Deliverable Proof – Reports resulting from the finalisation of a project task, work package, project stage, project as a whole - EIT-BP2020

Name of KIC project the report results from that contributed to/ resulted in the deliverable	REBOOST Project
Name of report	Regional Context – Eastern Greater Poland's Menatal Landscape
Summary/brief description of report	The Eastern Greater Poland region can be characterised as a pilot region for the 2038 Polish energy transition. This report explores the perceptions of stakeholders from business, government, and civil society. We delve into the stakeholder's experiences through deep listening interviews which sought to classify shared and differing mental models among each stakeholder group. Thereafter, stakeholder's attitudes towards transiton are deduced as well as the their opinions on the advantages, shortcomings, and barriers to the regional transition. Due to novelty of the energy transition in Poland, most stakeholders are unsure about whether they will play an active role in the transition and the impact it will have on their future
Authors	Delasi de Souza, Nikola Tietz, Annechien Hoeben, Maximiallian Zoll & Ilona M. Otto
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Supporting Documents: attach in pdf format

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Regional Context – Eastern Greater Poland's Mental Landscape

1. The Research

"A Boost for Rural Lignite Regions" aims to develop an online simulation tool that will be used for stakeholder engagement in three European energy transition areas. The project focuses on three regions: Lusatia in Germany, Konin in Poland, and Gorj in Romania. These regions are currently in differing stages of an energy transition; these stages are thoroughly discussed in each respective mental landscape report. The aim of this project is to involve and empower local stakeholders on all levels in European coal regions in developing resilient and robust sustainable strategies regarding the potential phase out of lignite mining and existing lignite-fired power generation as part of the European Green Deal Investment Plan and Just Transition Mechanism. The project takes place over the course of three years (2020-2022) and ends with pragmatic implementation prospects.

The first project year, REBOOST focuses mainly on understanding the study areas, the stakeholders' perceptions and attitudes termed the mental landscape which encompasses the manoeuvre spaces as well as the barriers and opportunities for decarbonisation actions. Consequently, the emphasis is placed on an "individual and personal spectrum", hence how the stakeholders see their own current and future situation and in lieu of a general spectrum i.e., in terms of the populations economic, social, and political situation. The subjective approach is based on the idea that the mind-sets of the involved actors do not simply reflect their current economic situation but are strongly influenced by what future developments they consider feasible. Our view, this perspective is crucial when it comes to orchestrating social transition processes. The knowledge gathered in the first year will be used to design three strategic simulations in which selected stakeholders from the three study areas will be asked to experiment and explore possible future transformation pathways in an interactive manner through an online simulation tool. Interviews and strategic simulation techniques will be used to ensure the participatory character of the project and to create supportive conditions for a knowledge co-production process in which local stakeholders play an active role.

Denzau and North (1994), defines mental model as pre-existing mental constructs which people employ to interpret and understand an environment. These are then subsequently used to solve the problems they face. In this sense, it is heuristics that allow for classification and retrieval of information about situations, objects and environments based on the most prominent characteristics (Hewitt et al., 2019). In this heuristics process, both the complexity of the problems and the abilities of individuals deal with different levels of complexity which are important in mentally organizing the surrounding environment. Such mental models are shared through communication and lead to the co-evolution of formal and informal aspects that structure interpersonal relationships. Such mental models and institutions reduce uncertainties in decision-making as

they structure expectations about the environment and thereby describe, explain, and predict behaviour of other individuals in this environment (Denzau and North, 1994).

Mental models are more than simple mental handholds to understand the environment. As mental representations of the world they are incomplete, flexible and subject to manipulation (Otto-Banaszak et al., 2011). As a result, when unexpected events happen that the mental model did not accurately predict, this leads to a correction of the employed model. In a complex environment, the information is too insufficient or contradictory to enable corrections and multiple ideas on how to address a particular problem (Denzau and North, 1994). Incomplete mental models in such a correction, lead to decisions which have an adverse effect (Forrester, 1991). Several authors have analysed the importance of such corrections (Schoell and Binder 2009; Pahl-Wostl and Hare 2004; Schulser et al. 2003).

In this report we explore the differences, but more importantly similarities on ideas of how to adapt and govern major groups of stakeholders involved in the transition and development process in the three regions. For the transition in the three chosen European transition areas, we argue that insecurity about the future, increases complexity and makes it more difficult to describe, explain and predict the environment. Denzau and North (1994) proposed that individuals form theories that enable them to deal with problems characterised with large uncertainties, through mutual communication of ideas. In this sense, mental models converge for individuals that have common backgrounds and experience (stakeholder groups) and diverge for individuals with different learning experiences. Thus, the learning process in uncertain environments is not fast enough and this process is accelerated if individuals can learn or correct based on mental models already established by like-minded individuals. Sharing mental models increases understanding but also strengthens already existing mental models. In addition, Vatn (2005) brings forward that efficient sharing depends on the type of values an individual wants to protect. In the context of this mental landscape report, we can expect that interpretations on how to transition away from coal varies across societal groups and their analogous experiences and will keep diverging as the transition environment remains uncertain.

The objective of this mental landscape report is to explore the differences in the perception of the shift away from coal among different stakeholder groups. In this rationale, mental models are internal mental constructions which interpret and structure the (transition) environment (Dezau and North, 1994). In this report, we explore the differences, but more importantly similarities on ideas how to adapt to the energy transition and involve major critical groups of stakeholders in the transition and development process in the three regions. For Konin, stakeholders were selected to represent 3 main groups namely, government, civil society, and business.

This report is part of a series of four analogous reports, one for each case study area complemented with three policy briefs on the mental landscapes and three policy briefs providing an in-depth review of the political economy of the energy transition in Poland, Germany and Romania. Furthermore, 3 extra policy briefs will be produced to illustrate the challenges of the regional coal phase-out and structural change as a multi-level problem, within the regional innovation system of the respective regions. Hence, one

solution is to establish a framework that focuses on the analysis of (regional) innovation systems and smart specialisations. We follow a comparative approach between the involved regions in Germany, Poland, and Romania. We assume that mutual learning together with local actors will be a core asset of the project, especially if we consider them being peripheral regions. Taken together, the reports and policy briefs close of the first (successful) project year.

The remainder of the report is structured as follows: Section two outlines the research approach and study design. The third section addresses the policy landscape is presented after which the results of the mental landscape mapping are systematically addressed, and general outcomes of the interviews are provided in section four. A short conclusion is provided in section five to complete the report.

2. Research Approach

The work summarised in this report evolved three steps. First, we explored the political, socio-economic, and geographical characteristics of the regions. Such a landscape screening helped us to identify key stakeholders (see step 2), and to identify key arguments/viewpoints (see step 3). In a fourth step, we organised a strategic simulation workshop with selected stakeholders simultaneously in the three regions.

2.1 Scoping

The concrete research objective for this year was to gain a detailed insight of the views of stakeholders of their own region and their understanding of the current situation of the coal mining. This requires awareness of attitudes, needs and preferences as well as an understanding of the current realities of different stakeholder groups. To better understand the different situations of our three case study regions, we started with desk research. Although, concrete studies on coal mining regions in Konin and Gorj are rare, it still provided us with a satisfactory picture along which we could structure our interviews. In contrast, in Lusatia various studies have been undertaken already, most of which are based on qualitative and quantitative data from the private businesses sector. The studies focused on the future pathways for industry, both from a cultural point of view and an ecological point of view. However, the available data does not often portray the standpoints of different interest groups. More often than not, the qualitative data available shows strategies that only apply to a single organisation and its effort to achieve its aims. Hence, in all three regions, this further resuscitates the necessity to hold interviews with stakeholders on all levels about their future. We then probed into the main problems and difficulties but also strengths and future strategies.

2.2 Stakeholder identification

As a second step, we have identified the key stakeholders in the three regions, their roles, objectives, and scope of action to engage expert interviews. We also assessed the stakeholders according to a power-vs.-influence map. Such stakeholder mapping helps to identify possible stakeholder coalitions as well as mutual and conflicting interests. This step was particularly relevant for Eastern Greater Poland since the region is currently in the initial stages of a transformation pathway. We have actively searched for potential problem owners at the national and international level to find international companies that might be interested in investing in low carbon solutions in this region. Furthermore, it was assumed that interests, involvement, education, and financial means influence the coal phase-out. Therefore, we also carefully determined and chose actors that were present in the media and were expected to be critical when implementing the (planned) respective processes.

2.3 In-depth Interviews and deep listening

We carried out in-depth interviews framed as 'deep listening' with key stakeholders in the study regions. The aim of the interviews was to identify the important stakeholder groups and existing discourses, map stakeholders' interests and perceptions, possible options for the regional transformations, as well as the opportunities, costs, risks, and fears that different stakeholder groups associate with these transformation options (Otto & et al., 2019). We created five guiding questions, which also allowed for potential additional questions for elaborations.

The interview contained the following questions:

1. Please explain your work / your commitment in relation to the region?
2. What are the advantages / strengths of the region from your personal point of view?
3. What main problems / difficulties can you identify?
4. Do you feel noticed and understood?
5. What do you expect from the future? (Since you have specific ideas, who could be responsible for the implementation in this case?)

This kind of interview is defined by Flick et al. (2016) as an episodic interview. Such episodic interviews foster a narrative form through which respondents can explain their opinions, experiences, and visions in relation to an object (Flick, 2016). In this rationale, two questions were added at the end of each interview:

6. Would you like to say / add something else?
7. Would you be willing to take part in an online workshop that simulates the future?

In many cases, we presented the project on the phone to the chosen actors and inquired after interest and availability for an interview. When interested, we sent out more elaborate information via email. Due to the Covid-19 pandemic situation, many interviews were held via zoom (also taking into consideration

security reasons). The interviews have been recorded, transcribed, and translated using the software Happy Scribe.

2.4 Strategic simulation workshops

Strategic simulation is a type of "serious games", also known as policy simulations, is an interactive, participatory method to develop strategic insight. Within Information gathered in the previous research steps was used to construct a frame for the strategic simulation workshop and to provide basic options that could be further explored and modified during the workshops. The aim of the workshop was for the participants to create and explore future transformation pathways. scenarios, stakeholders use their knowledge and available data in deliberative manner to develop strategies that can lead them to desirable futures, identifying challenges, seeking solutions, and negotiating trade-offs.

The simulation will be prepared in 3 versions, each adapted to the characteristics of a different region and carried out at the same time in each region through online sessions. In this regard, the workshop provided us with information about the concrete positions of stakeholders, manoeuvring spaces, mutual perceptions, and to select the appropriate method for steps in the next year. Moreover, elements were translated to the national languages to be more accessible to all involved stakeholders. During each workshop, there was ample room to ask questions and provide feedback.

3. Policy Context – Eastern Greater Poland

Coal in many countries is an affordable yet unsustainable means to meet energy demand since the initial costs of financing renewables remain considerably higher than what most countries can afford. To accomplish the target temperature outlined in the Paris Agreement, a global coal phase out is underway. Poland's key electricity production source is coal, which comprises roughly 73.6 percent (2019) of the total electrical energy mix (Macuk & Koszniec, 2020). Poland is the largest hard coal producer and second largest lignite producer in the EU (Brauers & Oei, 2020b; International Energy Agency, 2017). The efficacy of the EU Green Deal will determine the success of Poland's eminent energy transition while maintaining its energy security. The juxtaposition of these two difficulties with the Polish socio-economic and socio-technical realities is the main question to be addressed in the components of the policies and subsequent decision making.

Furthermore, Poland has not set out a clear plan to end coal mining as illustrated in the current National Energy and Climate Plan for 2021- 2030[1] due to the novelty of this decision. It was first deemed not realistic for Poland to shut down all coal mines by 2030 hence the new target year is roughly 2050. More so, Poland remains strongly opposed to EU policies to increase climate protection ambitions because of its vested interest in maintaining the coal regime and their interlinkages. As coal's increasing role

[1] Ministerstwo Energii. (2019). National Energy and Climate Plan for the years 2021-2030

continues to diminish in the EU, the urgency of a low carbon energy transition in Poland is evident; hence one region could lead as a pilot: Wielkopolska Wschodnia (Eastern Greater Poland). This lignite mining region with a land mass of 1031 km² iscomprised of five districts: City of Konin, Konin Poviat, Turek Poviat, Koło Poviat and Słupca Poviat. The region is inhabited by approximately 230,000 people whose historical dynamic development (between 1960 – 1980) was driven by mining, energy generation and heavy industrial activities (Kuźmińska, 2020).

For several years, the Polish coal industry and consumer coal prices were strongly subsidised to assure the feasibility of coal mining. After 1993, the subsidies on coal mining began to reduce due to large financial losses (IAEA, 2002). These financial losses were attributed to the incapability of the hard coal sector to adjust to the versatile economic condition induced by the free market policies of the government, large coal surplus as a result of a drastic reduction in local demand after increases in coal prices, costs of maintenance of non-production fixed assets such as coal miners housing, historical overemployment, despite the momentous decrease of the labour force between 1989 and 1997 and the high cost of production owing to the mining mechanisation and washing processes as well as the ensuing higher shares of wages in the total costs.

The energy sector in the Eastern Greater Poland region is solely privately owned by ZE PAK S.A. ZE PAK employs around 5,500 people and is therefore the leading employer in the region (Kuźmińska, 2020). ZE PAK's three main power plants are in Adamów, shut down in January 2018, the second in Konin powered by biomass - primarily supplies heat energy to the inhabitants of the City of Konin, and the third in Pątnów, the largest and most modernised plant which accounts for roughly 6 percent of Poland's energy production demands (Koenig et al., 2020). The lignite open cast mines belong to KWB Konin. Eastern Greater Polandis likely to be the first region in Poland's coal exit future and remains an economic monoculture as a result of its coal dependence. As is the case in other economic monocultures, should for instance supply chain disruptions similar to those brought about by the COVID-19 pandemic persist, this could cripple the local economy, which already suffers from high unemployment rates and low entrepreneurship rates. The proportion of workers employed in lignite extraction and coal power generation accounts for almost 6,000 direct jobs in Konin which account to 8.5 percent of all employees in the subregion (EU Commission, 2020; Witajewski-Baltvilks et al., 2018). Future fears are rampant among the population as coal mining goes hand in hand with the regions identity and foreclosing the sector put the citizens of Konin at risk.

Poland's largest utility provider PGE (Polska Grupa Energetyczna S.A.) announced their strategy in October 2020 [2]to be 100 percent powered by renewables by 2050, here after the ideal situation is that the entire coal industry follows suit. Some first initial steps towards a greener Konin were made by Green Energy Konin. Green Energy Konin, formed in 2018, intends to integrate the energy potentials in the region by creating a cooperative network of businesses to promote a low carbon future. Before that,

[2] Lo, J. (2020). *Poland's largest utility announces pivot from coal to renewables*. Climate Change News.

the Initiative Cluster of Low-Energy Technologies (formed in 2014) “Klaster Technologii Niskoenergetycznych” aimed to increase the level of innovation in the region through cooperation’s with several companies from architectural design, construction and energy consulting sectors. Currently this cluster initiative is inactive but may resume once financing and system solutions are secured. Other low carbon transition initiatives in Konin the also lack the formalisation and funding and remain in the natal stage.

An understanding of the regions resources, political economy, stakeholders, and energy policy is paramount to envision the extent to which the planned energy transition is feasible and publicly acceptable over an inter-regional scale.

3.1 Geographical Conditions and Natural Resources

The geographical conditions and the available natural resources in a region are determining factors that fortify the success of an energy transition and the ensuing low carbon future. The Wielkopolska Voivodeship (Greater Poland Region), is a region distinguished by its distinct ecosystem, economic development, and vital historic monuments. The sub region located to the east of Greater Poland, the Powiat Koniński (Konin Province) with its capital, Powiat Konin (Miasto na prawach powiatu Konin) is our studies region of interest. The landscape is post-glacial, in the south-eastern part of the Greater Poland region - old-glacial, in the central and northern part and young-glacial in the eastern. The region is characterized by greater hypsometric differentiation, a dense network of post-glacial gullies and depressions without drainage and several partially filled lakes (Lubelskie, 2012).

The Greater Poland Region is a moderate climate zone with a land use tendency of 65 percent agricultural land and 26 percent forest land (Borówka et al., 2012). While the northern and western part of Wielkopolska is pervaded by forest with numerous reservoirs, touristic and recreation sites; the southern and south-eastern parts are mainly agricultural and related processing industries (Smędzik, 2009). These characteristics in the south-eastern parts of Wielkopolska advantageously facilitate the transition of the Konin power plant to biomass power generation.

The dominant soils are medium fertile, brown and tawny soils and poor quality podzolic soils (Dzięciołowski, 1979). Agricultural production in Wielkopolska is higher than the country's average and its share in the output of agriculture in Poland is 15.7 percent (Lubelskie, 2012). Yet, climatic conditions and groundwater level are unfavourable for agriculture in the region. Other notable landscape characteristics in the region are glacial and periglacial relief, flatlands, and mild elevations, exemplified by absence of land subsidence (groundwater exploitation) and unfavourable water balance (Dzięciołowski, 1979; Lubelskie, 2012). The main natural resources are lignite (33% of domestic resources), natural gas (42,8% of national resources), salt deposits, stone and peat (Lubelskie, 2012; Macias et al., 2020).

Konin Province retains the largest areas of degraded and devasted land in the region and post-mining land reclamation activities (forest and agricultural functions) are ongoing.

3.2 Population Structure

The population size of the Konin city is 73,522 (2019) while the population size of Konin Province is 130,053 (Statistics Poland, 2019). The highest number of citizens in Konin City, - 83, 426 was documented in 1998, thereafter, this number systematically decreased, the city lost almost half a thousand people annually in the years after. Konin Province at present exhibits a larger percentage of older people (25,5 percent in 2014) in comparison to the national level, this indicates that the ageing population is a conundrum in the region[3][4]. It is forecasted that by 2050 40 percent of the subregions population will be ages 60 and over (Olbrot-Brzezińska et al., 2019). In addition, in 2018, the birth rate calculated per 1000 people is -6.74, being one of the highest in Eastern greater Poland.

In general, a large percentage of aging population in the work force is often a result of long-term low fertility and youth migration towards larger cities (Martinez-Fernandez et al., 2013). Both the aging of the population as a result of increased life expectancy and the migration is linked to the suburbanisation processes and economic migration which depending on the intensity will prove to be detrimental to the region. In spite of the later migration, a past study analysing ten main cities in Poland concluded that between 2000 – 2008, while the number of graduates decreased in larger cities such as Warsaw, the largest number of graduates recorded in this time period were from Konin, Biała Podlaska[5]. The aging phenomenon despite the increasing number of graduates is a common happenstance affecting industrial cities in Poland (e.g. Płock and Włocławek) and has been studied in Konin Province since 1970; the population has steadily shrunk thereafter (Martinez-Fernandez et al., 2013).

However, the Polish Statistics Office projects an increased total population in the Konin Province to 134,017 in 2030 but a decrease to 133,907 by the year 2040 (Statistics Poland, 2019). Although measures such as the 2030 National Plan of Spatial Development[6], address the needs of the current and future generation, and serve to increase the work force within aging population regions, its effectiveness is yet to be determined (Martinez-Fernandez et al., 2013).

3.3. Current Economic Situation

Inflation in Poland is projected to slow down amidst the worsening labour market conditions, which were further exacerbated during the COVID-19 pandemic (European Commission, 2020). The current unemployment rate in Poland is 3.77 percent, this is expected to rise to 4.85 percent in 2025 (IMF, 2020). This could reflect one of the inescapable consequences of a coal phase out due to the repercussions of structural changes without proper policies in place. Figure 1 illustrates that the between 1990 to 2018 the number of coal mining employee radically decreased from approximately 380,000 to 90,000. It is therefore necessary for further research to identify the currently indirect and directly affected employees

[3] Leszczycki, S., & Banskiego, J. (2012). *Polska wieś w perspektywie długookresowej – – ujęcie regionalne*.
[4] Kurek, S. (2014). Przestrzenne zróżnicowanie przemian demograficznych w polsce w latach 2002–2011.
[5] Siłka, P. (2012). *Potencjał innowacyjny wybranych miast polski a ich rozwój gospodarczy*.
[6] Poland Ministry of Regional Development. (2011). *National Spatial Development Concept Summary*.

in coal mining as the electricity share of coal will decrease.

The greater Poland region (Wielkopolska) is a diversified region that offers a mature multisectoral economy, dynamically established SME's, top tier services and an advantageous economic location (KPMG, 2009). Though the region is relatively diversified by national standards due to the high share of value added agriculture, there is a an exceptionally high number of underdeveloped services (Przemysław Ajchler et al., 2020). Wielkopolska intersects important European communication corridors and transport routes between Berlin, Warsaw, Konin and Moscow for instance. Power generation and coal extraction is one of biggest tax sources for local communes. More so, this region achieves higher economic indicators in comparison to the other regions in Poland, this is evidenced by the region's contribution to GDP per capita.

In 2016, the Konin subregion generated roughly 13.2 percent of the GDP for the Greater Poland Region while Poznan and its subregion generates almost half of Greater Poland's GDP. Each subregion plays an integral role in producing the GDP in the region. Konin has the largest contribution to gross value added from agriculture, forestry and hunting, a 13.7 percent (2019) contributed share to GDP from the construction industry. In trade, information, communication, and gastronomy the Konin-subregion contributes 10.7 percent (2019) to gross value added in the greater Poland region. Finally, in terms of financial and insurance activities and real estate services, Konin Province accounted for 13.7 percent (2019).

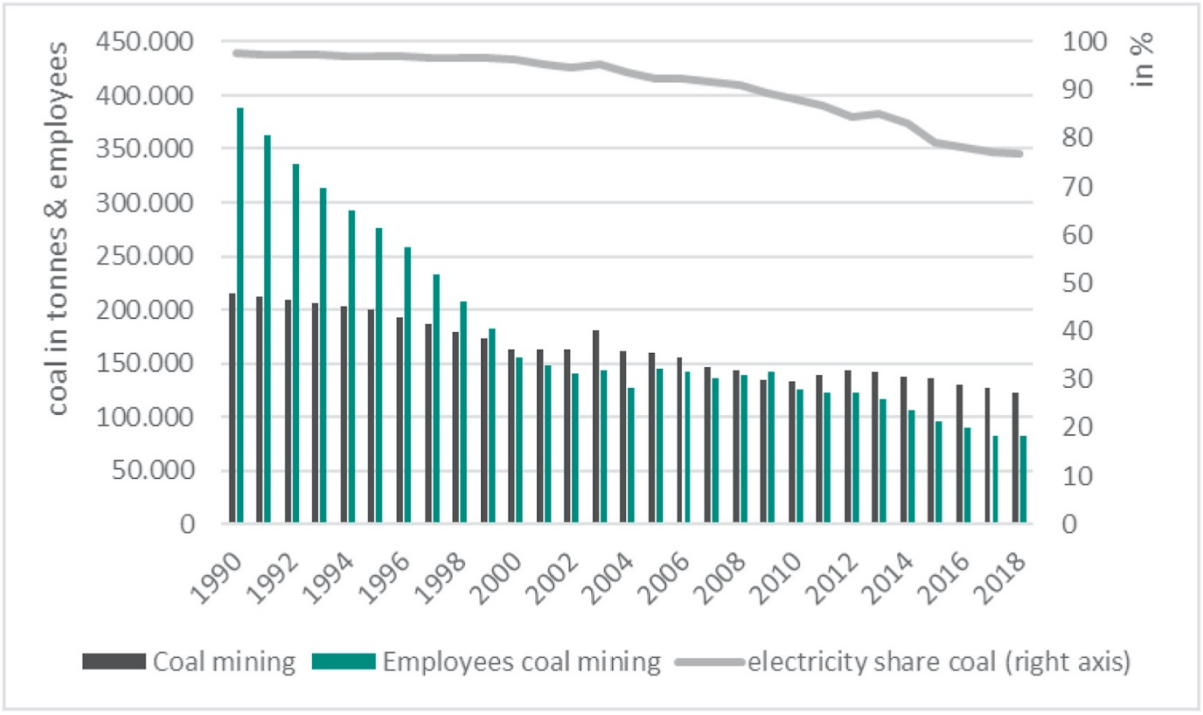

Figure 1. Coal mining, electricity generation and number of employees in Poland from 1990 to 2018

The unemployment rate in the Konin subregion decreased from 6,8 percent in 2017 to 5,6 percent in 2018 and increase to 8.5 percent in 2019; being the highest in the greater Poland region (Statistics Poland, 2019). This sudden increase in unemployment is attributed to the level of youth unemployment in the region and the lack of strategic job creation in as a common threat in industrial regions. Although

the relationship between fertility rate and the level of unemployment in the polish subregional level is fairly weak, the correlation between the unemployment level and percentage of aging population is strong. Given the proposed future coal phase out in the region, it remains to be deduced the repercussions it would have on the aged coal miners labour force. Any future strategy to reduce the negative impacts of an ageing population should encompass actions for improving productivity in the labour force and invest time in upskilling the current labour force. Moreover, there is a need to capitalise on the region's asses such as close border localisation and improve support for economic diversification to improve the regions labour market attractiveness. The percentage of entrepreneurship in the region decreased from 6,2 percent in 2017 but slightly increased in the years following.

The vast majority of establishments in the Konin Province belong to the private sector, roughly 97.7 percent in 2018, ranked into automotive, construction, business and technical (Olbrot-Brzezińska et al., 2019). Hence there is a small number of publicly owned assets in Konin Province. Small and medium size enterprises (SME) play an increasingly important role in the successful development of Konin's. economic market, as they created new employment and aided in reducing unemployment. SME's in Konin are mainly from the building sector and amount to more than 8030 companies in the sub region. Economic activity in the sub region is concentrated around 111 companies, the largest being Roland International Polska among others who increase the potential of the sub region to gain new capital and new technological solutions. To create more incentives for economic development, the government in Konin employs a tax exemption scheme on property, this is designed to decrease costs of investment in Konin and create new workplaces. These exemptions depend on the number of workplaces created and amount of capital invested. An economic benefit in Konin is the distributive network supply managed by the Wielkopolska Logistic Centre Konin which facilitates easy distribution of goods and imports country wide. Furthermore, Konin is believed to have recently obtained refinancing from the EU for infrastructure which will be a game changer for the future of employment in the region after the coal phase out.

Nonetheless, to develop an ameliorated business environment in the Konin Province support from financial institutions in the form of loan, high risk funds and the like is still necessary. Service providers in the region do not often have adequate and up to date training, businesses do not pursue informed marketing strategies and the technological capabilities can also be improved. Support should not only be acquired from financial institutions but from all economic stakeholders especially employers in Eastern Greater Poland.

3.4. *Entrepreneurship in the Konin-Sub region*

The Konin sub region possesses incentives for investment due to the number of industrial and service activities in the region. A study[7] in 2017 by the Polish Investment and Trade Agency concluded that Konin held the highest potential class (A) for investment attractiveness while its competitive edge relies

[7] Regional investment Attractiveness 2017. Wielkopolski Voivodeship, Polish Investment and Trade Agency, Institute of Enterprises of the Warsaw School of Economics, Warsaw 2017.

on the above-average availability of human resources, high transport accessibility and availability (Olbrot-Brzezińska et al., 2019). Other cities in the region with equally high rating were Kalisz, Leszno and Poznan. One crucial research gap in this regard, is to ascertain the optimal use of widely available labour in the region and strategic effort to attract investors.

The entrepreneurship sector is poorly developed due to the economic industrial past of the region and the lack of entrepreneurial attitudes among the population. This is one of the main problems hindering the success of investment in entrepreneurial development in Konin Province. In 2014, Konin received enterprise investments of approximately 500 million zł (approximately 112 million euros) in 2014 and 2015 and approximately 250 million zł (56 million euros) in 2016 and 2017 respectively (Olbrot-Brzezińska et al., 2019). The main enterprises in Konin are industrial processes (37.2 percent), transport and warehouse management (16.8 percent), production and supply of electricity (12.6 percent) and trade and repair of motor vehicles (11.7 percent).

The regional development agency serves as the local information point for European Funds in Konin. Some goals they identified for these funds are to implement international regional policy programs, develop Konin's SME sector and undertake activities geared towards regional development.

3.5 Main Challenges

The conventional challenges of any coal transition are the creation of jobs, reskilling an upskilling, new ventures, rehabilitation of former mining sies and land restauration (Allison Ball et al., 2018; Summary, 2019; Witajewski-Baltvilks et al., 2018). Apart from the conventional challenges associated with the coal industry, the main challenges associated with the current coal phase out plan is the social acceptance, transparency and uncertainty. It is unclear what the plan would be to somewhat appease all stakeholders and achieve a successful phase out by 2050. Should the exploitation of lignite deposits in the greater Poland region continue to be exploited, it would be unfavourable outside the Konin subregion. Roughly 80 percent of coal mines have been declared unprofitable and in spite of the long-term government subsidies, the coal mining industry reported a loss of PLN 4.5 billion (1.05 billion euros) in 2015. The loss is not only due to the high coal production costs, but these are coupled with a steady decrease in the revenues from coal sales, as well as growing debt due to snowballing labour costs (Renewable Energy Focus, 2017; Zoll, 20 C.E.). A report[8] proposes that in order to mine with an environmentally conscious trajectory until the expected phase out in the region, the following lines of action are necessary: protection and regulation of mineral deposits in the region, limiting exploitation in protected and agricultural land use areas, reclamation and development of post-mining areas and reduction of negative exploitation effects, support for the use of geothermal sources in the region and better use of minerals for medicinal or recreational purposes. The main socio-economic challenges in the region according to Ajchler et al. are the development and efficient use of human resources,

[8] Ajchler, P. et al (2020). *Strategia rozwoju województwa wielkopolskiego do 2030 roku*.

counteracting the negative effects of demographic processes, counteracting social disintegration and loss of regional identity and cultural capital, improving the living conditions while respecting the natural environment, mitigating and reducing territorial inequalities and increasing the efficiency of regional management (Ajchler et al., 2020). Further challenges perceived by the stakeholders themselves are explained in the next section.

Due to the fortified growth dynamics of Poznan, there is an increasing difference between the level of development in Poznan in comparison to the rest of the region. This impairs the infrastructural, economic, and social connections between the centre of the region and the outskirts. This further resuscitates the need to strengthen individual subregions, including those located in Eastern Greater Polandto support the diffusion of development from Poznan to the region in its entirety. There is a lack of accessibility to capital for development in the Konin- sub region (Przemysław Ajchler et al., 2020), from the government which is one of the reasons why the powerplant conversion to biomass from coal is mostly spearheaded by private companies. Another challenge is handling the socio-economic decline as a result of the phase out.

3.6 Energy Transition Barriers and Challenges

The current main corporate stance to coal in Poland is to respond with strategies that lobby advantageous laws for coal. Poland has long been described as the least "climate ambitious" EU member. Many corporates are strongly opposed to renewables, this facilitates an incessant discourse about the importance of coal in maintaining the countries energy security and the possibility of sustained economic development with "clean coal" technologies (Brauers & Oei, 2020b). Lignite production (583 MW in Konin) is planned through to 2030, although only the Tomisławice surface mine will be working after 2020. The new 450 MW PGE Turów lignite-fired unit, to be commissioned in 2020, will help to rebalance the trend of rising electricity imports needed to meet power demand. With overall output falling from the Adamów, Konin and Bełchatów mines, steeply after 2030, new mines would be needed. Without these, lignite production should end around 2045, latest 2050. The government's base scenario imagines the opening of three new deposits Złoczew (18-20 Mtpa), Gubin (18-20 Mtpa) and Ościsłowo (3 Mtpa), with planning work underway on the Złoczew mine (EUROCOAL, 2019). It is however uncertain whether after Poland's recent commitment, these planned mine opening will cease while sustaining energy security. The acceptance and support of the Polish civil society regarding coal is in decline, nevertheless, as Brauers & Oei (2020) suggest without a deep restructuring of core beliefs, identities and values, Poland's stance on coal may remain unchanged in the coming decade. In the past, coal exit restructuring programmes, for instance catered to labour (Martinez-Fernandez et al., 2013) during the late 1990s were strongly contested by unions and citizens alike.

A future challenge for the Polish Energy Sector will be to renovate the aging fleet of power plants. The government, however, is at an impasse with their preferred options for newer coal power plants due to

the strict and critical European regulations and lack of investors (Brauers & Oei, 2020a; Löffler et al., 2019). One alternative to meet the energy demands and provide similar values to coal is nuclear, however it is unlikely to be utilised in Poland due to the rising costs of construction as observed in the UK, France, and Finland. Poland may also desist from using natural gas as an alternative to coal because of the implications of a dependence on Russia for supply. Hence, the better alternative is to focus on renewables.

3.7 *Drivers of the energy transition in Poland regarding Greater Poland Regional Energy Policy*

The energy transition offers new possibilities for modernisation, promoting new fields of business, stimulating innovation, and creating new jobs. The current phase in the EU energy transition no longer focuses on funding renewable technologies but rather fashioning an electricity system that can handle the rising shares of weather-dependent electricity generation while simultaneously maintaining energy security and low costs. Depending on the context, an energy transition can be driven or hindered by several internal and external factors. An important external driver for Poland's energy transition is the European Union. The EU makes use of a "sticks and carrots" strategy to incentivise the energy transition by; enforcing stricter climate and environmental regulation to reduce consumption, implementing (conditional) financial incentives for the instalment of renewables in the national grid and the most effective incentive, cohesion policies to assist carbon incentive regions (Brauers & Oei, 2020b). An example of a comprehensive cohesive policy is the European Green Deal which would financially support Poland in its carbon neutrality efforts.

Internal drivers in Poland are the limited economic viability of domestic coal mining and of new coal-fired power plants, the reducing resources found in current open lignite mines, the aging energy infrastructure as well as the increasing competitive edge of natural gas, renewables and cost-effective electricity imports, and the increasing public objections. Another crucial driver are the coal corporations. When a coal industry major player changes certain aspects within its corporation, this could reverberate in the energy industry in Poland and perhaps other industry players follow suite. For instance, by abolishing miners' privileges, replacing management boards, liquidating numerous mines, limiting the production capacity of the existing mines and diversifying some electricity utilities using natural gas and renewables could accelerate positive change in Poland's energy industry. Table 1. below exemplifies the relative strength of impact of each barrier and driver discussed above among others. To date, the barriers still dictate the effectiveness of drivers of a coal phase out. While economic drivers and the aforementioned EU legislation are the main drivers which could destabilise the present coal regime, political and ideological reasons are main identified barriers to a coal exit strategy in Poland. Table 2, then illustrates the drivers and barriers for a reduction in Polish coal production and consumption.

3.8 Greater Poland Regional Energy Policy

The Polish government's 2030 energy policy was first envisioned in November 2009 and suggested support for renewables with a target of 15 percent by 2020, including a 10 percent share of biofuels in the transport sector (International Renewable Energy Association, 2015). This was part of Poland's

mandatory renewable energy targets in its contribution to the EU 20/20/20 goals. As the EU's largest lignite producer, Poland's energy transition is a determinant of the success of EU climate and energy goals.

In Poland, renewable energy sources and policies are quickly developing, and the dominant renewable energy source (RES) is wind energy followed by biomass. Wind farms are located in the Zachodniopomorskie Province (716.8 MW), Pomorskie Province (246.9 MW) and the Wielkpolskie Province (245.3 MW) (Polish Investment and Trade Agency, 2012). The Wielkopolska region is one of the leading regions in Poland in terms of its development towards a low carbon economy. As of 2014, there were 201 installations of RES in the region, out of which 137 Wind plants on land producing a capacity of 441.64 MW, 3 RES installations of mixed biomass with a capacity of 119.5 MW (mostly located in Eastern greater Poland) and other installations producing biogas from wastewater treatment plants, agricultural biogas and landfill biogas (Energy Regulatory Office Bulletin, 2014).

RES contributes an 15.4 percent (2020) share of RES in the energy mix (Macuk & Koszniec, 2020). In order to increase the share of renewables and decrease the dependency on coal, efficient supply side policies to increase the employment and capacity of wind technologies and biomass energy in transport is tantamount. These policies must then facilitate a shift of currently privatised renewable energy market to a state-owned decentralised market entity.

However, the PiS government has tried to undercut the growth of onshore wind power with legal changes as part of the 2016 "Act on Investments in Wind Power Plants". It increased property taxes imposed on the owners of the plants as well as a minimum distance ("buffer zone") required between wind farms and residential buildings, forests, or national parks at ten times the height of a wind turbine. This "buffer zone" of H10 or 10 the height of the pole on which the turbine is mounted, in practice, approximates between 1.5 and 2 km. This eliminates several investment opportunities in terms of land for wind turbines and their construction (Dawid 2017; Hajto et al. 2017; Liebe et al. 2017; Sokołowski 2017). While in April 2018, the then responsible Ministry of Energy announced intents to repeal current taxation rules and distance obligations and restore the law to its previous version, the changes have not been enforced. The regulation has blocked any new growth in the onshore wind energy sector in the country slowing down and interrupting the development of RES capacity at the turn of 2016/2017 (International Energy Agency 2018, p. 24). In addition, the ongoing drafted EPP 2040 by the Ministry of Energy predicts an end of onshore wind power within the current energy mix by 2040 (Ministerstwo Energii 2018).

Several programs exist that cater to the implementation of the European Commission energy policies.

In particular, the EU's Horizon 2020 programme[9] supports research and market integration of energy efficient technologies, this then functions as an incentive for energy-efficiency investments. A study concluded that between 2005 – 2013, there was a significant increase in investments in renewable energy (Pająk et al., 2017). The future aspiration is after the implementation of the Green Deal investment a ripple effect occurs and market multipliers further develop the RES market. Another integral programme was forerunner to the EU Horizon 2020 programme, the Intelligent Energy – Europe Programme (IEE). The aims of this programme was to improve energy efficiency and the rational use of energy resources, promote new and renewable energy sources (RES) by adopting diversified energy sources and finally to promote energy efficiency and the use of RES in the mobility sector (Pająk et al., 2017). Although this programme recently closed, some of its projects are still underway including the measures in Poland[10]. Another relevant policy mechanism is the Just Transition Fund, a mechanism of the European Green Deal which serves to support the transition of regions whose economies are based on coal mining; Poland is to receive the largest share of 2 billion EUR.

The Wielkopolska region has advantageous conditions for developing its energy sector. Poland's national energy governance architecture that includes its highly centralized energy system in decision-making and employing a state-led governance approach are, however, blocking a possible straightforward procedure in this field. Zoll (2020) offers an overview of the instruments to stimulate the low-carbon energy transition in the Polish electricity sector with the Energy Law Act of 10 April of 1997 being the centrepiece and the most comprehensive piece of energy legislation.
The central level is the key level for decision-making in energy matters, which includes an overlap between political and administrative actors in terms of personal and organizational capacity (Zoll 2020, 2021) As such, tall relevant dimensions of energy policy are executed by:

a) The Ministry of Climate that is responsible for:

- The overall energy policy;
- Improving energy efficiency;
- Increasing supply security;
- Developing competitive fuels and energy markets;
- Introducing nuclear powers;
- Increasing use of renewable energies;
- Reducing the energy impact on the environment;
- Defining priorities in Poland's Energy Policy until 2030;

[9] Puukka, J. (2018). *Spreading Excellence & Widening Participation in Horizon 2020. Analysis of FP participation patterns and research and innovation performance of eligible countries*.

[10] Berent-Kowalska, G., Peryt, S., & Wnuk, R. (2012). *Energy Efficiency Policies and Measures in Poland*

- Implementing tasks to shape the energy policy and regulatory environment;
- Coordinating the energy policy;
- Energy carrier diversification and energy source diversification;
- Creating and implementing Poland's climate policy;
- Creating inventories of greenhouse gas emissions and sinks;
- Reporting and verification.

b) and the Ministry of Development, which oversees:

- Prosumer energy and decentralised generation

With the national government involved not only in regulating market conditions but also in exercising substantial influence and control over the market participants, regional actions are limited. As regions are legally responsible only for the participation in the planning of energy and fuels supply in the region, including coordination of the planning of municipalities, as well as testing the compliance of the energy and fuels supply planning with the state energy policy (Zoll 2020, 2021). Nevertheless, the Wielkopolska region has advantageous conditions for developing its energy sector.

In 2012, the board of the Wielkopolska Region implemented a 2020 development strategy named the *Strategy for the operational programme's contribution to the union's strategy for smart, sustainable and inclusive growth*. Its main objectives were to optimise energy management, expand the production and use of alternative sources and improve regional energy security (Pająk et al., 2017). About 352,2 million was allocated to this Wielkopolska strategy from the European Regional Development Fund and accounts for 14,49 percent of the total support program. The priority energy axis covered in the thematic objective CT4: *Supporting the transition to low carbon economy in all sectors* contains the following objectives relevant to our study region (Board of the Wielkopolska voivodship, 2016; Energy Regulatory Office Bulletin, 2014; Ministry for Regional Development, 2020):

- 4.1 Support the creation and distribution of energy from renewable sources – Increase the share of renewable energy in energy consumption.
- 4.2 Promote energy efficiency and use of renewable energy sources in enterprises – Reducing energy intensity of the economy.
- 4.3 Promoting energy efficiency, intelligent power management and the use of renewable energy sources in public infrastructures, including public buildings and housing sector – Reduce energy intensity of the residential and public sectors.
- 4.4 Promote low-carbon strategies for all area's types of territories, in particular urban areas, including the promotion of sustainable multi- modal urban mobility and adaptation measures to mitigate the impact of climate change – reducing greenhouse gas emissions.

Regional and EU policies, liken the example in the preceding paragraph, provide prospects for the

development of renewable energy sources by the year 2025. Therefore, certain polish leading energy providers are planning for a low carbon future by increasing their RES capacities. For instance, ENEA SA, Poland's third largest energy provider planned to invest approximately 20 billion PLN between 2014 – 2020 in a low carbon transition and an additional 4.5 billion PLN in "green energy" to increase its generation capacity by 1.9 GW (Pająk et al., 2017).

Table 1. Overview of policies addressing specific drivers of Poland's political economy of coal (Brauers & Oei, 2020b)

	Restrictive Policies	**Mix**	**Supportive Policies**
Supply Side Policies	Restructuring of the remaining coal mining sector and subsidies Reducing and eventually stopping financial support could end domestic production of coal before 2040* (Bukowski et al., 2015). A continuous phase-out plan like e.g., in the UK or Germany (with production quotas or specified years for mine closures) could increase planning security for all affected actors. Our analysis shows that a stronger policy like an immediate moratorium on coal mining is currently politically infeasible. Addressing drivers of financial problems of the coal industry, limited coal resources in already operating mines, pressure from the EU banning coal subsidies, international pressure to phase-out coal as well as concerns due to climate change, air and water pollution. Reducing barrier of limited financial resources by freeing state money that could be redirected to renewables or structural/social programmes.	Diversifying corporations As most corporations are state-owned, obligations for a minimum diversification of energy sources can be implemented: could encourage a process from coal mining towards more sustainable industries. Using the drivers of increasing competition from renewables and natural gas, as well as the electricity capacity gap, rising CO2prices and societal concerns about climate change, air and water pollution Might contribute to reducing barriers of rising electricity prices, energy security and lower concerns by civil society about negative consequences related to reducing coal production.	Renewables phase-in Pointing out how dwindling domestic coal resources would make Poland import dependent in the medium-term future, and that ~50% of the total installed electricity capacity comes offline between 2020-2035 could serve as a justification for more renewable energy support (e.g. feed-in-tariffs, revoking of law from 2016 restricting wind power expansion**, investment of state owned-companies in renewables). Domestic production of renewable energy related technologies or development of auxiliary services could create prosperity and knowledge apart from coal. Addressing drivers of increasing competition by renewables, electricity capacity gap after 2020, coal power plants breaching EU emission levels, concerns about climate change, general pressures to phase-out coal open up space for renewables. Need to overcome barrier of limited support mechanisms for renewables; renewables incorporating a larger market share could increase pressure for coal companies to be competitive and reduce fears about unreliability of RES.
Demand Side & Structural Policies	Restructuring of coal-based electricity generation Limiting financial support and subsidies for coal power plants. No support for 'clean coal' projects or further modernisation. Being part of the EU means that tighter emission standards e.g., enforcement of already decided emission limits (IED), limited capacity payments (e.g., a ban on capacity payments for generation with more than 550 g CO2/kWh), increasing CO2 prices, etc. need to be implemented. Addressing drivers of financial problems of existing coal-fired power plants, increasing competition of renewables and natural gas, as well as EU emission limits, rising CO2 prices and societal concerns with respect to climate change, air and water pollution. Might contribute to reducing barrier of unnecessary investment in so called "clean coal" technologies.		Social and structural policy measures A socially acceptable coal phase-out needs to prevent electricity price increases for low-income households. Negotiations with trade unions can result in a social security programme including the creation of new, well-paid jobs, a reliable social security net, retraining programmes and job search support. Support for former coal regions needs to increase their capacity to diversify the local economy and create more resilient, attractive and competitive regions. Local authorities need sufficient funds and capacity training for implementation. *** Household coal demand can be reduced e.g. by subsidies for building refurbishments or shift from coal heating to alternatives like heat pumps. Addressing driver of air pollution concerns. Contribution to reducing the barrier of fears of workers and citizens about negative impacts for the region and themselves.

Notes: * This is not to say that 2040 should be the target year. Analysis has shown that compliance with the Paris Agreement would require an EU-wide coal phase-out by 2030 (Climate Analytics, 2017).** Polish Act on Investments in Wind Power Plants (Sejm paper no. 961/2016). *** See Brauers et al. (2018) for dimensions for a just transition in coal region

Table 2. Drivers and barriers for a reduction in Polish coal production and consumption (Brauers & Oei, 2020b)

Drivers	Barriers
Economic Factors	
Limited economic feasibility of domestic hard coal mining. (+++)	Regional economic dependence and high employment share in the coal sector. (---)
Limited economic feasibility of new coal-fired power plants. (+++)	Limited financial support mechanisms for renewables (need for upfront investment). (---)
Aging infrastructure of power plants and the electricity grid and limited domestic coal resources in still operating mines. (+++)	Potentially rising (household) electricity prices in the short-term. (---)
Reduction of load factors due to cheaper electricity imports. (++)	No need for corporations to make profits as the state does not expect them to be competitive. (---)
Increasing competition of renewables (including potential offshore wind farms) and natural gas (availability of LNG imports). (++)	Restricted government budget for new investments in renewables, structural policy programs, etc. (--)
EU ETS: fewer free certificates and rising CO2prices. (+)	
Political & Legislative Factors	
Power plants breaching EU emission limits (Industrial Emissions Directive, IED). (+++)	Energy security concerns (about energy imports and perceived unreliability of RES). (---)
(Conditional) Financial incentives from the EU for the instalment of renewables and cohesion policies to help carbon intensive regions. (+++)	Government in favour of continuing high coal dependency (bail-out of bankrupt companies, subsidies, capacity market, etc.). (---)
Increasing pressure by the EU: Ban on coal mining subsidies, restriction of capacity markets, climate policies, etc. (++)	Vested interests and high political influence of coal companies. (---)
Rising international pressure on coal. (+)	High political influence of coal labour unions. (---)
	Investments in and discourse of “clean coal” technologies. (-)
Social & Environmental Factors	
(Local) protests due to air and water pollution and against new mine openings. (+)	Fear of change and loss especially in coal regions (energy poverty levels, past negative restructuring experiences, etc.). (---)
(International) climate change concerns. (+)	Ideology and culture: Belief that growth is only possible with coal, that coal is central to development, defining national and regional identities. (---)

Note: For drivers and for barriers the (+), (++), (+++) and (-), (--), (---) indication illustrates the relative strength of the impact, respectively.

4. Organisation of the stakeholder interviews

The 21 stakeholder interviews that we conducted between November 2020 and December 2020 employed the questions outlined in the first chapter and follow-up questions for understanding. The stakeholders were comprised of government and non-governmental organisations, civil society, private companies, media, education sector and the environmental sector. The commonality between all interviewees was that they were directly involved in their various capacities in Eastern greater Poland. The stakeholders were selected based on a purposive sampling strategy by our local partners involved in the coal transition in Konin Province. Later, the interviewees were invited to a stakeholder workshop to further elaborate on their shared mental models. The list of stakeholder groups and their associations is presented in Table 3 and Table 4. The average stakeholder interview length was 23 minutes with a clear difference in time spent in the interview between stakeholders from the government and coal business sector speaking less and stakeholders from civil society having more to say about the transition.

Deep listening interviews entail interrelationships among the interviewer, the interviewee, the research purpose and questions and the research environment (Salmons, 2015). Considering the COVID-19 pandemic, some interviews where possible were conducted in person while others were conducted online. According to Salmons (2015), e-interviews should not considerably affect the quality of a qualitative research. Despite the change of the conventional research milieu, e-interviews as an emergent method should not significantly affect results and under certain conditions rather complement more established methods, increase the interviewee pool and save time and costs. Nevertheless, had it not been for the limitations due to the current pandemic, perhaps we would have had a larger pool of interviews.

The interviews examined the shared, different and group shared mental models of each stakeholder to derive insights on their perceptions of the energy transition. Due to time constraints the interviews were coded with a simple themed coding method and thereafter analysed using content analysis. The interviewed stakeholders were then further grouped into three main groups, being Business, Government and Civil Society as part of the stakeholder analysis. As illustrated below in Figure 2, their optimistic, neutral or pessimistic views are denoted in the various colours in the legend:

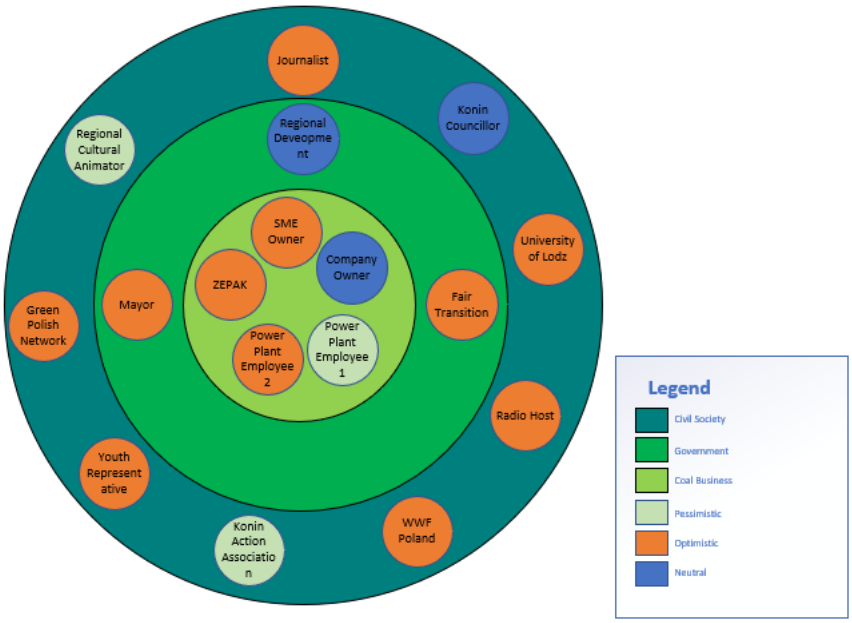

Figure 2: Onion Diagram of Interview Stakeholders

As figure 2 illustrates, most of our interviewed stakeholders were from civil society while the least were from the government. The focus of their interviews, stated in Table 3 below, further explains why they perceived such stances on the transformation. Most of the stakeholders held an optimistic view of the energy transition and their futures while one stakeholder from civil society and one from the business sector perceived that change pessimistically. The stakeholders with a neutral view, did not express a clear opinion on the transformation and rather extensively discussed the factors involved.

4.1 Shared Mental Models

The majority of stakeholders interviewed perceived a positive general social acceptability of the energy transition and increasing cooperation among stakeholders in the Eastern Greater Polandregion but emphasised the lack of transparency of the whole process. In comparison to other regions, they believe the Eastern Greater Polandwill make the first strides towards achieving carbon neutrality in Poland. Several stakeholders are interested in these changes. The respondents also expressed that if communities felt that they could contribute to the transformation they would but are often hindered by the historical lack of public participation in decision making. Young people will be the main drivers of the transformation in the future. Many believed as well that educating incoming youth who would be the future workforce and retaining emigrated youth is crucial in the transformation process. Several stakeholders were also unclear as to what active participation was possible and necessary on their part.

Many interviewees mentioned the progress in Silesia and stated that Eastern Greater

Polandstands a better chance at success because there are fewer jobs losses in comparison to other regions which would be easier to handle because less people are affected hence less complications involved in the transformation. The reoccurring limitation mentioned by all is the government's lack of experience due to the novelty of the situation and the difficulty in refurbishing the regional coal identity as well as generational mentalities and patterns. Inhabitants do not agree that the solutions created in the past by the government fit needs and are fearful that this would occur again. A general opinion is that there is well-developed communication between towns and corporations but not between the people and the government. The main questions that arose are, since the transformation entails a shift from the regional coal identity, what would be the future regional identity and what would become of the people embracing the old?

4.2 Environmental Advocates

The interviewee from the Green Network stressed that in their experience, despite the European Green Deal, there are fears that these funds might be misdirected into national projects not associated with the energy transformation as means to placate the losses from coal lobbyists. This implied that there might be forged realisations of projects to appease EU reporting with intangible results. Another stakeholder with a "green" stance on the energy transition claimed that there is misallocated international attention on the Silesia region in Poland's energy transition as the most prominent region of research but a lack of international awareness of the Eastern Greater Polandregion as a pilot region.

The environmentalists agree that the privatisation of the coal industry in the Eastern Greater Polandregion is the greatest driver of the transition's success and advantage in comparison to other regions. Should the coal industry in region not have been privatised but rather state-owned it is assumed that similar to other regions the energy transition, this process would be slower and more bureaucratic. The environmentalists were the only interviewees that emphasised improving foreign attractiveness to the region through technological advancement rather than focusing on tourism, agriculture, and workforce. There is a strong potential for local and motivated grassroot communities in the region however the belief is that their potential will be thwarted without clarity and a plan created with all stakeholders involved. The second belief is that they will be overlooked in the process and will have to push the government to make their voices heard. A consideration mentioned as well was how much time would be

necessary for the population to get used to and embrace the changes in the energy transition? In general, the environmentalists in the interviewee pool feel that they can have an impact on decisions affecting their self-efficacy since their movements dating 2013 resulted in change but are fearful that the process will be top down rather than bottom up.

4.3 Coal Business Industry as Advocates Against the Energy Transition

Since the livelihood of "coal people" will be severely impacted by the coal transition, it is clear why they remain opposed to it and pessimistic, especially since there is no clarity on their future and they are of the opinion that they do not have a voice in the transition. The aged miners will not be able to quickly acquire a new skill and are not mentally prepared to change their professional identity. An interview respondent from the coal business sector mentioned that there are little prospects for miners and miners like his grandfather should not be dismissed or left out of the transition. Rather than speak about the end of the coal era, the interviewees mentioned rebuilding the industry at smaller scale until the resources become scarce. Evidently, it is more difficult for this stakeholder group to embrace the new global reality.

An interview participant from ZEPAK, highlights the importance of showing the positive change that the transformation will bring about to the population directly. Although some are aware that these changes are needed and beneficial many are not. Showing advantages of the transition could aid in improving the public acceptance of policies. It would seem that while one part of the population is environmentally conscious and aware of what this transition will bring about the latter does not understand why this is "good" for them. Business stakeholders view several future risks on the strategic level due to lack of communication with the society and believe the intricacies of the transformation may be misunderstood by the government. A change of this severity requires that people visibly see the good change in their lives and the potential it has for their future claims a business stakeholder. Since the climate impact might not be a clear motivator for business stakeholders' other motivations need to be outlined. One motivation was the future lucrative opportunities of changing to renewable energy as ZEPAK did. However, a stakeholder mentioned that there are policy issues involved which disincentivise businesses such as the legal barriers to wind investment. According to them without an amendment to the act on wind investments no installations could be expected. Because it is unclear who is responsible for spearheading the transformation, how and at what pace, it makes it even more difficult for a business stakeholder to adapt and plan ahead.

4.4 The Government

The overarching theme in the responses from stakeholders from the government is how to give the people another sense of identity in the region. The future view is optimistic due to the regions resources and the respondents point out the need for strong public participation in the process. One of the barriers mentioned is the lack of financial support and the need for investors. One interesting insight is that a mayor felt the entrepreneurial spirit in the region has been "murdered" due to the historically strong regulations and former job security prospects in coal. The advantages of the region from their purview are that there is a large workforce available, people see value in the region and a plethora of "people who want to act, have a vision and have ideas for how to positively change the region". It was however unclear with the mention of investment from the government stakeholder what should be invested and whether they assume responsibility for the energy transformation in the region.

Another interview participant stated, "What is needed is knowledge and experience in how to arrange these energy transition activities, what is needed to be planned today and how can these be realised in accordance with the end goal". This highlights a current standpoint of the Polish government given the sudden decision to decrease their national dependency on coal. Perhaps Poland can adopt some lessons learned from Germany and apply certain aspects to the regional context. Fears were also mentioned that given the current COVID-19 pandemic any funds for this transition could be delayed in turn delaying their start towards a transition. Although the energy transition will create jobs for the population in its entirety, it is first necessary to address the pre-existing technological shortcomings within the region. Lastly, although the interview respondents mentioned similar advantages previously discussed in the chapters beforehand, they point out the opinion similar to the environmentalists that these advantages may not be fully realised due to formal and legal barriers and varying political influences.

4.5 Civil Society and the differing mental models

One can presume from the interview responses that several stakeholders not limited to civil society are on board in varying degrees and varying ways and ready to have a conversation about the energy transition. A stakeholder suggests that there should be equal involvement of all stakeholders and shared responsibilities. At present, it is believed that the miners unions are left out of the conversation since their raison d'être has been eliminated. It is unclear whether they are staying out of the conversation or the latter. It is crucial during the transformation processes that even the voices of the weaker groups in the transformation are not only heard but also considered.

Several stakeholders from civil society feel insecure in their fields of work but feel that the transformation is solely contingent on the government, not themselves. And the activist's belief is "Government involvement is not meaningful" hence they would rather take matters in their own hands.

The youth representative from the civil society stakeholder group explained that if more youth were asked of their opinion they would feel better noticed and gain a sense of co-responsibility for the region. This stakeholder thinks the transformation will revive entrepreneurial activity in the region which could make young people more willing to stay. Like every other stakeholder before, this stakeholder feels although they have an opinion, it will not be taken into account. Further studies on the youth self-efficacy are necessary to disprove or validate this view. A further opinion stated was that Konin has not invested enough in people and invested too much on green energy development and infrastructure without an equal investment on remedying social issues may hinder that transitions success. An out of the box thinking of solutions is necessary to keep youth within the region, create incentives for the renewable energy job market and transform the community's social environmental context.

Lastly an opinion which was not mentioned by any other stakeholder was that the transition should also address cultural aspects and landscape clashes. Stakeholders such as artists and those involved in entertainment in the region, according to the regional cultural animator do not feel appreciated or feel like they would benefit from the transformation. This stakeholder emphasises cultural cohesion as an integral part of reforming the regional identity but retaining the cultural relics. The stance of the civil society is surmised by one stakeholder quote, "The state should be an instrument and not replace the opinions of society, but rather stimulates its development".

Table 3. Overview of stakeholders in Konin represented by the interview participants

Interview no.	Organisation (Role)	Stakeholder Sub-group (i.e., NGO etc)	Focus of the Interview (i.e., main opinion or stance)	Interview Length
1	Parliamentary Team for a fair transition	Government	Regional Identity and Future Uncertainty	23 minutes
2	Mayor	Government	Regional Identity, Importance of Konin City in the Transition and Optimistic expectations due to resources	30 minutes
3	Regional Cultural Animator	Civil Society	Addressing natural landscape clashes regional relic preservations	28 minutes
4	Regional Development Agency Official	Government	Stakeholder mentality shift for the transformation, lack of transformation know-how and robust planning.	39 minutes
5	ZEPAK SA Board Advisor	Business	How to demonstrate the positive changes in the transformation. Risks on the strategic level and lack of public communication.	34 minutes
6	Konin Action Association	Civil Society	Ensuring public participation in the transformation process and needs of weaker groups. Addressing hydrological issues.	38 minutes
7	Platform of the Future Industry	Civil Society	Regional shock, scientist lack of self-efficacy in decision making	27 minutes
8	Regional Development Agency	Government	Cooperation, public moderate dissatisfaction and coal mining efforts	14 minutes
9	City Councillor	Civil Society	More stakeholder involvement, investment potentials and future decision making	17 minutes
10	Journalist	Civil Society	Uncertainty about freedom of speech on the transformation. Positive outlook on the transformation	17 minutes
11	Youth Representative	Civil Society	Co-responsibility in the region, best possible solutions, joint determined youth effort and the revival of entrepreneurship in the region	23 minutes
12	Green Polish Network Representative	Civil Society	Public participation in environmental protection and legislative process. Optimistic Energy transition. Effective involvement and public openness to the transition	33 minutes
13	WWF Poland Representative	Civil Society	Public communication on the energy transition and communication of the transition merits for public acceptance.	24 minutes
14	PAK KWB Konin	Private Mining Company	Pessimistic perception on the transition, unwanted change and difficulty in changing field of work after 40 years of age	11 minutes
15	University of Lodz – Faculty of Philosophy and History	Civil Society	Ecosystem restoration and biodiversity. Consideration of local communities and regional clean up	23 minutes
16	Polish Green Network Representative	Civil Society	Role of the EU in the transition, transfer of knowledge and network of activists. Lack of government support in the transition and ambitious goals of the greater Poland region. Need for community decision making instead of government.	24 minutes

Table 4: Overview of stakeholders in Konin represented by the interview participants cont.

Interview no.	Organisation (Role)	Stakeholder Sub-group (i.e. NGO etc)	Focus of the Interview (i.e. main opinion or stance)	Length of interview
17	Company Owner	Business	Youth and education and value in private companies in the region. Konin as an investment location and emphasis on human resources	22 minutes
18	Konin Lignite Mining Council	Business	Increased public participation in the process, esp. employees. Increased representation of workers in different sectors, trade unions and organisations. Lack of future visions among employees.	11 minutes
19	Konin Power Plant Employee	Business	Optimism towards transition, more opportunities given the inevitable end of coal	6 minutes
20	Energy Transformation Speaker and Activist	Civil Society	Youth perspective and strengthening entrepreneurship in the region	20 minutes
21	Head of SME	Business	Optimism about the region, increasing regional attractiveness and the importance of a common vision. Entrepreneurship potential and involvement of all stakeholders in the process and implementation of the transformation	27 minutes

5. Conclusion

By analysing 21 stakeholders deep listening interviews, this report sought to create a mental map of stakeholder perceptions and opinions on a future coal phase out in Eastern Greater Polandand the implications on their respective future in the region. We separated the stakeholders in 3 main groups, being government, civil society and business and discovered the shared and differing mental models amongst them. Most stakeholders are uncertain of the steps and pace of this transformation as well as who is spearheading the energy transformation and how. Our analysis illustrates how the lack of information and transparency of the process can impact its public acceptance. Since as some stakeholder's mentioned, historically public participation was not evident in the Polish government's decision making, most stakeholders emphasised their wish for their voices to be heard and considered in the decision making. In addition, most stakeholders were optimistic about a coal phase out and understand why it is necessary, however as expected, a few remained pessimistic especially given the lack of a future employment solution. This is one of the greatest challenges which can only be solved with the active participation of workers indirectly and directly affected.

The purpose of this report is to support policy makers by identifying regional challenges, advantages and solutions suggested by the stakeholders involved to facilitate a smoother energy transition. Among the stakeholders interviewed, the government plays the largest role in the transition. A stakeholder from the civil society group stated, "There a too few active actors in the transition who are growing tired without support and too many unknown courses of action.". There needs to be a broader social representation of stakeholders and a clearer vision for employees affected by the energy transition.

Many mentioned as well that it is unclear what the new regional identity will be and if it could be fathomable to mentally move people away from coal since it has been in families for generations. Another stakeholder from civil society also highlighted the importance of maintaining the cultural identity of the region in line with the energy transition. Coal had been a secure and lucrative employment choice in the region hence many inhabitants in the past did not seek to work in any other sector. As a mayor mentioned, the dependence on the coal sector for employment "murdered" the entrepreneurial spirit in the region. Since there will be a large workforce in the region after the transition, many suggested creating investment incentives such that companies would start up more businesses in the region and perhaps the young workforce would also stay in the region instead of seek work elsewhere. An underlining theme among all stakeholders is the integral role the youth of Eastern Greater Poland play in the energy transition

processes and how their opinion should a determining factor as well. The main question that arises is, what can the facilitators of the transition do, to ensure that all voices are heard? It is difficult to consider all voices when deciding but after the interviews, it became clear that the benefits have to be visible to all. More so, the pace at which certain parts of the transformation occur should optimally give enough time for people to prepare and act accordingly. It is still unclear how much time will be necessary for people in Eastern Greater Poland to accept this new reality and what negative or positive impact it will have on each individual. Further research may be needed to expand on solutions inhabitants may have and how current aged coal workers envision of their coal-free future. Given the future shift in work force, one stakeholder mentioned that is also critical to prepare the current education system for the new qualifications that will be necessary for the regions new energy future, perhaps in line with renewable energy. Future policies made should cater to youth employment in the region and re- allocation of coal displaced workers. A new regional identity can be forged in collaboration with its inhabitants perhaps through a consensus. There is a need for further research on consensus studies and the creation of platforms for direct communication about the process and phases. A policy and subsequent decision-making process should be bottom up and address the new income disparities. In summary, addressing the decline of coal and coal complementing industries, creating infrastructure for the new renewable energy industry, improving labour qualifications in line with the energy transition, gaining experience through transition studies, EU collaboration and improving the attractiveness of the region for its young inhabitants and investors; are all key factors for policy makers. The success of the energy transformation depends on joint public and government efforts that promote decentralised renewable energy systems. In brief, as mentioned by most stakeholders since the transformation involves several weaker groups, their opinions should be considered and any 2038 policies in theory should cater to the existing needs of all without leaving out any worse off.

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