The amount of this social benefit ranges from EUR 223 to EUR 390 per month, depending on the number of years of service (the average nominal wage in 2016–2020 in the mining and quarrying sector in the Prievidza district was EUR 899). Dismissed workers might choose to benefit from this aid for some time, and look for a job afterwards.

As the respondent dealing with social and crisis intervention at the local level pointed out, the laying-off of miners and the partial closure of a coal mine is not a new experience for the region. Already in 2006/2007, the region experienced significant redundancies of miners and the associated negative social impacts. As the respondent states: "At that time, many people lost their jobs, many ex-miners couldn't cope with the situation, started drinking, families broke up, ended up on the street and in our facility ...

²⁴ Act no. 385/2019 on the compensation allowance for miners and on amendment and supplementing of certain acts.

Losing a miner's job had a big psychological impact, in the past, they had high salaries and lived in the idea of 'I am a miner, who is more'. Suddenly they found themselves without a job and without any help". Homelessness grew, as did the number of property foreclosures, and so on. Redundant miners looked for work abroad. In 2006–2007, there were no targeted government programmes or projects to reduce the negative impacts of the mining downturn. Similarly, EU-funded projects did not contemplate this type of transformation. Local municipalities have limited support options; municipal social services and a crisis support centre have been opened, and local NGOs have been partially involved. In the respondent's opinion, people did not perceive at all and are still sufficiently aware of the environmental aspects of mining. People are angry that they are losing their jobs and miner status, which was highly valued in the past. The problem is especially acute with senior miners who find the change very difficult to accept. Now, because of the energy crisis, the situation is also beginning to change a little. After a relatively calm period, when some people began to take environmental aspects into account, at least marginally, the energy crisis appeared and people began to say that it would not have happened if mining had continued. Once again, the social situation is beginning to deteriorate, and tensions are rising. "It will be very important to communicate the benefits of ending mining and the potential and possibilities of financial resources for the transformation of the region".

2.3.3. Policies and reasons behind the transition

The Slovak economy is among the most energy-intensive economies in the EU. Also, most of the energy resources are non-renewable, and energy dependence on the import of energy carriers remains high. In 2019, the Environmental Policy Strategy (GO SR, 2019) mentioned rather vaguely the need to curb coal-fired power and heat generation. In 2020, Slovakia adopted the Low Carbon Development Strategy of the Slovak Republic until 2030, with a view to 2050 (ME SR, 2020), in which it announced the end of the provision of environmentally harmful subsidies, such as support for coal. According to this strategy, the Slovak Republic has room for the decarbonisation of the energy sector, mainly in the replacement of coal with low-emission sources. In 2021, one of the key strategic documents, the Recovery and Resilience Plan for Slovakia (MF SR, 2021), listed decarbonisation as one of the key priorities for which EU resources should be allocated. New jobs are expected to be created through the integration of RES in production sectors at the local level (such as communities producing energy from RES) as well as at the national level, either in the sector of energy production from RES, or through the emergence of new business models. The Recovery and Resilience Plan for Slovakia includes the end of support for the burning of brown coal in the Nováky power plant, and transformation of the upper Nitra region.

Due to the growing economic inefficiency of lignite mining and the related risks to maintaining employment in the region, in 2007 the government started supporting the production of electricity from domestic coal through a feed-in tariff for domestic lignite. In 2007, the support through a feed-in tariff amounted to EUR 35.28 million; this gradually increased from year to year, and in 2021 was EUR 87.13 million. For the period 2007–2021, support for lignite mining in the Upper Nitra amounted to EUR 1,167 million (OECD, 2023; see figure 29). Another public source of financial support was that of direct grants for raising the accessibility of lignite reserves, provided by the Slovak government (Ministry of Economy) between 2006 and 2010 and in total amounting to EUR 20.89 million (OECD, 2023).

In 2019, the Integrated National Energy and Climate Plan for 2021–2030 was adopted, setting national climate targets. The plan set targets such as the closure or transformation of solid fuel heating plants, increasing the share of RES in the energy mix, a mandatory share of RES in district heating systems,

the promotion of hydrogen production from RES, reduction of final energy consumption in industry, higher electrification and greening of transport, and increasing energy efficiency in industry, public buildings and housing. According to the Territorial Just Transition Plan for Slovakia (ME SR, 2022) adopted in 2022, the transition to a climate-neutral economy will have a direct impact on some declining or transitioning sectors of the economy, production processes, employment and the structure of the economy, labour market supply and requirements for new skills. The decarbonisation of the economy places increased demands on upskilling and reskilling plus lifelong learning, especially in those regions most affected by the transformation (the Upper Nitra, Banska Bystrica region, Eastern Slovakia). It is estimated that in the transition regions, decarbonisation and economic transformation will lead to direct losses of up to around 4,250 jobs by 2030. Energy poverty is also a challenge in energy-intensive regions; the risks of it occurring may be increased by decarbonisation. Policies in this area should aim to promote sustainable jobs, along with retraining and education in order to increase the employment of vulnerable groups and ensure a match between supply and demand in the labour market.

Non-negligible negative factors of mining in the Upper Nitra were the health risks of lignite mining. In 2015, the mining company Hornonitrianske bane, a.s. was among the 10 companies with the highest number of occupational injuries and illnesses. People working in the mining industry were significantly more likely to become disabled. In Slovakia, the disability index was 7 times higher in the mining industry than the average in the economy (IFP, 2018).

In 2009, the largest mining accident in Slovakia's modern history occurred in the Upper Nitra, when 20 miners died. According to local stakeholders, people in the region still remember this tragedy, and as such it could be one of the factors contributing to a positive view of the end of mining.

The negative environmental impacts of lignite mining and burning in the Upper Nitra are significant. The power plant in the town of Nováky is the second-largest source of air pollution in Slovakia, and the Prievidza district is one of the regions with the most air pollution in the country. The burning of domestic lignite in the region produces 72% of the national production of sulphur dioxide and 8% of all dust particles (UPVSR II, n.d.). The annual share of electricity production from domestic lignite at the Nováky power plant in the total electricity consumption in Slovakia is approximately 5%. Another important aspect of ending mining is protection of the region's waters. The Nitra River, whose headwaters are located in the Upper Nitra, is one of the most polluted watercourses in Slovakia. In addition to local chemical companies, the mining company and the power plant in Nováky are significant river polluters.

In 2015, the region was at the epicentre of negative media attention in connection with possible corrupt links between government elites and the mining company. The discussion on the effectiveness of government support for coal mining had thus developed another negative dimension – a possible instance of abuse of public finance. The case immediately became part of the anti-corruption agenda of opposition political parties, and to some extent contributed to the negative image of coal mining.

As an interviewed expert concluded on the reasons for phasing out coal mining: “in my view, it was a combination of factors, certainly the EU decisions – the EU Green Deal, “Fit for 55” and Re-Power EU –that played a key role. But economic factors also played a significant role. After an initial stage, when the government tended to be resistant to phasing-out and supportive of continued mining, it began to see it as a window of opportunity, to showcase in an international forum the ‘success story of decarbonising the region’. Economically, the mining also proved difficult to sustain, particularly for political reasons, as the continuation of subsidies could be exploited politically against the government. The fact that the

mining company also realised at some point that it would be difficult to continue also played a role, and it gambled on an exit to try and ‘make the most’ of decarbonisation”.

2.3.4. Lignite mining in the region in the time of transition

In 2007, the government started supporting the production of electricity from domestic coal through a feed-in tariff for domestic lignite. The reasons were the growing costs of mining and the political goal of maintaining employment in the region. For the period of 2007–2021, support for lignite mining in the Upper Nitra totalled EUR 1,167 million (OECD, 2023). In 2015, the Ministry of Economy decided to continue supporting the production of electricity from domestic lignite. The support was established for a period of 14 years (2017–2030) (ME SR, 2015). The decision on providing the support took an unusually long time, and was politically controversial and questionable from the point of view of the suspicion of illegitimate state aid to the mining company. However, as the interviewed regional representatives stated, the period until 2030 was perceived in the region as one of guaranteed stability. The transformation in “the far future” was perceived as a necessary fact, but with relatively few specifics. 2017 proved to be the turning point, when the Minister of Economy (unexpectedly) informally indicated in a public discussion that the end of government support for mining could come even earlier. Until 2017, “public discussion and consideration of ending mining was more or less taboo and considered an act of courage”. Public debate about the end of mining has been limited. According to regional stakeholders, “the close relationship between the owners of the mining company and the government was also a problem”. Fear of the negative social impacts of the end of coal mining also played an important role. After the first unofficial “rumours” about the early cessation of government support and the necessity of transformation, the municipality of Prievidza became active, verifying the information about the irreversibility of the stopping of government support for mining. From the point of view of the regional stakeholders, it was “very strong and dramatic information”. Lastly, in 2017, the Slovak government announced the strong involvement of EU resources in the transformation of the region.

2.3.5. Transformation of the Upper Nitra in public policies

In 2018, an important change took place: the Slovak government approved a decision to end support for producing electricity from domestic sources of lignite by 2023, which practically spells the end of coal mining in the region (GO SR, 2018). Since 2018, the transformation of the Upper Nitra has become a serious and integral part of national economic policies.

In February 2018, the first meeting of representatives of the European Commission, the Government of the Slovak Republic, the public administration and the private sector was held concerning the transformation of the Upper Nitra region. The goal was to “identify specific areas and projects through which it is possible to support new business activities, create conditions for increased labour force mobility, and overall make the region more attractive for new investors and create new jobs, also taking into account existing work skills, potential and traditions in the region” (GO SR, 2019). The main message of this first “high-level” meeting was to create an action plan for the transformation.

Subsequently, on a central national level, a working group for the preparation and implementation of the action plan for the transformation of the Upper Nitra region was established. The working group was created and led by the Office of the Deputy Prime Minister for Investments and Informatisation, while its members were representatives of all relevant (economic) ministries and regional self-government

representatives, municipalities, NGOs (CEE Bankwatch Network, Greenpeace, Friends of the Earth), managers of large companies from the region (Nestlé, Brose, ContiTech) and the energy sector. Trade unions were also represented by the Trade Union of Mine Workers, Geology and Oil Industry. In April and May 2019, five public meetings were held in regional towns: Handlová, Nováky, Bojnice, Prievidza and Partizánské. Independently of the centrally established working group, in 2018 local working groups were established at the regional level to develop an action plan for the transformation. The activities of the local working groups were coordinated by the NGO Friends of the Earth–CEPA. These working groups consisted of several dozen people who worked in four groups to define a vision for the region as well as the individual steps that would make the vision a reality.

The start of the transition process in 2018 was rather uncoordinated, unclear and uncertain. Activities were taking place at both central and local levels, and communication was poor. Also during this period the mining company was planning to open a new field. In this context, Friends of the Earth–CEPA was very active in trying to coordinate the processes, resulting in improved communication between the local and central levels. Later on, PricewaterhouseCoopers Slovakia (PwC) entered the process of preparing the action plan. It was contracted by the Slovak Government to develop an action plan for the transformation of the Upper Nitra. The interviewed regional representatives were very positive in their evaluations of the consultancy company’s input. PwC acted as a mediator and developed the action plan, which was largely based on proposals that emerged from the activity of local actors and the work of local working groups. The results of the activities at the local level thus became the basis for the action plan.

Strong and active involvement of local actors (local municipalities and environmental non-governmental organisations) in the process of creating key documents for the transformation of the region was an important aspect of the whole process, and one of the conditions for a successful transformation as well as an example of good practice in a participatory approach to creating economic policy in Slovakia.

In June 2019, the government approved the final version of the action plan. An important milestone was the announcement of the European Commission of the Just Transformation Mechanism in January 2020, including the proposal of the Just Transformation Fund, from which EUR 459 million would be allocated to the Slovak Republic²⁵ (MIRDI, 2021; MIRDI, 2022). Of this, up to EUR 250 million was earmarked for the Upper Nitra region. Regional representatives were acutely aware of this fact and saw it as a huge and unique opportunity. In November 2020, a detached office of the Ministry of Investments, Regional Development and Informatisation of the Slovak Republic was established in the region for the purpose of better coordination of project implementation. An updated version of the action plan was also approved, taking into account the unexpected situation caused by the COVID-19 pandemic. There was a reallocation of European funds in favour of addressing the economic and social impacts of the pandemic, while the activities and measures in the action plan were also reassessed. The second important factor that contributed to the updates was the creation of the Just Transition Fund, through which the European Commission allocated financial resources for the Upper Nitra. The Just Transition Fund became the main pillar of regional transition funding. In 2020, there was a change of government in the Slovak Republic, which brought about a restructuring of the entire implementation, coordination and management process of EU funds. Because the projects and programmes of the region’s

²⁵ In addition to the Upper Nitra, the Just Transformation Mechanism should also cover two other regions that face problems associated with greenhouse gas emissions and the need for decarbonisation: NUTS 3 regions Banskobystrický kraj and Košický kraj (MIRDI, 2021; MIRDI, 2022).

transformation are largely funded by EU resources, this change necessitated an update as well as postponement of the implementation.

From the very beginning of the transformation in 2017, local and regional actors participated eagerly in the process of creating a regional strategy (an action plan for the transformation of the Upper Nitra). In 2017, even before the official announcement of the end of mining, local government representatives started organising public meetings and discussions at which, together with the mining company, they talked about its plans for the transformation of the region. These first meetings and discussions created a good starting platform for local actors and the formulation of their ideas and expectations in the transformation of the region. They also raised awareness of the negative environmental impacts of mining, and the region's representatives considered these first meetings extremely important.

The activities of the mining company as an important actor in the regional transformation at the beginning of its process (2017–2018) deserve special attention. Several regional representatives who were interviewed recognised that the mining company was relatively well-prepared for the transformation. They had already started to diversify their activities: they invested in agriculture, fish farming and tourism, and they are among the largest landowners in the region. From the point of view of the representatives of the region, the year 2018 was also important when the mining company announced that they were going to open a 12th mining field (even though the phasing-out of mining had already been declared). However, this new mining investment was blocked by the regional parliament of the Trenčín self-governing region. It did not approve the changes in the regional zoning plan, and thus blocked the further development of mining activities. In this context, the conflict between the local spa company Kúpele Bojnice and the mining company also played a major role, as the possible opening of the 12th mining field threatened the supply of water to the spas, which would threaten the development of tourism in the region. The mining company's intensive efforts to continue and expand mining are also confirmed by the fact that in the local municipality of Koš the central government expropriated land for the future needs of the mining company. According to local stakeholders, the blocking of the new mining field was a blow to the mining company. In addition to ending government financial support for domestic coal burning, which we believe is a key step in ending mining, local authorities have also played an important role in limiting the further expansion of mining activity.

In 2018, municipal and regional elections were held, and the mining company nominated its candidates in Prievidza, Partizánské and other municipalities. These openly promoted the continuation of mining and were supported by the mining company, which means that the mining company was still trying to gain political power at the local level, which could help it to continue mining. However, the candidates supported by the mining company lost significantly, which according to regional participants can also be seen as a clear signal from the people that they wanted an end to mining in the region, and wished for something else.

An important milestone in economic policies was the approval of the updated version of the Action plan at the end of 2020. It defined the vision of the region: "Upper Nitra is an attractive and self-sufficient region with the development of economic activities in symbiosis with a clean environment, which is connected to other economic centres within Slovakia and the European Union" (GO SR, 2020). The action plan states that unemployment is not a fundamental problem for the region, and the key areas of future development are mobility and the connectivity of the region, business and entrepreneurship (including the creation of sustainable jobs), the environment, quality of life and social infrastructure. The action plan, as well as other programme documents, considers transport infrastructure one of the

key factors of successful regional transformation and development. One of the regional development priorities is the modernisation and completion of transport infrastructure in the region (roads and public transport) while also connecting the region to trans-European transport networks. According to the action plan, support for the economy and entrepreneurship should “support investments that create new jobs in existing and new businesses and development projects aimed at the new use of brownfields after mining activity and after the production of energy from brown coal, as well as support the establishment and development of SMEs and support innovation in potential businesses in the region” (GO SR, 2020).

An important part of the action plan comprises projects funded by the Just Transition Fund, focusing on the following areas: a) productive investments in SMEs, including startups, which lead to economic diversification and reconversion; b) investments in the creation of new companies, including through business incubators and consulting services; c) investments in research and innovation activities and support for the transfer of advanced technologies; d) investments in the introduction of technologies and infrastructure for affordable clean energy, investments in the area of reducing greenhouse gas emissions, and the promotion of energy efficiency and energy from renewable sources; e) investments in digitalisation and digital connectivity; f) investments in the regeneration and decontamination of sites, in land restoration and projects to repurpose sites; g) investments to support the circular economy, including support through waste prevention, waste reduction, resource efficiency, reuse, repair and recycling; h) increasing the level of skills and retraining of workers; i) assistance for job seekers in finding a job; and j) the active inclusion of job seekers (GO SR, 2020).

2.3.6. Funding the transformation

Public economic and regional policies are relatively strongly centralised in Slovakia. The administration of self-government regions (NUTS 3 level) and municipalities (cities and towns – level LAU 1) have very few financial resources and little access to direct or indirect measures for creating and shaping their own regional policy. Similarly, as our research has shown, the national central sources of funding for the transformation are severely limited. According to regional representatives, funds from the national budget or other national sources are not used for the benefit of the transformation, so it is not possible to assess their real impact. Therefore, the entire process of transformation of the Upper Nitra region relies primarily on EU funding and central state administration which is responsible for EU fund implementation. However, since 2017, we have seen the strong involvement of local and regional actors in the transformation process. The first projects designed to transform the region and reduce the negative impacts of the transition started to be implemented in 2020 from the resources of the 2014–2020+2 programming period. Financial resources were invested in quality support for regional administration processes and capacity building of local governments. Projects were implemented to promote employability, to increase the competitiveness of SMEs, and in the energy sector and transport infrastructure.

Employability and employment

In 2020, the pilot European Structure and Investment Funds (ESIF) project focusing on the special conditions of the region’s transformation, and entitled “National Project for Employability Support in the Upper Nitra Region”, saw the commencement of its implementation in the region. The amount allocated is EUR 11.9 million, and the project is being implemented thanks to support from the European Social Fund within the Operational Programme Human Resources. The governing body is the Ministry of Labour, Social Affairs and Family of the Slovak Republic. The project aims to provide help and

support to employees of mining companies while improving their qualifications and developing their competencies and soft skills. Running from 2020 to November 2023, the project is intended for 700 former mine workers (TSK, 2022). The adaptation process of the project participants – the laid-off miners – takes six months; during this period they are still employees of the mining company, and are paid wage compensation from this project. The entire adaptation process consists of the following activities: a) group and individual sessions and activities between tutors and project participants, aimed at developing soft skills (communication, coping with anxiety and stress, personal presentation); b) group and individual sessions and activities provided by external lecturers (evaluation of employees' professional skills and personal assumptions, determination of their values, interests and motivations, and the development of career path alternatives); c) the possibility of completing one professional retraining course; d) the possibility of completing one course for the development of personal skills and competencies (financial literacy, computer skills, etc.); and e) help in finding a new job – preparing a job application (including CV and motivation letter), and preparing for an interview.

According to regional representatives, the project is not a bad one. However, its timing is poor, as it is scheduled for completion as early as November 2023, which will occur when the biggest wave of redundancies is expected, and as such the programme's activities will then be most needed. At the beginning of the project, the problem was low interest within the target group – the employees of the mining company. However, the first participants in the programme confirmed its usefulness, and the programme took off. The coronavirus pandemic also proved to be a problem, hampering the continuity of activities. According to regional representatives, the problem today is the administration capacity of participants. High gas and electricity prices have also increased demand for lignite and reduced the pressure to lay off miners in 2022. Regional representatives believe the mining company is “currently reluctant to release miners to upskill and reskill in the programme. They need every miner now”. The “megalomaniacal project setup” is also proving a problem. “During project planning, the Ministry of Labour pushed hard for high project indicators, which are currently a big problem to meet. The final indicator of the project is 700 participants and after more than two-thirds of the project, not even 50% has been reached. The non-fulfilment of the indicators is a real problem for the municipalities involved, which are partners in the project, because based on the unfulfilled indicators the municipalities may face financial correction, which is a real problem in times of tight budgets”. However, respondents anticipate that after the end of this project, the Just Transition Fund will be used to ensure the continuation of project activities, although they will be designed in a better way. The energy crisis will not reverse the process of mining closures in the region, although layoffs will be less gradual and more concentrated in the final year of government support for coal mining (2023).

Energy and transport infrastructure

The mining company will continue to be an important player in the region's energy sector even after the coal mining operations have ceased. Together with the town of Prievidza, they are co-owners of the Prievidzské tepelné hospodárstvo company, which produces and distributes heat in the region. Through the Operational Programme Quality of the Environment, it received funding for the project “New basic heat source in the Cigel' mine for the town of Prievidza–cogeneration unit”. This is for the construction of renewable energy sources (the energy potential of mine water and a solar-energy system). The amount of support is EUR 0.421 million. In July 2022, the Slovak Energy and Innovation Agency (an organisation under the Ministry of Economy) announced a Call for proposals for the construction, reconstruction and modernisation of heat distribution for the upper Nitra. The call is financed by the Environmental Quality Operational Programme and its allocation in the amount of EUR 15 million is

intended for the construction, reconstruction and modernisation of central heat supply distribution systems in the Upper Nitra. An important part of the transformation is the transition from burning coal to other sources of heat production. Heating for the city of Prievidza will be based on existing biomass boilers, mine water, solar thermal panels, heat pumps and natural gas.

According to the local environmental actor, the decarbonisation of the region must not stop only at the transformation of the central producer of heat. The activity should also focus on reducing energy consumption. A big challenge for the future is the insulation of public buildings. This is also part of the action plan, and there is considerable demand for such projects, mainly from public sector actors. “For example, in the city of Prievidza, we can save up to 63% of the heat for heating by the comprehensive renovation of buildings”. According to an independent local actor who was involved in the initial stages of preparing the transformation, among the biggest challenges of the region’s transformation in 2023 is the shortage of regional professional capacities planning further decarbonisation. Cooperation within the region, through networking and partnership, needs to be developed and further intensified. In particular, consulting services for the establishment of non-profit organisations would be welcome.

Regional representatives are critical of the process of preparing the construction and modernisation of road infrastructure in the region. In particular, the lack of progress on the bypass around the town of Prievidza and the regional motorway are perceived as critical.

After 2023, several larger infrastructure projects funded by the EU are expected to be implemented: the industrial park Prievidza West II and its connection to transport infrastructure; the reconstruction and modernisation of roads in the town of Prievidza and its region; the building of a new central heat source based on waste energy recovery; increasing the energy efficiency of public buildings in the region; optimising the heat distribution network; and building a brownfield industrial park in the area of heat power-plant Nováky (Jenčová, 2022; Ilčíková & Melichár, n.d.; GO SR, 2020).

Competitiveness and SMEs

In 2020, a Call for applications for the provision of a non-refundable financial contribution aimed at supporting SME business development was announced as part of the EC initiative aimed at transforming the Upper Nitra coal region. It was announced by the Ministry of Economy as part of the Integrated Infrastructure operational programme through which SME projects in Prievidza and Partizánske districts could be supported. The total amount allocated in the call was EUR 17.6 million, and the aim was to support the development of business in the region and the growth of the competitiveness and innovation capacity of regional enterprises. In the context of the region’s transformation, the non-refundable financial aid aimed at the technological development of regional SMEs indirectly supports employment and also reduces the energy demand (through new technologies). More than 100 enterprises were supported.

According to local business sector representatives, assessment of the implementation of approved projects in the region is rather negative. The first problem is the administrative length and complexity of the processes. Project preparation is time-consuming and expensive for applicants. The administrative complexity requires the involvement of external consultancy firms specialising in the management of EU-funded projects. However, from the entrepreneur’s point of view, external consultants make the process of securing a project more expensive. In 2022, a big problem for approved projects has proven to be the large increase in technology prices. Programme projects are mostly based on the purchase of ready-made new production technologies at 2020–2021 prices. Therefore, the higher prices of purchased technologies significantly complicate the absorption of programme funds.

The above-mentioned projects were financed from sources of EU funds within the programme period 2014–2020+2. Increasing the technological level of enterprises and reducing their energy intensity can be one of the ways to address high energy prices. Similarly, the modernisation of reconstruction and heat distribution is a way of reducing energy consumption.

Development project of the mining company

When evaluating the initial period of transformation of 2017–2023, we can say that one of the key actors of the process, which is the mining company, adapted to the changes more or less successfully. The mining company's investments can be acknowledged as the only significant private source in the region's transformation. Development projects for the diversification of the mining company are aimed at furthering growth in metal and mechanical engineering production (repair of railway wagon chassis, with the possibility of creating 50 new jobs) and the production of railway wagon chassis (the estimated number of new jobs is 500, while the amount of investment expected is EUR 70 million). The company is also interested in participating in changing the energy production base in the region. It is planning a “Heat supply project in the upper Nitra region”, based on renewable sources (20 new jobs and an investment of EUR 8.2 million). The diversification of future companies also includes expansion of agriculture and fisheries (utilisation of the thermal energy potential of mine water with 75 new jobs, an investment of approximately EUR 13 million). Another potential project is the revitalisation of the mine area and the development of tourism. According to the management representatives of the mining company, these development projects could bring in more than 1,000 new jobs and reduce the social impact of ending coal mining. However, the limiting factor to diversification is the unavailability of bank loans for the company. A possible solution is the use of ESIF resources or the Just Transformation Fund, but the obstacle is the current setting of criteria for co-financing projects from ESIF, which significantly limits the proportion of aid for large companies (only up to 25% of the investment). The mining company, which has become a co-owner of the local municipal heating plant, will continue to play a role in the regional energy sector in the future.

2.3.7. Conclusions

The decarbonisation of energy-intensive regions, sectors and economic structures is part of national climate and energy policies. Achieving a climate-neutral economy will have some impact on regional economies and regional labour markets. The areas, tools and resources to address the impacts of the transition are also part of the national strategies (Territorial Just Transition Plan for Slovakia).

The region of the Upper Nitra is relatively small compared to other coal regions in the EU, and its role within the Slovak economy is not significant. However, the phasing out of mining has an impact on the regional economy, as well as rather important environmental effects in national terms. The importance of mining and consumption of domestic lignite has gradually declined in the past two decades. In the period of 2017–2023, a political decision was taken to end mining, for its gradual reduction, and preparation for the final phasing out. A strategic transformation plan was drawn up, and development projects designed (focusing on administrative capacities, active labour market policies, and calls for projects for SMEs). The regional energy base changed towards using natural gas and renewable energy sources, and the first development projects were started. The phasing out of coal and the start of the transformation can be considered a success.

In 2017, political discussions about ending coal mining and burning in the Upper Nitra began. The key determinants were the government's decisions to end financial support for coal burning by 2023, the

decision of private owners to shut down the thermal power plant in Nováky, as well as the activism of local and regional actors against the planned expansion of coal mining. The final and major wave of miner layoffs is expected in 2023. The government's decision to end support for the use of domestic coal was not changed by the turbulent growth in energy prices in 2022. The activity and participation of local and regional actors in the process of preparing for the transformation in 2017–2019 and the organisation of meetings between representatives of central authorities and local actors were successful. The transformation of the region has become a major part of the Territorial Just Transition Plan for Slovakia. Trade unions were part of the process of preparing the transformation strategy, and they participated in the round table meetings during the preparation of the action plan, but their visibility was relatively poor. The problem, as perceived by the stakeholders, was their strong connection to the management of the mining company, and they were more or less its voice. The trade unions attempted to secure the continuation of coal mining even after 2023, as too did the management of the mining company; such was their common goal. Local stakeholders (municipalities, NGOs) perceived the link between the trade unions and the management or owners as quite strong. The trade unions organised a petition for the continuation of mining, but this was unsuccessful. Overall, the mining industry's position in the economy is very low (one coal mining company), and hence the position of the mining trade unions is relatively weak and limited. In addition, the approach by other actors in the transformation process has been strong, active and much more visible than the activities of the mining unions. In terms of social dialogue, the risks and social impacts of ending mining were rather on the agenda of representatives of local municipalities.

The strong and active involvement of local actors (local municipalities and environmental non-governmental organisations) in the process of creating key documents for the transformation of the region was an important point in the process and one of the conditions for a successful transformation as well as an example of good practice in a participatory approach to the creation of economic policy in Slovakia.

The biggest concerns about the transformation were the possible negative effects on the regional labour market and the social situation of laid-off miners. Positive developments are, however, anticipated in this respect. An important prerequisite for a successful transition is a relatively good situation in the regional labour market and continuing demand for available labour in the region. These factors allow for relatively good adaptation among the discharged miners. In 2023, layoffs of approximately 1,100 mining employees will not have major negative impacts. Policy measures have already been built into national labour and social policies to facilitate the adaptation of laid-off miners: the option of early retirement for miners, or the provision of compensation to miners laid off due to mine closures.

The main source of funding for the region's transformation is EU funding; it is assumed that national and local resources will play a very limited role. An extraordinary opportunity for the transformation of the region and its further development is the amount of funding within the Just Transition Fund, which reached EUR 250 million. Beyond 2023, other challenges for the region's transformation are its further decarbonisation (reducing energy consumption, increasing energy efficiency, increasing the share of renewable energy sources, the insulation of public buildings and involving private actors in decarbonisation), strengthening absorption capacities for spending on projects destined for the region, and the further participation of local and regional actors.

2.4. Case studies comparison

The qualitative analysis in this study was centred around the following set of items, presented in the figure below:

Figure 30. Analytical framework for the round-table and stakeholders' interviews.



Source: own elaboration.

Based on the JRC's Sustainable employment and welfare support toolkit (Kapetaki et al., 2020) which provides useful guidance for effective energy transition for regions, the following elements were included when discussing the rationale built for the energy transformation:

- to what extent the focus in managing the transition was on workers losing employment and disfavoured communities,
- plans on how these workers could adapt to new skills and jobs,
- to what extent the attraction of new activities and expansion of existing ones were envisaged and planned,
- to what extent the supply of decent jobs was assured.

The comparison of the three researched case studies is thus concentrated around the rationale, the process, and the outcomes of energy transition, and follows the above list. Three case studies have been researched – Lusatia in Germany, Wielkopolska in Poland, and Upper Nitra in Slovakia – and the differences between them are considerable. The coal phase-out has long been decided upon, and is being worked on in Germany, which is not the case in Poland or Slovakia – which, again, have taken a different approach to the issue.

Factors influencing the transition

In the case of **Lusatia**, during the period analysed in this study political factors have played a major role in the energy transition, together with environmental factors to some extent; a minor role was played by sociological factors. In the late 1950s coal mining in Germany was in crisis – it was cheaper to import coal than to buy it domestically. Over the next 60 years, the number of people working in coal mining fell from just over 600,000 to around 15,000. This drop was predominantly caused by economic factors. Now, as the climate crisis intensifies and coal phaseouts have become an essential means of reducing greenhouse emissions, the European Green Deal has played the major role in stimulating the transition.

In the case of Poland, it was only in 2021 that energy transformation involving a total shift from coal-fired power plants to a zero-emission economy became part of the national plans for the energy policy mix. The Energy Policy of Poland accepted in 2021 was the first policy document clearly aiming for the decarbonisation of the coal and lignite mining regions, the closure of the lignite mines, and the implementation of the transformation processes – including in **Wielkopolska**. The energy strategy has been strongly affected by EU policies and instruments developed since 2003, and the need to deliver EU climate neutrality by 2050.

According to the research conducted for this study, in **Upper Nitra** a mix of factors determined the transformation: economic (inefficiency of lignite mining), social (health risks to employees – e.g. in 2015, the only mining company that carries out mining in Upper Nitra – Hornonitrianske bane, a.s. – was among the 10 companies with the highest number of occupational injuries and illnesses in Slovakia), and environmental. Those factors gradually created enough pressure to end coal mining in the region, and government support for mining is due to end by 2023. Still, political factors, with a prominent role of EU policies, were also of great importance.

Leaders of the energy transition

The views on who has been **the main leader of the energy transition** differ across case studies and stakeholders. In **Lusatia** a leading role has been attributed to the Coal Commission launched by the federal government in 2018, comprising federal government and regional government officials, plus union and industry representatives. In **Wielkopolska** no similar body has been established, and a *de facto* leading role in dealing with transition was attributed by stakeholders to the company ZE PAK, which has been dealing with the social challenges of transformation (including reskilling) without any significant public support. The general directions of energy policy development were set by the state with the 2021 Energy Policy of Poland, while in February 2021 the Council of the Wielkopolska Voivodeship accepted the Strategy for Eastern Wielkopolska that aimed for climate neutrality by 2040 (Strategia na rzecz neutralności klimatycznej Wielkopolska Wschodnia 2040). The consultation process inaugurated by the Agency of Regional Development – Transformation (a daughter organisation of the Agency of Regional Development – a joint-stock company with the main stakeholder being a local government unit) engaged 90 regional and national stakeholders from different sectors and industries (ARR Transformacja, 2021). Their combined efforts resulted in the drawing up of the Concept of the Just Transition for Eastern Wielkopolska.

The main directions of energy transformation in **Upper Nitra** have also been set by the central level, but according to stakeholders the main role in the process of preparing for the transformation (after 2017) was played by Hornonitrianske bane Prievidza a.s., and it is expected that this private entity will remain a strong economic regional player even after 2023. In the process of developing the action plan

for Upper Nitra (approved by the government in June 2019), PricewaterhouseCoopers Slovakia (PwC), contracted by the Slovak government, played a key role.

The role of trade unions, civil society and affected workers in transition

Regarding the **role played by trade unions, civil society and affected workers** (in plans' development and implementation), in the view of the trade unions we interviewed, their cooperation with employers in **Lusatia** has been productive and effective. Once again the importance of the Coal Commission in securing the involvement of all possible actors, i.e. trade unions, science, economic enterprises and politics, was underlined in this context. A strong networking of the actors engaged in structural change in the region has also been very helpful in making progress on individual issues. In **Wielkopolska**, the proposed and implemented changes were undertaken through close collaboration with social partners (including trade unions), but without a structured strategy. The interviewed stakeholders recounted how they were always invited to the dialogue process, but said the negotiations "were useless, since they did not lead anywhere".

In **Upper Nitra** the public debate about the end of mining has been limited. According to regional stakeholders, "the close relationship between the owners of the mining company and the government was also a problem". What distinguishes Upper Nitra from other case studies is the involvement of NGOs. On the central level, a working group for the preparation and implementation of the action plan for the transformation of the Upper Nitra region was established. It was created and led by the Office of the Deputy Prime Minister for Investments and Informatisation, its members were representatives of all relevant (economic) ministries and regional self-government representatives, municipalities, NGOs (CEE Bankwatch Network, Greenpeace, Friends of the Earth), managers of large companies from the region (Nestlé, Brose, ContiTech) and the energy sector. Trade unions were also represented by the Trade Union of Mine Workers, Geology and Oil Industry. Independently of the centrally established working group, in 2018 local working groups were established at the regional level to develop an action plan for transformation. The activities of the local working groups were coordinated by the NGO Friends of the Earth–CEPA. The local working groups consisted of several dozen people who worked in four groups to define a vision for the region as well as the individual steps that would make the vision a reality.

Changes in employment structure

The issue of **workers losing employment** (not so much the situation of disfavoured communities) was one of the central points in managing transition in all three case studies. What differentiates Lusatia, Wielkopolska and Upper Nitra is their approach to the issue of public authorities. In the case of Wielkopolska, for example, the regional energy transformation has been undertaken with limited involvement of the public authorities (any support for laid-off workers), and greater involvement of the employer, ZE PAK.

As regards **ways and means for plans on how workers being made redundant could adapt for new skills and jobs**, special initiatives were mentioned in **Lusatia** such as a training agreement between LEAG, eastern Germany's largest energy company operating power plants and opencast lignite mines in Brandenburg and Saxony, and the German Federal Railways (the planned maintenance plant will create 1200 jobs). In general terms, cooperation between companies was indicated as an important point in the context of educating employees in regard to new qualifications. In this context not without importance is the fact that Lusatia's population is aging faster, which means that many people will retire

in the near future. Therefore, the challenge is to provide enough skilled workers for the newly created economic structures and for the economy in general. The issue of reskilling and upskilling was not properly addressed in relevant documents regarding transformation in **Wielkopolska**. The Just Transition Strategy for Wielkopolska mentioned in brief about “professional vocational activation of unemployed people and job seekers, including support for those affected by the transition and their relatives”. In practice, this should mean professional support for those employed in ZE PAK – career counselling, reskilling, legal and psychological assistance, support to start up their own business, and others – to be provided through various initiatives. All three researched regions, including **Upper Nitra**, face the problem of encouraging miners to invest in their skills and competences, and change their occupation. In addition to that the projects funded by the Just Transition Fund in Upper Nitra are supposed to increase the level of skills and retraining of workers, provide assistance to job seekers in finding a job, and support the active inclusion of job seekers.

In the context of the **appeal of new activities and expansion of existing ones**, the goal of the transformation process in **Lusatia** has been to create replacement jobs that generate comparable added value. One of the examples of such investments is LEAG’s “Gigawatt Factory”, which looks to develop an energy centre consisting of photovoltaic and wind power plants with a capacity of 7 gigawatts on former mining sites, as well as the building of a hydrogen-ready power plant. But if Lusatia is to fill the jobs that are to be created, there must be considerable immigration to the region. The Concept of the Just Transition for Eastern Wielkopolska stipulates that the aim of the strategy is to transform the eastern parts of **Wielkopolska** to become a national leader in the green economy in 2040. The idea is to base the regional economy on the circular economy using local manufacturing capacities based on environmentally friendly technologies. In the case of **Upper Nitra** an important part of the action plan comprises projects funded by the Just Transition Fund. These are investment projects oriented towards SMEs, the creation of new companies, and research and innovation as well as investments in introducing technologies and infrastructure for affordable clean energy, and in such areas as reducing greenhouse gas emissions and promoting energy efficiency and energy from renewable sources.

Financial programmes supporting structural change

In relation to **financial programmes supporting structural change** in **Lusatia**, there are three sources of funds. The first is federal funding that is given out under the supervision of the federal states, the second involves projects that the federal states have proposed or are still proposing to the federal government, but which are disbursed under the supervision of the federal government (Structural Strengthening Act – a list of roads and railway connections that are to be built in Lusatia). The third source of funding is the so-called strong programme which finances smaller projects that are above all participatory in nature. In addition to that, the Just Transition Fund is an important source of EU funding: Brandenburg will receive €785 million to diversify its economy and smoothly move away from a lignite and petrol-based economy, and in Saxony, €645 million will be invested in the just transition of the Lausitzer Revier, the Mitteldeutsche Revier and of the city of Chemnitz, dependent on lignite mining and lignite-fuelled energy production (EC, 2022a).

At the time of writing this report the Just Transition Plan had not yet been activated in Poland, but the EC had adopted five Polish Operational Programmes with Territorial Just Transition Plans (TJTTPs), worth more than €3.85 billion under the Just Transition Fund (JTF), to support a just climate transition in the coal regions of Silesia, Małopolska, Wielkopolska, Lower Silesia and Łódź. The Konin subregion of **Wielkopolska** will receive €415 million for its plan to transition away from its lignite mining industry

and lignite power plants. The Fund will support training and reskilling activities for 5,500 workers in the lignite industry (EC, 2022b). As the regional Eastern Wielkopolska strategy is broad in scope, the assumption is that it will be financed from diverse sources involving public and private capital.

In **Upper Nitra** the announcement of the Just Transition Mechanism in January 2020 was an important milestone; the adopted Territorial Just Transition Plan (TJTP) for Slovakia is setting the strategy for the investment of €459 million allocated to the country from the Just Transition Fund (EC, 2022c). Out of this sum, the Upper Nitra region can use funds of up to €250 million. The Just Transition Fund became the main source of funding the regional transformation in Upper Nitra – funds from the national budget or other national sources are not used for this benefit. Projects in this region have also been funded from other EU sources, such as the European Structure and Investment Funds (ESIF) or the Operational Programme Quality of the Environment.

Obstacles in the implementation of programmes and tools

As regards **(possible) obstacles to the implementation of programmes and tools identified during qualitative research**, the administrative capabilities (also in terms of human resources) of the actors involved to implement projects from EU sources, along with the pressure of time, were mentioned in relation to Wielkopolska and Upper Nitra. In general terms, it was agreed that a lack of public support makes the transformation lengthier and too expensive.

As the transition process in Wielkopolska is still in its inception phase, it is too early to judge its **outcomes**. In Lusatia the transition plan seems to be achieving its required goals, although its implementation has not always been smooth. As for ensuring social protection and decent and quality jobs, nine companies that are settling in Lusatia will be covered by collective agreements; for the older employees, a solution was found in the form of a regulation in the law with an adjustment allowance for those who are over 58 years old. In Upper Nitra, in turn, laid-off miners are entitled to a relatively generous social benefit.

Chapter 3. Conclusions and recommendations

In this study we examined three examples of lignite regions vulnerable to the phase-out of coal mining: Lusatia in Germany, Wielkopolska in Poland, and Upper Nitra in Slovakia. As discussed in the previous chapter, and specifically in the sub-section dedicated to the comparison between the regions (see section 2.4), **there is no one-size-fits-all recipe for a just transition that could benefit every region.**

Ideally, the transition should start with an assessment of the current economic, environmental and social situation. This assessment should be conducted in order to identify the areas in which an intervention is needed, and to design strategies that are tailored to local circumstances. This includes an analysis of the existing infrastructure and assessment of the strengths and weaknesses of the existing economy, among other things. As exemplified by the analysed regions, this very first step in the transition is often not given enough attention – even in Lusatia, which serves as a good example of transition, researchers and scholars call for a greater involvement of science in this process.

Nevertheless, in each case the assessment led to the development of **local strategies**, which should be built on local assets and recognise the spectrum of “drivers of change”. The analysed regions provide **three different pathways of building and implementing such strategies**. In Lusatia the Coal Commission, made up of representatives of key stakeholders, played an important part in this process and helped ensure its sustainability and durability. In Wielkopolska, stakeholder engagement and consultations took place but solutions developed during this process have not always been implemented, leading to no proper public support. In Upper Nitra the transition strategy was to a great extent imposed by the central government, but local actors (municipalities, NGOs) were still actively involved in the process of creating key documents for the transformation. Again, from these examples, it is not possible to draw the unequivocal conclusion that the involvement of all stakeholders is a prerequisite for successful transformation under all conditions; however, the practice does appear to reinforce the likelihood of achieving the intended results.

On the grounds of the examples of energy transition researched here, it can be argued that **transition processes that engage various actors and involve stakeholder coordination** (i.e. trade unions, science, enterprises, government, and NGOs, etc.) **are more likely to ensure a just outcome in terms of social and economic effects**. In other words, a just transition requires the engagement of various actors, at different levels, and an approach that includes many different policy instruments (policy mix). A holistic approach to the energy system – encompassing industrial policies, labour market policies, social protection measures, diversity and inclusion programmes, and skills training and retraining strategies – which requires working together with many stakeholders across different industries, may therefore be regarded as vital for a just transition. To put it differently, **genuine cooperation between social partners and between trade unions and employment policies enhances the likelihood of the transition’s success**.

Each structural change – including transition from coal to sustainable energy sources – **has a very long time horizon**: it takes decades rather than years. It is a long-term process with a number of phases: preparation, amelioration, restructuring and reinvention. The main challenge associated with it is how to redistribute the costs and benefits of the transition. This requires a shift from a focus on short-term gains to longer-term investments which is difficult to achieve under the conditions of the political process and the associated electoral cycle. The existence of mechanisms that function as independently as possible from the electoral cycle increases the chances of achieving the objectives of the transition.

Again, the Lusatian Coal Commission might provide an example of such a mechanism which allows also for the implementation of corrective measures and restructuring and reinvention.

Structural changes need also **adequate and stable financing**. In Germany, EUR 40 billion was allocated to shape structural change in the country as a whole, of which EUR 17.2 billion was for Lusatia alone. The transformation of Upper Nitra has become a major part of the Territorial Just Transition Plan for Slovakia, and the main source of funding for the region's transformation is EU funding (with the Just Transition Fund reaching EUR 250 million). In the case of Wielkopolska, the financing is still uncertain as the JTP has not yet been activated, but the 2021 Regional Eastern Wielkopolska Strategy states that the transition should be financed from various sources (public and private, national strategic programme funds, EU, and international). In general terms, what failed to work in Poland was that programmes aimed at restructuring mining focused mainly on hard coal, while the restructuring of employment was financially secured by companies' own funds plus national budget donations.

Another related aspect is **measures to create new high-quality jobs**. In Lusatia, companies operating in the region benefit from response to structural change through innovation, and the opening up of new markets, and the expansion of cross-border infrastructures and the creation of new jobs are expected outcomes of the transition. This aspect has been neglected in case of Wielkopolska where support from the public authorities is urgently needed; in Upper Nitra positive developments are anticipated in terms of the regional labour market, with policy measures already in place to facilitate the adaptation of laid-off miners.

It must be noted, however, that measures to create jobs and those aiming to support miners must be carefully designed and adjusted to regional conditions. The example of ABMs in Lusatia, which in the opinion of the study's informants failed, provides a valuable insight on the effects of an ill-designed measure.

As shown with the research, **transition to a green economy is not only about the economy – it is also about culture, nature and cities that can attract highly skilled workers**. In other words, transition depends on existing cultural factors (e.g. self-identification of miners and their sense of belonging to a particular community, or stakeholders' willingness to cooperate and their trust in other stakeholders) and, at the same time, it forces a change in them (e.g. change in the region's identity). It is a long and difficult process that would be hard to conclude in a short period of time. For all three regions analysed, miners' identity issues were important in the transformation process, and the process itself was (to a varying extent) perceived by them as a threat. This is important insofar as it affects miners' willingness to take advantage of labour market policies related to obtaining new qualifications, further training and, ultimately, seeking work outside mining.

The authors of this study formulate below some recommendations concerning the transition in each of the analysed regions. Their scope reflects the degree of transition in the region concerned, with Lusatia being the most advanced and rather a positive case, and Wielkopolska needing to “get back to the basics” and considerably revisit its regional plans and strategies to actually make the transition work, not only economically but also from social, cultural and environmental points of view.

Specific case study recommendations

Lusatia

- **An extended dialogue process** to develop a **further roadmap for action** for lignite in Lusatia should be underpinned by sound scientific studies that dovetail the energy and economic policy

implications of lignite phase-out with regional and structural policy development approaches for Lusatia. Current studies either deal with the macroeconomic analysis of the economic structure of Lusatia or are strongly focused on the possibilities of reducing lignite production and replacing it with renewable energies, but without considering the regional specifics of Lusatia in detail. These two strands of research should now be brought together to create a knowledge base for the upcoming planning and discussion processes.

- **Concrete concepts for shaping and managing structural change should be developed primarily at regional level.** However, this process should be actively supported by the state government. For the development of a broadly accepted mission statement and development concept for Lusatia, the systematic and continuous involvement of representatives of the districts and civil society is very important.
- The development concept to be drawn up should focus not only on the prospects for the “economic area” but also for the “living space” of Lusatia, in order **to make Lusatia socially and culturally appealing to desirable workers.** Qualified specialists will only remain in the region if a large number of **soft location factors** are met: good transport connections (especially rail and public transport), cultural and leisure activities, high-quality educational facilities, attractive supply infrastructure for families, and nearby shopping facilities, etc.
- Furthermore, **the regional development process in Lusatia should be systematically linked with the innovation structures at state level**, i.e. in Brandenburg the five clusters of the innovation strategy with the state of Berlin (innoBB) and the four Brandenburg-specific clusters. In particular, it is also possible to tie in with the state government’s strategy for defining and specifically promoting 15 regional growth clusters in Brandenburg, which also include Cottbus, Westlausitz and Spremberg (in the district of Spree-Neiße) (Vallentin et al., 2016).
- **An active labour market policy** is required for the development of Lusatia, a policy that contributes to securing the skilled workers required for the renewable energy sector and to reducing structural problems in the labour market, in particular long-term unemployment. Target group-oriented employment promotion projects are required to reduce long-term unemployment, and they should be launched primarily in the regions and employment agency districts with particularly high long-term unemployment.
- **Investment in qualifications** is urgently needed for meeting the challenges of technological, sectoral and demographic change. Alignment of the education systems to the needs of the regional economy, reducing the school dropout rate, modernising curricula, optimising career orientation, facilitating access to company internships and involving universities in further training can be part of a qualification offensive if they are specifically supported.
- **Intensifying further education and training** is of particular importance. Further training is often insufficiently implemented in companies, and entire groups of employees are excluded from further training measures. In order to get ahead in operational practice, the DGB Sachsen, for example, requires all employees to have the statutory right to further training of at least 5 days per year (Further Training Exemption Act). If SMEs receive additional state support for further training, the success of a further training offensive can be increased. At the same time, this would open the way to lifelong learning. What is also needed is a programme to secure and provide further development for skilled workers for Lusatia; it should be coordinated nationally and implemented through regional projects.

Wielkopolska

- **The interplay between the labour market and energy policies for the efficient energy transition should be revisited.** Focusing solely on energy policy might result in Wielkopolska becoming an even more polarised region, with the Konin area lagging behind its other parts.
- **Indicators for effective energy transition should be revisited.** Short-term stabilisation on the labour market and low unemployment rates combined with raising salaries are not adequate indicators to evaluate the effectiveness of implemented actions and strategies.
- Agreements concluded through social dialogue should be adhered to and implemented. There must be a commitment from all key stakeholders to the creation of decent jobs, the introduction of fair regulations, and the strengthening of social protection mechanisms. An accompanying strong policy framework should include an effective mix of economic instruments.
- **A long-term perspective on transition** should be applied, and public authorities, by activating public funds from different sources, should support the planned aims and corresponding activities.

Upper Nitra

- As Upper Nitra is highly industrialised but has relatively low labour productivity, **public investments should aim to develop human capital and increase the knowledge level**, and to support innovativeness and added value in the manufacturing industries as well as higher diversification in economic activities, towards knowledge-intensive services. Public investments should be aimed not only as subsidies to specific enterprises, but also for supporting the business environment and conditions for the development of domestic small and medium-sized enterprises and the inflow of FDI (e.g. development of transport infrastructure or industrial parks, especially brownfields).
- Regional out-migration and population decline are long-term challenges. Therefore, **public investments should not only aim to support purely economic factors, but should also go directly towards developing social infrastructure and improving the quality of life.** In this context, the long-term consequences of employment in the mining industry include a high rate of disability as well as a high share of the workforce with limited work skills. Labour market policies as well as development projects should also take this fact into account.
- EU resources are the dominant source of financing the transformation (EUR 250 million from the JTF). Due to the significant administrative complexity of the implementation, **it is necessary to improve the administrative capacities of the regional beneficiaries.** The challenge is also to increase regional absorptive capacities through networking, building partnerships of potential recipients and providing consulting services. It is also essential to simplify the administrative implementation of projects.
- As some projects aimed at the retraining of laid-off miners (e.g. National Project for Employability Support in the Upper Nitra Region) end in 2023, it is essential that they continue even after this date, when the biggest wave of layoffs is expected.
- Insufficient transport infrastructure is considered a barrier to Upper Nitra's development. The transformation of the region and its financial resources provide an opportunity for the modernisation of transport networks.

Based on the specific recommendations and conclusions, the following **general recommendations** can be formulated:

- Strategies and activities should be aligned across scales of government: local, regional, national and EU policy alignment. The policy mix aimed at facilitating a just transition which could successfully mitigate the risks associated with this process in the area of employment should include **elements operating at different governance levels (EU, national, regional, local)**. In this context, the regional level is regarded as suitable for working on improvements in employment.
- Moreover, **involving the local and regional level is crucial in the context of ensuring further sustainable development of municipalities and regions in general**. In some regions undergoing transition (e.g. in Lusatia) mayors and district councils are concerned that large proportions of business tax revenues will disappear and that municipalities will no longer be able to fulfil their duties.
- Coal regions – which our study concentrated on – are areas that often do not exactly fit the regional and administrative boundaries. Thus the **participation in the afore-mentioned coordinating bodies as well as relevant policies and policy tools, whenever justified, should not be limited to a given region but rather should acknowledge a network of relationships between regions**.
- The process of developing regional transition plans and policies should be transparent and well designed, so that all involved stakeholders are well informed and know the next steps. This includes supporting trust-building measures.
- Policies and policy tools drawn up should take into account the **demographic situation of the region concerned**, especially in the context of youth outflow, low birth rates and regional development plans with a longer time horizon.
- The research suggests that **investing in skills, training and retraining is an important element of just transition**. Better coordination between the energy sector and educational institutions is important in order to respond to the emerging trends in the educational needs of the energy sector and other sectors. Cooperation between companies (business entities) is also an important element of educating employees in regard to new qualifications. As such it is necessary to verify and monitor which qualifications are needed in the context of creating new jobs.
- New jobs emerging as a result of energy transition should be **decent jobs**, with adequate and competitive salary as one of the key components.
- Other policy instruments which are needed to facilitate a fair energy transition may include **social insurance programmes, temporary income support, unemployment support, community care programmes, labour market support** (e.g. retraining, skills upgrading, skills transferability), **environmental rehabilitation and repurposing strategies**. However, the capability to use these instruments varies across regions – not only because of different resources and abilities at a region's disposal, but also the range of the regional authorities' competences, as some of the potential measures may fall within the scope of the central government.
- **Access to adequate funding** supporting transition and allowing the proper implementation of the agreed policies and plans is key. Dispersed ad-hoc interventions (like in case of ZE PAK in Poland), although very much needed in the absence of other actions, cannot fully address all challenges related to up- and reskilling of workers.
- **Transition policies and plans should be regularly evaluated and reviewed** in terms of meeting the climate targets as well as other relevant indicators, including those related to training and employment and securing new decent workplaces.

- In this context it is advisable to **retain flexibility** in terms of policies, technologies, and the economy, etc., as transition is a long-term process with a number of phases: preparation, amelioration, restructuring and reinvention.
- **Local capacities for change should be developed:** adequate local capacity is as important as funding for successful transformation. Local capacity building should focus on developing the skills of miners, as well as strengthening local institutions and organisations. Additionally, local capacity building should include the enhancement of local leadership. Furthermore, local capacity building should also include the development of local networks and partnerships, which can help ensure that local laid-off miners have access to the resources and support they need.

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Annex 1.

Table 1. List of indicators for each case study

Economic output
1. Regional GDP
2. Regional GDP in relation to national and European GDP
Socio-demographic characteristics of the region
3. Changes in the age structure (in absolute terms and in relation to national and European averages)
4. Changes in the educational structure of the population (in absolute terms and compared to national and European average)
5. Changes in migration flow (in absolute terms and in relation to national and European averages)
6. Change in the income level (in absolute terms and in relation to national and European averages)
7. Average age of labour force/age structure of labour force in raw-materials for power generation related sectors
8. Employment changes in coal-related jobs between year x and x-1, compared to increase in other sectors' employment (by total, age and educational level, whenever possible)
9. Composition of the region (area, number of inhabitants, economic composition of the region)
10. Industrial relations in the area (number of sectoral social partners, relevant union information)
11. Existence of fund or aid system (name)
Sectoral-specific characteristics
12. The change in the share of raw-materials for power generation -based jobs in total employment in the regions
13. The change in the added-value of raw-materials for power generation -related businesses in total added-value of regions

14. Weight of the relevant carbon-intensive industry before the transition and after (number of direct jobs in mining before the transformation and now)
15. The change in added-value decrease in raw-materials for power generation-related jobs between year x and x-1, compared to the increase in other sectors' added-value between year x and x-1
16. The change in the share of companies linked with mining

Lusatia, Germany

Economic output

Indicator 1. Regional GDP in Lusatia (in millions EUR)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
27 723	28 592	28 878	29 445	30 416	30 791	31 617	32 824	33 791	34 257

Source: Statistische Ämter (2021a).

Indicator 2. Regional GDP in relation to national and European (EU 27) GDP (in millions EUR)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lusatia	27 723	28 592	28 878	29 445	30 416	30 791	31 617	32 824	33 791	34 257
Germany	2 564 400	2 693 560	2 745 310	2 811 350	2 927 430	3 026 180	3 134 740	3 267 160	3 367 860	3 473 350
European Union	10 980 000	11 320 000	11 391 946	11 520 206	11 784 026	12 214 800	12 552 647	13 076 870	13 532 162	14 016 454

Source: Statistische Ämter (2021a); EUROSTAT (n.d.).

Socio-demographic characteristics of the region**Indicator 3. Changes in the age structure (in absolute terms and in relation to national and European averages) – in %**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Inhabitants under 6 years	Lusatia	4,42	4,54	4,62	4,65	4,69	4,78	4,91	4,98	5,01	5,02
	Germany	5,01	5,06	5,07	5,09	5,14	5,27	5,41	5,53	5,62	5,69
Inhabitants from 6 to under 18 years	Lusatia	8,39	8,7	8,94	9,19	9,39	9,59	9,84	9,95	10,01	10,14
	Germany	11,3	11,3	11,18	11,1	11,01	10,95	10,91	10,82	10,76	10,76
Inhabitants from 18 to under 25 years	Lusatia	7,17	6,33	5,59	4,97	4,52	4,32	4,31	4,39	4,57	4,7
	Germany	8,24	8,07	7,93	7,76	7,67	7,71	7,66	7,63	7,59	7,53
Inhabitants from 25 to under 30 years	Lusatia	5,55	5,45	5,42	5,4	5,36	5,28	4,84	4,32	3,79	3,31
	Germany	6,06	6,04	6,11	6,25	6,36	6,56	6,5	6,4	6,26	6,1
Inhabitants from 30 to under 50 years	Lusatia	26,95	26,12	25,55	24,92	24,36	23,98	23,61	23,44	23,4	23,33
	Germany	28,79	28,17	27,76	27,28	26,77	26,33	25,89	25,59	25,38	25,21
Inhabitants from 50 to under 65 years	Lusatia	22,57	23,82	24,67	25,52	26,05	26,09	26,07	25,99	25,82	25,59
	Germany	19,99	20,69	21,19	21,66	22	22,14	22,4	22,64	22,85	22,96
Inhabitants 65 years and older	Lusatia	24,95	25,04	25,2	25,35	25,64	25,95	26,42	26,94	27,4	27,91
	Germany	20,6	20,67	20,76	20,87	21,05	21,05	21,22	21,39	21,54	21,75

Source: BBSR (2020).

Changes in the age structure (European averages) – in %

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Inhabitants under 14 years	15,40	15,40	15,40	15,40	15,30	15,30	15,30	15,20	15,20	15,20
Inhabitants from 15 to under 64 years	67,00	66,80	66,60	66,30	66	65,70	65,40	65,10	64,80	64,60
Inhabitants 65 years and older	17,60	17,80	18	18,30	18,70	19	19,30	19,70	20	20,20

Source: BBSR (2020).

Indicator 4. Changes in the educational structure of the population (in absolute terms and compared to national and European average) – Students per 100 inhabitants 18 to 25 years

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lusatia	21,52	25,41	33,91	36,76	32,54	32,35	31,4	30,58	29	27,73
Germany	32,91	36,74	39,15	41,74	43,34	43,54	44,38	45,04	45,5	46,18
EU	-	-	-	-	-	32,2	32,0	32,7	33,3	33,9

Source: BBSR (2020); EUROSTAT (n.d.).

Indicator 5. Changes in migration flow (in absolute terms and in relation to national and European averages) – Net migration (per 1000 persons)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lusatia	- 5,02	- 4,28	- 2,91	- 1,54	0,62	7,17	4,08	2,28	3,04	3,15
Germany	1,56	3,48	4,58	5,31	6,78	13,87	6,06	5,03	4,81	3,93
EU	1,5	1,4	1,8	3,5	2,1	3,5	2,3	2,5	3,1	3,3

Source: BBSR (2020).

Indicator 6. Change in the income level (in absolute terms and in relation to national and European averages) – Total compensation per employee (in EUR)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Lusatia	27 768	28 590	29 216	29 966	30 845	32 189	32 970	33 967	34 962	36 282
Germany	35 409	36 465	37 430	38 150	39 250	40 343	41 270	42 342	43 569	44 876
EU	-	32 414	32 914	33 375	33 697	34 154	34 622	35 374	36 238	37 114

Source: Statistische Ämter (2021b).

Indicator 7. Average age of labour force/age structure of labour force in raw materials for power generation related sectors

Data not available.

Indicator 8. Employment changes in coal-related jobs between year x and x-1, compared to increase in other sectors' employment (by total, age and educational level, whenever possible)

I.8.1. Employees in the lignite mining industry in Lusatia (including employees in the general supply lignite-fired power plants)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
8049	8126	8169	8369	8245	8316	8764	8640	8378	8116

Source: BBSR (2020).

I.8.2. Employees in Lusatia

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
in total	531,321	532,050	532,304	531,850	532,464	530,890	533,055	539,234	540,878	540,615
A. Agriculture, forestry and fisheries	12,888	13,245	13,133	13,180	12,967	13,095	12,648	12,560	12,411	12,21
B. Manufacturing industry	143,024	147,971	149,691	150,046	150,746	148,776	148,258	148,798	150,917	154,286
- lignite mining industry	8049	8126	8169	8369	8245	8316	8764	8640	8378	8116
C. Services	375,409	370,834	369,48	368,624	368,751	369,019	372,149	377,876	377,550	374,119

Source: Statistische Ämter (n.d.).

I.8.3. Employment changes in different sectors and coal-related jobs between year x and x-1

	2011	2012	2013	2014	2015	2016	2017	2018	2019
in total	0,1%	0,0%	- 0,1%	0,1%	- 0,3%	0,4%	1,2%	0,3%	0,0%
A. Agriculture, forestry and fisheries	2,8%	- 0,8%	0,4%	- 1,6%	1,0%	- 3,4%	- 0,7%	- 1,2%	- 1,6%
B. Manufacturing industry	3,5%	1,2%	0,2%	0,5%	- 1,3%	- 0,3%	0,4%	1,4%	2,2%
- lignite mining industry	1,0%	0,5%	2,4%	- 1,5%	0,9%	5,4%	- 1,4%	- 3,0%	- 3,1%
C. Services	- 1,2%	- 0,4%	- 0,2%	0,0%	0,1%	0,8%	1,5%	- 0,1%	- 0,9%

Source: Statistik Der Kohlenwirtschaft e. V. (n.d.); Statistische Ämter (2021c).

Indicator 9. Composition of the region (area, number of inhabitants, economic composition of the region)

See section 2.1.1 of the study.

Indicator 10. Industrial relations in the area

Main trade unions:

- Industriegewerkschaft Bergbau, Chemie, Energie (Bezirk Cottbus)
- Industriegewerkschaft Bauen, Agrar, Umwelt (Bezirksverband Südbrandenburg)
- IG Metall Geschäftsstelle Cottbus - IG Metall

- Ver.di-Bezirksverwaltung Cottbus
- Die Gewerkschaft Nahrung-Genuss-Gaststätten (Ortsstelle Cottbus)
- Die Eisenbahn- und Verkehrsgewerkschaft Cottbus

Indicator 11. Existence of fund or aid system (name)

See section 2.1.6 of the study.

Sectoral-specific characteristics

Indicator 12. The change in the share of raw-materials for power generation - based jobs in total employment in the regions – Employees in the lignite mining industry in total employment in Lusatia

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,51%	1,53%	1,53%	1,57%	1,55%	1,57%	1,64%	1,60%	1,55%	1,50%

Source: Statistik Der Kohlenwirtschaft e. V. (n.d.).

Indicator 13. The change in the added-value of raw-materials for power generation -related businesses in total added-value of regions

Data not available.

Indicator 14. Weight of the relevant carbon-intensive industry before the transition and after (number of direct jobs in mining before the transformation and now)

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
75102	76152	76675	78265	78395	79193	77031	78872	79121	79016

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
65478	52189	39258	27249	22328	19248	13883	11979	9517	7718

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
7081	6755	10338	9632	9489	8881	8456	8334	7862	7982

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
8049	8126	8169	8369	8245	8316	8764	8640	8378	8116

Source: Statistik Der Kohlenwirtschaft e. V. (n.d.).

Indicator 15. The change in added-value decrease in raw-materials for power generation-related jobs between year x and x-1, compared to the increase in other sectors added-value between year x and x-1

Data not available.

Indicator 16. The change in the share of companies linked with mining

Data not available.

Wielkopolska, Poland**Economic output****Indicator 1. Regional GDP in Wielkopolskie (NUTS-2 region) and Koninskie Region (NUTS3)**
(in millions EUR)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Wielkopolskie (NUTS2)	35 703	36 801	37 802	39 533	42 195	42 148	46 251	48 853	52 672	52 161
Koninski (NUTS3)	5 042	5 145	5 143	5 311	5 587	5 585	6 210	6 595	7 218	NA

Source: EUROSTAT (2022) [nama_10r_2gdp, nama_10r_3dgp].

Indicator 2. Regional GDP in relation to national and European (EU 27) GDP (in EURm)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Koninski (NUTS3)	5 042	5 145	5 143	5 311	5 587	5 585	6 210	6 595	7 218	NA
Wielkopolskie (NUTS2)	35 703	36 801	37 802	39 533	42 195	42 148	46 251	48 853	52 672	52 161
Poland	379 860	387 947	392 310	408 968	430 466	427 092	467 427	497 842	533 600	523 668
European Union	11 320 000	11 391 946	11 520 206	11 784 026	12 214 800	12 552 647	13 076 870	13 532 162	14 016 454	13 394 141
Koninski/ Wielkopolskie	14,12%	13,98%	13,61%	13,44%	13,24%	13,25%	13,43%	13,5%	13,7%	NA
Koninskie/ Poland	1,33%	1,33%	1,31%	1,30%	1,30%	1,31%	1,33%	1,32%	1,35%	NA
Wielkopolskie/ Poland	9,4%	9,49%	9,64%	9,67%	9,8%	9,87%	9,9%	9,81%	9,87%	9,96%
Wielkopolskie/ EU	0,32%	0,32%	0,33%	0,34%	0,35%	0,34%	0,35%	0,36%	0,38%	0,39%

Source: EUROSTAT (2022) [nama_10r_2gdp, nama_10r_3dgp].

Socio-demographic characteristics of the region

Indicator 3. Changes in the age structure (in absolute terms and in relation to national and European averages)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Koninski (NUTS3) up to 15	107 655	106 566	105 628	104 459	103 934	103 238	102 988	103 205	103 653	103 707	103 015
Koninski (NUTS3) 15-64	469 915	467 397	465 119	461 728	458 299	454 729	450 522	446 414	441 902	437 223	432 605
Koninski (NUTS3) 64 +	78 597	82 585	85 941	89 382	93 087	96 378	100 097	103 736	107 063	110 641	113 380
Wielkopolskie up to 15	554 041	552 727	552 613	552 183	553 520	554 882	558 891	566 218	572 105	576 466	577 578
Wielkopolskie 15-64	2 460 508	2 448 075	2436 875	2 405 276	2 388 308	2 370 149	2 370 149	2 350 65 1	2 333 365	2 315 942	2 297 114
Wielkopolskie 64 +	408 156	429 900	448 263	468 005	488 893	507 776	528 433	548 736	567 702	587 117	602 858
Koninski up to 15/total	16,41%	16,23%	16,08%	15,93%	15,86%	15,78%	15,76%	15,8%	15,88%	15,92%	15,87%
Koninski 15-64/total	71,62%	71,19%	70,83%	70,43%	69,94%	69,49%	68,93%	68,33%	67,71%	67,1%	66,66%
Koninski 64+/ total	11,98%	12,58%	13,09%	13,63%	14,2%	14,73%	15,31%	15,88%	16,41%	16,98%	17,47%
Wielkopolskie up to 15/total	16,19%	16,11%	16,07%	16,05%	16,05%	16,08%	16,16%	16,34%	16,47%	16,57%	16,61%
Wielkopolskie 15-64/total	71,89%	71,36%	70,89%	70,36%	69,76%	69,21%	68,55%	67,83%	67,18%	66,56%	66,06%
Wielkopolskie 64 +/total	11,92%	12,53%	13,04%	13,6%	14,18%	14,71%	15,28%	15,83%	16,35%	16,87%	17,34%
PL	15,25%	15,14%	15,09%	15,04%	15,04%	15,04%	15,10%	15,24%	15,36%	15,44%	15,48%

up to 15/ total												
PL 15-64/total	71,14%	70,90%	70,52%	70,07%	69,55%	69%	68,36%	67,65%	66,98%	66,33%	65,8%	
PL 64+/ total	13,61%	13,96%	14,39%	14,89%	15,42%	15,96%	16,55%	17,11%	17,66%	18,22%	18,72%	
EU up to 15/total	15,45%	15,41%	15,37%	15,33%	15,29%	15,25%	15,24%	15,23%	15,18%	15,12%	15,06%	
EU 15-64/total	66,8%	66,57%	66,29%	65,99%	65,66%	65,41%	65,1%	64,82%	64,57%	64,32%	64,1%	
EU 64+/total	17,75%	18,03%	18,35%	18,69%	19,04%	19,34%	19,66%	19,95%	20,25%	20,56%	20,84%	

Source: EUROSTAT (2022) [DEMO_R_PJANGRP3]

Indicator 4. Changes in the educational structure of the population (in absolute terms and compared to national and European average) – Share of adults (aged 25–64) with tertiary education (levels 5–8)

	2017	2018	2019	2020	2021
Wielkopolskie	25,2	26,5	28,4	29,3	27,6
Poland	29,9	30,9	32,0	32,9	33,2
EU-27	29,9	30,7	31,6	32,8	33,4

Source: EUROSTAT (2022) [EDAT_LFSE_04] (data unavailable at NUTS3 level).

Indicator 5. Changes in migration flow (in absolute terms and in relation to national and European averages) – Net migration

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Poland <i>(absolute terms)</i>	- 11 841	- 2 726	- 26 943	- 18 935	- 12 792	11 507	4 593	22 147	20 081	3 909	-
Wielkopolskie <i>(absolute terms)</i>	670	752	- 580	306	- 314	597	943	3 910	3 147	2 153	-
Koninskie <i>(absolute terms)</i>	- 730	- 805	- 1 549	- 1 003	- 931	-1 127	- 778	- 567	- 1 057	-709	-
Poland <i>(rate)</i>	- 0,3	- 0,1	- 0,7	- 0,3	- 0,3	0,3	0,1	0,6	0,5	0,1	-
Wielkopolskie <i>(rate)</i>	0,2	0,2	- 0,2	0,1	- 0,1	0,2	0,3	1,1	0,9	0,6	-
Koninskie <i>(rate)</i>	- 1,1	- 1,2	- 2,4	- 1,5	- 1,4	- 1,7	- 1,2	- 0,9	- 1,6	- 1,1	-

Source: EUROSTAT (2022).

Indicator 6. Change in the income level (in absolute terms and in relation to national and European averages) – Average full time adjusted salary per employee (in EUR)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Wielkopolskie	n.a.	9 275,9	9 580,2	9 797,2	9 678,7	10 422	11 389	12 411	12 756	12 336
Poland	10 442	10 569	10 842	11 096	11 146	12 086	13 071	14 047	14 327	14 431
EU-27	28 433	28 919	29 193	29 685	30 157	30 849	31 511	32 508	32 286	33 511

Source: National Statistical Office (n.d.); EUROSTAT (2022) [nama_10_fte: Average full time adjusted salary per employee (for PL and the EU-27)]; Statistical Office in Poznan (n.d.).

Note: The data for Wielkopolska region is an approximation based on the own calculations being done on “Wynagrodzenie przeciętne w sektorze przedsiębiorstw” by NSO in Poland (National Statistical Office, n.d).

Indicator 7. Average age of labour force/age structure of labour force in raw materials for power generation related sectors – Age structure of labour force in mining and quarrying of energy producing materials (NACE Subsection CA)

Age/region	15-24	25-34	35-44	45-54	55-64	65+
Poland	4,4%	20,3%	27,7%	26,5%	16,9%	4,3%
EU-27	4,4%	16,6%	26,5%	26,8%	20,5%	5,2%

Source: EUROSTAT (2021). Note: No data available at NUTS2 level

Indicator 8. Employment changes in coal-related jobs between year x and x-1, compared to increase in other sectors' employment (by total, age and educational level, whenever possible)

Poland's transition away from coal was initiated in early 90s. Since then, the employment in the mining sector has declined by 80% (from roughly 390 000 to 80 000). Between 2015 and 2020 employment in the coal mining sector declined by around 11% (Śniegocki et al., 2022).

Employment changes in mining of coal and lignite in Poland and the EU-27

	2013	2014	2015	2016	2017	2018	2019	2020	2021
EU-27	-0,53%	-4,45%	-6,02%	-5,58%	-5,87%	-3,9%	1,14%	-1,64%	-15,1%
Poland	6,6%	-1,79%	-15,5%	-2,53%	-7,15%	-5,39%	11,96%	1,35%	-13,7%

Source: Own calculations based on: EUROSTAT (2022) [LFSA_EGAN22D, Employment by NACE Rev.2].

Indicator 9. Composition of the region (area, number of inhabitants, economic composition of the region)

See section 2.2.1 of the study.

Indicator 10. Industrial relations in the area

- **Number of sectoral social partners** – 7,1% of all sectoral social partners is registered in the Wielkopolska voivodship.
- **Relevant trade union information** – 7,5% of all trade unions in Poland and registered in the Wielkopolska voivodship.

Indicator 11. Existence of fund or aid system (name)

See section 2.2.6 of the study.

Sectoral-specific characteristics

Indicator 12. The change in the share of raw-materials for power generation – based jobs in total employment in the regions

Over the past 25 years the employment in the lignite mining sector has decreased from 27 000 people in 1991 to 9 000 people in 2016. It accounted for about 1% of the total employment in the region (943 800 working people in the voivodship overall) (Ministerstwo Energii, 2018).

Indicator 13. The change in the added-value of raw-materials for power generation-related businesses in total added-value of regions

According to the report of the Institute of Structural Research (2019), the share of coal in the total added value of the energy sector in Poland decreased from 65% in 2000 to 45% in 2018, while the share of renewable energy sources rose from 1% to 10% over the same period. This shift has caused a reduction in the added value of coal-related businesses and an increase in the added value of businesses related to renewable energy. No more detailed information is available (IBS, 2019).

Indicator 14. Weight of the relevant carbon-intensive industry before the transition and after

No data is available that would allow for measuring the weight of the carbon-intensive industry in the Wielkopolska region before and after the transition. Nevertheless, given the fact that in recent years there has been a shift towards more sustainable forms of industry in Wielkopolska, which has resulted in the closure of coal mines and power plants, it can be assumed that the weight of carbon-intensive industries in the region has decreased over time, as a result of the transition.

Indicator 15. The change in added-value decrease in raw-materials for power generation-related jobs between year x and x-1, compared to the increase in other sectors added-value between year x and x-1

Data not available.

Indicator 16. The change in the share of companies linked with mining

Data not available.

Upper Nitra, Slovakia**Economic output****Indicator 1. Regional GDP (at current market prices)**

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP in current prices (million EUR)	TR	6,227	6,584	6,848	7,004	6,935	7,109	7,452	7,329	7,378	8,000	8,199	8,148
EUR per inhabitant	TR	10,400	11,000	11,500	11,800	11,700	12,000	12,600	12,400	12,600	13,600	14,000	14,000
EUR per inhabitant in percentage of the EU (%)	SK	49	51	52	53	53	53	54	53	53	54	55	56
EUR per inhabitant in percentage of the EU (%)	TR	43	44	45	46	45	45	46	44	43	45	45	47

Source: EUROSTAT (2022) [nama_10r_3gdp]; note: EU – European union; SK – Slovakia; TR – Trenčiansky region.

Indicator 2. Regional GDP in relation to national and European (EU 27) GDP

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP in PPS, per inhabitant in percentage of the EU (%)	SK	72	76	76	77	77	78	78	73	70	70	69	70
GDP in PPS, per inhabitant in percentage of the EU (%)	TR	63	67	66	67	66	67	67	61	57	58	56	58

Source: EUROSTAT (2022) [nama_10r_3gdp]; note: EU – European union; SK – Slovakia; TR – Trenčiansky region.

Socio-demographic characteristics of the region

Indicator 3. Changes in the age structure (in absolute terms and in relation to national and European averages) – in %

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Less than 15 years	EU	15.4	15.4	15.4	15.4	15.3	15.3	15.3	15.2	15.2	15.2	15.1	15.1
Less than 15 years	SK	15.5	15.4	15.4	15.4	15.3	15.3	15.3	15.5	15.6	15.7	15.8	15.9
Less than 15 years	TR	13.5	13.4	13.4	13.3	13.3	13.3	13.3	13.4	13.6	13.8	13.9	14.0
From 15 to 64 years	EU	67.0	66.8	66.6	66.3	66.0	65.7	65.4	65.1	64.8	64.6	64.3	64.1
From 15 to 64 years	SK	72.1	72.0	71.8	71.5	71.1	70.7	70.2	69.6	68.9	68.2	67.6	67.0
From 15 to 64 years	TR	73.0	72.9	72.6	72.3	71.8	71.4	70.8	70.1	69.3	68.5	67.8	67.1
65 years or over	EU	17.6	17.8	18.0	18.3	18.7	19.0	19.3	19.7	20.0	20.2	20.6	20.8
65 years or over	SK	12.4	12.6	12.8	13.1	13.5	14.0	14.4	15.0	15.5	16.0	16.6	17.1
65 years or over	TR	13.5	13.7	14.0	14.4	14.9	15.3	15.9	16.5	17.1	17.7	18.3	18.9

Source: EUROSTAT (2022) [demo_r_pjanagr3]; note: SK – Slovakia; TR – Trenčiansky region.

Indicator 4. Changes in the educational structure of the population (in absolute terms and compared to national and European average)

I.4.1. Population by educational attainment and age group – tertiary education (ISCED11 levels 5–8)

		2017	2018	2019	2020	2021
EU	From 20 to 24 years	16	16	17	18	19
EU	From 25 to 34 years	38	39	39	41	41
EU	From 25 to 64 years	30	31	32	33	33
EU	From 30 to 34 years	39	39	40	41	42
Slovakia	From 20 to 24 years	15	15	16	14	13
Slovakia	From 25 to 34 years	35	37	39	39	40
Slovakia	From 25 to 64 years	23	25	26	27	28
Slovakia	From 30 to 34 years	34	38	40	40	40
Western Slovakia	From 20 to 24 years	15	15	16	14	16
Western Slovakia	From 25 to 34 years	33	34	37	34	35
Western Slovakia	From 25 to 64 years	21	21	22	22	24
Western Slovakia	From 30 to 34 years	31	33	38	32	33

Source: EUROSTAT (2022) [EDAT_LFSE_04\$DEFAULTVIEW]; note: data are not available on NUTS 3 level, Western Slovakia NUTS 2) is approximation of the Upper Nitra.

I.4.2. Population by educational attainment and age group in 2021 (%)

		Less than primary, primary and lower secondary education (levels 0–2)	Upper secondary, post-secondary non-tertiary and tertiary education (levels 3–8)	Upper secondary and post-secondary non-tertiary education (levels 3 and 4)	Upper secondary and post-secondary non-tertiary education (levels 3 and 4) – general	Upper secondary and post-secondary non-tertiary education (levels 3 and 4) – vocational	Tertiary education (levels 5–8)
EU	From 20 to 24 years	15.4	84.6	66.1	35.9	30.2	18.6
EU	From 25 to 34 years	14.8	85.2	44.0	11.8	32.2	41.2
EU	From 25 to 64 years	20.7	79.3	45.9	:	:	33.4
EU	From 30 to 34 years	15.3	84.7	43.1	10.4	32.7	41.6
Slovakia	From 20 to 24 years	10.7	89.3	76.2	26.0	50.3	13.1
Slovakia	From 25 to 34 years	6.3	93.7	54.2	4.8	49.4	39.5
Slovakia	From 25 to 64 years	6.7	93.3	65.4	:	:	27.9
Slovakia	From 30 to 34 years	5.8	94.2	54.0	3.7	50.4	40.2
Western Slovakia	From 20 to 24 years	4.5	95.5	79.6	21.6	58.0	16.0
Western Slovakia	From 25 to 34 years	3.7	96.3	60.9	3.1	57.8	35.4
Western Slovakia	From 25 to 64 years	5.2	94.8	71.1	:	:	23.6
Western Slovakia	From 30 to 34 years	4.0	96.0	63.1	2.8	60.3	32.9

Source: EUROSTAT (2022) [EDAT_LFSE_04\$DEFAULTVIEW]; note: data are not available on NUTS 3 level, Western Slovakia NUTS 2) is approximation of the Upper Nitra region; : - n/a.

Indicator 5. Changes in migration flow (in absolute terms and in relation to national and European averages)

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Net migration	SK	-4 929	2 966	3 416	2 379	1 713	3 127	3 885	3 722	3 955	3 632	4 347
Net migration	TR	-1 458	-424	-414	-481	-623	-638	-464	-490	-469	-611	-233
Crude rate of net migration	SK	-0.9	0.5	0.6	0.4	0.3	0.6	0.7	0.7	0.7	0.7	0.8
Crude rate of net migration	TR	-2.4	-0.7	-0.7	-0.8	-1.1	-1.1	-0.8	-0.8	-0.8	-1.0	-0.4

Source: EUROSTAT (2022) [demo_r_gind3]; note: SK – Slovakia; TR – Trenčiansky region.

Indicator 6. Change in the income level (in absolute terms and in relation to national and European averages) – Income of households* (Purchasing power standard, per inhabitant)

	2011	2012	2013	2014	2015	2016	2017	2018
EU	16,900	17,000	17,100	17,300	17,700	18,200	18,900	19,500
Slovakia	10,400	10,600	11,000	11,300	11,600	11,000	11,000	11,700
Western Slovakia	9,900	9,900	10,300	10,500	10,800	10,300	10,300	11,300

Source: EUROSTAT (2022) [NAMA_10R_2HHINC]; note: data are not available on NUTS 3 level, Western Slovakia NUTS 2) is approximation of the Upper Nitra region.

Indicator 7. Average age of labour force/age structure of labour force in raw materials for power generation related sectors – Population on by broad age group (% of total population)

		2014	2015	2016	2017	2018	2019	2020	2021
Median age of population – females	Slovakia	40.2	40.6	41.0	41.4	41.8	42.1	42.5	42.9
Median age of population – females	Trencin region	41.9	42.4	42.8	43.2	43.6	44.0	44.5	44.9
Median age of population	Slovakia	38.6	39.0	39.4	39.8	40.2	40.6	41.0	41.4
Median age of population	Trencin region	40.2	40.7	41.2	41.6	42.1	42.5	43.0	43.4
Median age of population – males	Slovakia	37.2	37.6	38.0	38.4	38.8	39.2	39.6	40.0
Median age of population – males	Trencin region	38.7	39.2	39.7	40.1	40.6	41.1	41.6	41.9

Source: EUROSTAT (2022) [demo_r_pjanind3]; median age of population 2014–2021.

Indicator 8. Employment changes in coal-related jobs between year x and x-1. compared to increase in other sectors' employment (by total. age and educational level. whenever possible) – Employment in mining and quarrying (number of employees)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Slovakia	8,267	7,905	6,956	6,561	7,019	7,232	6,864	6,583	6,359	6,221	6,437	5,257	5,467
Trencin region	3,736	3,662	3,555	3,541	3,746	3,667	3,852	3,648	3,263	2,900	2,834	2,233	1,876
Prievidza district	3,627	3,480	3,442	3,477	3,623	3,532	3,722	3,532	3,155	2,808	2,720	2,206	1,835

Source: SO SR (2022).

Indicator 9. Composition of the region (area, number of inhabitants, economic composition of the region) – Sectoral structure of employment (in %, employed person by NACE industries, 2019)

	EU 27	Slovakia	Trenciansky kraj	Slovakia/ Trenciansky kraj difference
Total – all NACE activities	100	100	100	
Agriculture, forestry and fishing	4.5	3.0	2.5	-0.5
Industry (except construction)	16.1	24.0	35.1	11.1
Manufacturing	14.6	22.0	32.6	10.6
Construction	6.4	7.5	7.1	-0.3
Wholesale and retail trade; transport; accommodation and food service activities; information and communication	27.5	28.9	27.3	-1.6
Wholesale and retail trade, transport, accommodation and food service activities	24.6	26.0	25.2	-0.8
Information and communication	2.9	3.0	2.2	-0.8
Financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities	15.9	13.5	9.5	-4.0
Financial and insurance activities	2.3	1.9	1.2	-0.7
Real estate activities	1.0	1.2	1.0	-0.2
Professional, scientific and technical activities; administrative and support service activities	12.6	10.5	7.3	-3.2
Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services	29.5	23.1	18.4	-4.7
Public administration, defence, education, human health and social work activities	23.5	19.9	15.7	-4.2
Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	6.0	3.2	2.7	-0.5

Source: EUROSTAT (2022); nama_10r_3empers.

Indicator 10. Industrial relations in the area (number of sectoral social partners. relevant union information)

Data not available.

Indicator 11. Existence of fund or aid system (name)

See section 2.3.6 of the study.

Sectoral-specific characteristics

Indicator 12. The change in the share of raw-materials for power generation - based jobs in total employment in the regions

Data not available.

Indicator 13. The change in the added-value of raw-materials for power generation-related businesses in total added-value of regions

Data not available.

Indicator 14. Weight of the relevant carbon-intensive industry before the transition and after (number of direct jobs in mining before the transformation and now)

Data not available.

Indicator 15. The change in added-value decrease in raw-materials for power generation-related jobs between year x and x-1. compared to the increase in other sectors added-value between year x and x-1

Data not available.

Indicator 16. The change in the share of companies linked with mining – *Number of employees and production of mining company Hornonitrianske bane*

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mining production (1000 t)	3 133,490	3 093,038	2 971,595	2 934,136	2 578,273	2 312,683	2 054,579	1 685,261	2 001,754
Number of employees in mining	6,269	5,980	5,649	4,049	3,397	3,168	3,001	1,879	1,898

2010	2011	2012	2013	2014	2015	2016	2017	2018
2 196,444	2 159,981	2 093,800	2 275,330	2 078,961	1 939,330	1 956,510	1 860,701	1506,940
2,182	1,874	1,910	1,936	1,874	1,695	1,415	2,056	1,403

2019	2020	2021
1 474,826	986,269	1 080,562
1,275	1,263	1,221

Source: MMO (2022).

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