61ST GRADUATE STUDY PROGRAMME

"ALL RIGHTS FOR ALL PEOPLE"
UNIVERSAL DECLARATION
OF HUMAN RIGHTS AT 75

COMPILATION OF GROUP WORKS

75 UNIVERSAL DECLARATION OF HUMAN RIGHTS
DIGNITY, FREEDOM & JUSTICE FOR ALL

UN GENEVA 3 - 14 July 2023

Foreword

This volume is a compilation of group works of the 58 participants of the 61st Graduate Study Programme of the United Nations Office at Geneva, which was held at the Palais des Nations in Geneva, Switzerland from 3 to 14 July 2023.

Opinions, positions, statements, and conclusions expressed in the five reports included in this compilation are exclusively of their authors – graduate students who participated in the Programme. They do not necessarily represent or reflect the views of the United Nations, the group moderators, or the moderators' respective organizations.

"Forging a Just Transition: Towards Green Jobs and Rights-Based Futures"

This work was produced by Working Group 5 of the 61st Graduate Study Programme, which was held at UN Geneva, Switzerland from 3 to 14 July 2023.

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Introduction

Amidst the global challenges posed by the triple planetary crisis, there is growing recognition among policymakers, world leaders, and stakeholders of the need to address the transition to renewable energy in a manner that is fair and equitable. It is widely acknowledged that every nation will undergo this transition, and it is imperative that it be done with fairness in mind. Our team was tasked with identifying key factors and indicators that determine a country's readiness for a just energy transition within the coal mining industry.

Methodology. Through our comprehensive analysis, we have identified key factors to be considered, including socio-economic, political (including regulatory factors), geographical, and technical in nature. These indicators enable us to assess a country's readiness for just transition away from coal mining.

Case selection. In order to put these factors to the test, we have conducted an in-depth analysis focusing on Poland and Kazakhstan as case studies. These case studies hold relevance to the United Nations Economic Commission for Europe (UNECE), as both countries are its Member States. Poland stands as a historically prominent example of a coal-reliant economy within the UNECE's regional mandate, while Kazakhstan plays a crucial role in the Central Asian region, with the potential to influence neighboring countries. Poland has been descaling its coal mining industry for decades, and as a European Union Member State it has access to EU funding opportunities and is influenced by EU policy. Kazakhstan, on the other hand, has a robust fossil fuel industry and a steady coal mining industry. Both countries are at different stages of transitioning their coal mining industries. Thus, by examining how these factors manifest in the specific case studies, our aim is to gain valuable insights into the challenges and opportunities associated with achieving a just energy transition in these unique contexts.

Expected Outcome. The work we have been assigned to do is of crucial importance because its results are expected to help with establishing indicators allowing for assessing the readiness of a country to transition to a low and zero-carbon future in a just and sustainable manner. It aims to offer a set of criteria that would enable spotting the gaps and thus also making necessary policy adjustments. The identified factors should offer a clear picture of the current situation in each given state, which, in turn, would provide a basis for developing tailored recommendations on targeted actions, as well as short- and long-term transition strategies.

Socio-Economic Dimension

Timing and speed at which the change is happening. We argue that transition takes a considerable amount of time, and all stakeholders (workers, businesses, and communities) are to be mapped in the system in order to identify the level of influence of each and how best to prepare them as early as possible. Also, the timing and speed of transition are well subject to political economy dynamics. Therefore, socioeconomic analysis enables policymakers to develop targeted policies that address the specific needs of different groups, foster inclusive economic growth, and promote social cohesion throughout the transition process. This section includes demographic indicators, macroeconomic indicators, employment data, and cultural factors.

2.1 Demographic Indicators

Demographic indicators provide valuable insights into the population's composition, size, age structure, and migration patterns. Understanding these factors is essential for assessing the potential impact of the just transition on different demographic groups and identifying specific needs and challenges they may face during the transition process. Among the indicators to consider are:

- *Age distribution*: The age distribution of the population is a crucial factor to consider in the "Just Transition" process. If the population is relatively young, there is a higher chance for the youth to be trained in new skills, such as environmental management and technical skills for the renewable energy sector. Moreover, if the population is relatively old and nearing retirement, it creates opportunities for the younger generation to step in and replace the retiring workforce soon. However, if the majority of the workforce is in the middle of their careers, they may be less flexible in adapting to a new industry and too young to retire soon, which can pose challenges for systemic change. Thus, analyzing the age distribution helps identify the workforce's adaptability and potential for transitioning to new industries and technologies during the just transition.
- The *growth rate* is another important indicator to consider since it illustrates the growth or decline of the workforce.
- *Net migration* is the last demographic indicator that we consider important for just transition because it presents the difference between immigrants and emigrants, and it can also showcase underlying political implications as well.

Poland

Poland’s population is 38.1 million people. The country has a declining population growth rate at 0.1per cent in 2010 and at -0.4per cent in 2022 (World Bank, 2022). The population is middle aged, with 41.7 being the average age, and 10.3per cent of the population being below 20 years old. The gender breakdown is close to even, with 51.6per cent of the population being female. The average life expectancy in 2021 is 76 years old, which is decreased from 78 in 2019, likely due to the COVID-19 pandemic (World Bank, 2022). The net migration rate of 2021 was -2,968

which means a few more people were leaving the country more than entering it (World Bank, 2022). In 2017, data the average household size stood at 2.8 (United Nations, 2017).

Kazakhstan

Kazakhstan's population is 19.2 million people, with a slightly declining population growth rate from 1.4per cent in 2010 down to 1.1per cent in 2022 (World Bank, 2022). Kazakhstan has a younger population with the average age being 30.7 years old (World-o-Meter, 2023) and 19.1per cent of the population being under 20 years old. The gender breakdown is close to even, with 51.9per cent of the population being female (Population Pyramid, 2023). The average life expectancy in 2021 is 70 years old, which decreased from 73 in 2019, likely due to the COVID-19 pandemic (World Bank, 2023). The net migration rate in 2021 was -18,917 which means more people were leaving the country than entering it as immigrants (World Bank, 2023). In 2017. data the average household size was 3.5 (World Bank, 2023).

Discussion

Kazakhstan has a younger population than Poland, with a slightly increasing population of 1.1per cent (around 19,200 births - 18,917 net migration rate = 283 population increase). Poland is worse off, with a population growth rate of -0.4per cent (so -381,000 + -2,968 = -383,968 population decline in 2021).

In Poland, the employment in the coal industry was at around 88,000 in 2020, from 400,000 miners in 1990 (Aleksander er al. 2014). In Kazakhstan, it was around 23,000 people in 2020, and has been at steady employment numbers since an increase in 2012 (Howie et al. 2022). Considering the declining or barely growing population rates of these two countries, it can be expected that the overall employment sector of each country will face staffing crisis in the coming decades, particularly Poland with an aging population. For both cases, youth engagement programs will be important to recruit into the renewable energy sector, and skills-based training is imperative.

The importance of developing a skilled workforce and finding funding opportunities is further backed up by the 2022 European Investment Bank Municipality Survey. In the survey, 60 per cent of European Union municipalities consider their investments in climate mitigation and adaptation infrastructure in the last three years to be insufficient. There's a severe lack of experts with environmental and climate assessment skills (69 per cent of municipalities reported) and 80 per cent reported that they lacked funding, with the length of regulatory processes and uncertainty about said regulations being a major blockage for local investment programs (European Investment Bank 2023).

1.2 Macroeconomic Indicators

Macroeconomic indicators such as GDP, inflation, and income distribution help evaluate the overall economic performance and well-being of the country. They provide a basis for assessing the potential economic implications of the just transition, including the costs and benefits

associated with transitioning to green jobs and sustainable industries. Analyzing these indicators helps policymakers understand the macroeconomic context and make informed decisions about resource allocation and economic policies during the transition.

- *Commodity market prices* - introducing market strategies that stabilize the market. Uncertainty around commodity prices makes it difficult for communities to transition because prices affect both willingness and capacity to diversify toward other industries.
- *Private investment attractiveness* (foreign direct investment) - attracting private investment could boost the economic diversification and provide alternative for jobs however, we argue that this requires collaboration between stakeholders, throughout the value chain as well as significant local and regional institutional capacity, including for repurposing of the mining lands and assets.
- *Composition of the GDP*: Analyzing the composition of the GDP provides insights into the sectors that contribute significantly to the economy. It helps identify sectors that require transformation during the just transition. For example, if a country's GDP heavily relies on fossil fuel extraction or energy-intensive industries, transitioning to cleaner and more sustainable sectors becomes crucial for a successful just transition.
- *GDP per capita growth*: GDP per capita is important to ensure that economic benefits are equitably distributed during the transition. It helps assess whether the just transition is fostering inclusive growth and improving living standards for all segments of the population. Addressing disparities and promoting social equity are central aspects of a just transition.

Poland

Poland is an industrialized, diversified economy[11] that experienced a decade of strong economic growth, prior to the pandemic. From 2012 to 2019, Poland’s gross domestic product (GDP) increased by 37 per cent[12] and its economic growth rate per capita was 4.5 per cent in 2019 significantly higher than the European Union (EU) average of 1.7 per cent. Moreover, Poland has a stable economy according to the European Union Commission (2023). Polish economy is strong, supported by an expansionary fiscal stance, a favorable situation in the labor market and the large inflow of displaced persons from Ukraine. However, the economic growth has weakened partly due to elevated inflation (11.7 per cent) and tighter financing conditions, despite these challenges, the easing of supply bottlenecks and a substantial inflow of foreign direct investment (FDI) are predicted to bolster export growth[13] .

Nonetheless, Poland's public finances face pressures, with the general government deficit projected to rise from 3.7 per cent of the GDP in 2022 to 5.0 per cent in 2023. This trend is chiefly attributed to energy support measure costs, pension indexation, and increased expenditure on healthcare, defense, and farmer aids. The deficit is expected to stand at 3.7 per

[11] See annex 01 and 02 to oversee the GDP structure and the principal export products.

[12] See annex 03 for more detail

[13] European Commission (2023).” Economic Forecast to Poland”. https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/poland/economic-forecast-poland_en

cent of GDP in 2024, causing the public debt ratio to reach 53 per cent of GDP by 2024 (OECD, 2023; European Commission, 2023)[14].

Regarding the energy market, OECD (2023) mentions that Poland's electricity market is largely liberalized, allowing consumer choice of suppliers, although regulated prices are prevalent for household consumers. The retail market has low switching rates, and ownership of generation and electricity sales is concentrated among state-controlled energy companies. Efforts are being made to strengthen consumer rights through proposed amendments to energy and renewable energy laws. The natural gas market is still undergoing liberalization, with limited competition and a dominant state-owned company. Poland's crude oil and oil products markets are fully liberalized, but market concentration and limited competition persist. The coal sector is also dominated by state-owned companies.

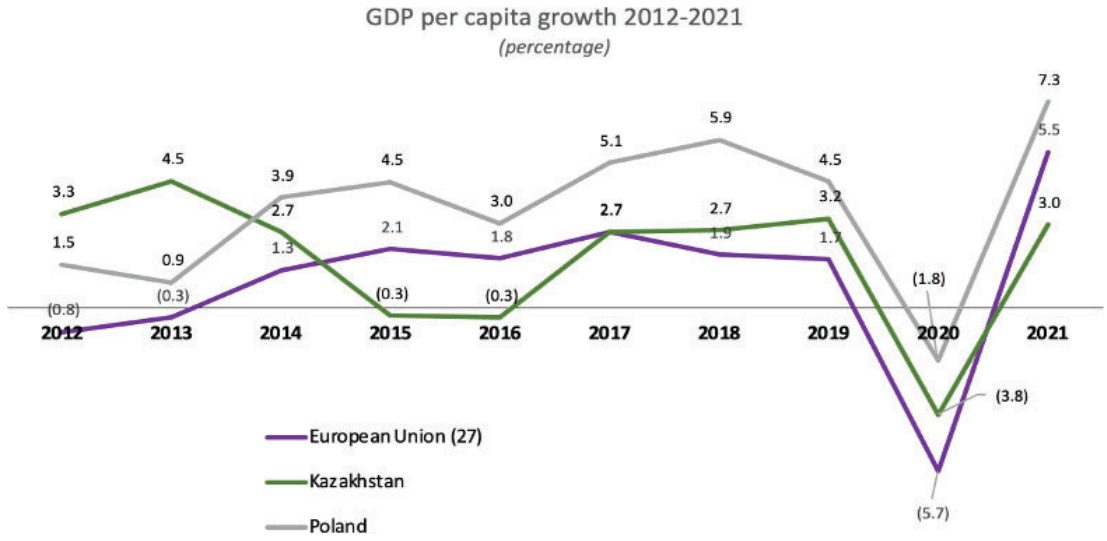


Figure 1. Source: World Bank (2023).

Kazakhstan

Meanwhile, Kazakhstan, as Central Asia's largest economy, boasts significant natural resources, including oil, gas, and minerals. The oil and gas industries and related sectors accounted for 17 per cent of gross domestic product (GDP) in 2020 (IEA 2022). Oil provides most of the country's export earnings and serves as the main source of government revenue. These sectors are key contributors to the nation's GDP[15], rendering the economy susceptible to global commodity price fluctuations. The country's economic growth has been volatile yet relatively positive over the

[14] OECD Data (2023). General government deficit. https://data.oecd.org/gga/general-government-deficit.htm

[15] See annex 01 to see the GDP structure and Annex 04 to see the import/ export composition

past decade, driven by the first generation of market-oriented reforms, abundant mineral resource extraction, and robust FDI (World Bank, 2023)[16].

Kazakhstan has initiated active efforts towards economic diversification. Government-led initiatives such as the "Bright Path" (Nurly Zhol) program focus on infrastructure development and industrial innovation. Concurrent efforts aim to develop sectors like manufacturing, agriculture, and services, though progress has been measured. Moreover, the ambitious "Kazakhstan 2050" vision aims to elevate the nation into the world's top 30 economies by 2050, by diversifying the economy towards a knowledge-based model, while emphasizing sustainable development and green economy principles (Kazakhstan 2050 Strategy)[17].

Regarding the energy market sector, this is gradually transitioning towards a competitive model, with the goal of attracting private investment, promoting renewable energy sources, and improving overall efficiency. The electricity market is regulated by the Ministry of Energy and the Agency for Regulation of Natural Monopolies (AREM). For instance, Independent Power Producers (IPPs) are allowed to participate in the market, and there are plans to introduce a wholesale electricity market and a balancing market to enhance market dynamics and efficiency (IEA 2022). Usually, most electricity is sold using bilateral contracts, while the share traded on the centralized market has been low and declining. In 2019, centralized trading accounted for 28 per cent of supply, while in 2021 it fell to around 1 per cent (Kazinform, 2021b).

Discussion

In conclusion, Poland maintains a generally strong external position, with EU structural funds continuing to bolster public investment and the country emerging as a prime destination for FDI. However, its high trade openness and considerable external debt render it vulnerable. On the fiscal front, Poland has significantly reduced the public debt-to-GDP ratio. On the other hand, Kazakhstan shows potential for improved economic growth, expected to benefit from increasing energy prices due to supply and demand factors. However, rising inflation could negatively impact this growth and decelerate its trajectory towards becoming a top 30 global economy and their commitment with “just transition” (Nussupova, 2023)[18].

1.3 Employment

The employment aspect is crucial as it directly relates to the creation and availability of green jobs during the just transition. Assessing employment indicators, such as unemployment rates, job creation, and skills gaps, helps identify the current state of the labor market and the potential challenges and opportunities for transitioning workers. Understanding employment dynamics

[16] The FDI net inflow in this past 5 years has increased from 2.3per centGDP to 5.1per centGDP. (World Bank 2023). https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=PL

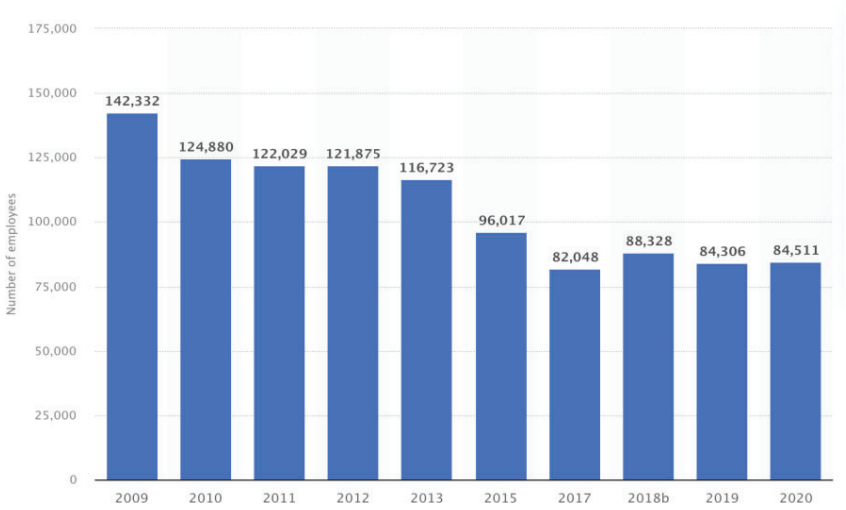
[17] https://kazakhstan2050.com/

[18]https://astanatimes.com/2023/01/uncertainty-and-optimism-kazakhstans-economic-forecast-for-2023/

allows policymakers to design effective policies and programs to support affected workers, ensure job security, and facilitate a smooth transition to new employment opportunities, further explanation later in the document.

Poland

Figure 2. Total number of employees in the mining of coal and lignite industry in Poland from



2009 to 2020. Source: Statista Research Department, 2023.

Historically, the trend has shown that there has been a decline in employability when it comes to the coal mining industry in Poland (Figure 2). Some authors argue that this has been partly due to the shift into the growing green energy production industry, while others showed that it has been slowly and negatively affecting the labour market and the overall livelihood of people in the country. Based on the 2021 report from Statista, the number of employees has remained nearly the same between 2019 and 2020 (84,511 employees.), yet when considering Europe as a whole, Poland remains the largest employer in the coal mining sector. Since this number only represents 2 per cent of the employability in the country, some believe that the impact of job loss resulting from a complete energy transition at the national level may be small or negligible. We argue that this might have not necessarily been the case, since about 88,000 people were estimated to directly be employed in the coal mining industry by the end of 2021.

Kazakhstan

Kazakhstan is known for its significant coal reserves, and the coal mining sector has historically played an important role in the country's economy and, eventually, the livelihood of the people. In 2020, the overall Kazakhstan oil industry accounted for nearly 50 per cent of the domestic energy production - in this proportion, coal remained the largest source of energy production accounting for 28 per cent out of the overall 50 per cent. The sector has provided employment opportunities for a considerable number of people. As shown by the agency of statistics of Kazakhstan, the overall employment rate has increased. We argue that this is also reflected in the coal industry, mainly because according to data from the World Coal Association, Kazakhstan coal production as also increased in the past five years.

Figure 3.

Several studies have demonstrated that employment in the coal industry is at the forefront of the challenges that the transition towards a less carbon-intensive economy brought about. They argue that there are a certain number of workers that might be able to transition relatively easily to new employment opportunities whilst, many others may not be, resulting in chaotic cases of limited access to jobs and thus, inability to meet the livelihood needs of the negatively affected population. This challenging labour market situation is projected to worsen in remote locations and traditional sectors that are progressing with the transition concept but at a slow pace.

1.4 Cultural Indicators

Cultural factors play a significant role in shaping people's perceptions, attitudes, and behaviors towards the transition process. Considering cultural aspects helps understand the values, traditions, and beliefs of different communities and how they may impact their willingness and ability to engage in the transition. Cultural factors also influence the acceptance and adoption of new technologies, practices, and behavioral changes required for sustainable development. Incorporating cultural considerations ensures that the just transition strategies are culturally sensitive, respectful, and inclusive. Therefore, this document divides into tangible and intangible assets, further explanation later in the document. There are several reasons to indicate how cultural assets play a crucial role in coal mining communities and the "Just Transition" process.

Historical Identity: Coal mining communities often have a rich history and heritage associated with their mining activities. Cultural assets such as museums, monuments, and historic sites serve as reminders of the community's past, preserving its unique identity and providing a sense of pride and belonging for the residents. These assets help to foster a connection between the present generation and their predecessors, ensuring the continuity of their cultural heritage.

Protection and Safeguarding of the Cultural/Natural Heritages: Coal mines and the pollution caused by those mines seriously threaten the protection and safeguarding of the cultural/natural heritages. When these coal mines are close to the core zone or buffer zone of the heritage sites, they have the possibility to trigger irrevocable damage to the outstanding universal values of the cultural assets. There are many NGOs and international organizations working on the protection of cultural heritage rights of the people. Their existence causes a pressure on the government and decision makers Therefore, the existence of the cultural/natural heritage sites is a significant issue needed to be taken into consideration to assess the countries readiness to "Just Transition" process.

Economic Value: Cultural assets can have significant economic benefits for coal mining communities. They attract tourists and visitors, stimulating local businesses and creating job opportunities in the tourism and hospitality sectors. Cultural tourism can contribute to the diversification of the local economy, reducing dependency on coal mining as the sole source of income. This economic diversification helps to mitigate the negative impacts of any fluctuations or decline in the coal industry.

Education Opportunities: Cultural assets offer educational opportunities for both locals and visitors. Museums, art galleries, and cultural centers provide a platform for learning about the history, culture, and traditions of the coal mining community. They can serve as important education resources, enabling school field trips, research projects, and cultural exchange programmes. By engaging with their cultural assets, individuals can gain a deeper understanding of the community's heritage and the significance of coal mining in shaping their region's history.

Environmental Conservation: Cultural assets can also contribute to environmental conservation efforts in coal mining districts. Many cultural assets, such as historic buildings or landscapes, are intertwined with the natural environment. By valuing and preserving these assets, communities can develop a greater appreciation for the surrounding natural resources. This can foster a sense of responsibility towards sustainable practices and environmental stewardship, encouraging the adoption of eco-friendly initiatives and helping to protect the environment.

Overall, cultural assets are vital for coal mining communities and the civilians living around the district as they preserve historical identity, drive economic development, enhance community well-being, provide educational opportunities, and promote environmental conservation. By recognizing and investing in their cultural heritage, these communities can build a sustainable future beyond the coal industry.

Poland

Tangible Heritage Sites. While there are no direct overlaps between specific cultural heritage properties and coal mines in Poland, it is important to note that some coal mines are located in the vicinity of historically significant regions. For example:

The Upper Silesian Coal Basin is near Katowice, a city that features the modernist architecture of the Nikiszowiec district, which is considered a cultural heritage site.

The Wieliczka Salt Mine, a cultural heritage property, is relatively close to the coal mining region in southern Poland, although they are not directly overlapping.

It is worth mentioning that the development of coal mines sometimes poses challenges to the preservation of cultural heritage due to environmental impacts and land use conflicts. Efforts are made to balance the economic importance of coal mining with the preservation of cultural heritage in these regions. Efforts should be made to mitigate any potential impacts on cultural sites and ensure sustainable development practices.

"Black Gold" Mining Museum in Zabrze: Located in the Upper Silesian Coal Basin, this museum showcases the history and significance of coal mining in the region. It exhibits mining equipment, tools, and offers insights into the lives of miners.

Miners' Settlements: In regions like the Upper Silesian Coal Basin, there are unique settlements known as "miner's colonies" or "miners' estates". These residential areas were built specifically to accommodate miners and their families, reflecting a distinct architectural style and cultural heritage.

Intangible Heritage Properties. The mining industry has contributed to intangible heritage, such as traditional mining songs, folklore, and cultural practices associated with coal mining communities. These include specific customs, celebrations, and rituals passed down through generations.

Oral Traditions: Coal mining in Poland has influenced the oral traditions and folklore of the region.

Song: "Przy kominku" (By the Fireplace) - This Polish folk song is often associated with coal mining communities in the Upper Silesian region. It reflects the experiences and emotions of miners and their families, conveying a sense of camaraderie and nostalgia for their coal mining heritage.

Song: "Hej, góralu" (Hey, Highlander) - While not exclusively a coal mining song, "Hej, góralu" is a popular Polish folk song that is often sung by miners. It expresses the struggles, determination, and pride of working in the mines.

Dialects of Coal Mining Communities. Silesian Dialect: In the Upper Silesian Coal Basin region of Poland, coal miners and their communities often use a distinct dialect known as the Silesian dialect or "Gwara Śląska." It is a regional variation of the Polish language with its own vocabulary, grammar, and pronunciation. This dialect has been shaped by the historical presence of coal mining and the cultural heritage of the local population.

NGOs and other organizations working on cultural issues related to coal mines.

Culture Action Europe (CAE): CAE is a European network of cultural organizations, and they advocate for the importance of culture in various societal aspects, including sustainable development and mining regions.

The Association of Creative Initiatives "ę": This Polish NGO focuses on cultural projects and initiatives, often in areas undergoing transformation or facing social and environmental challenges.

Greenpeace Poland: While primarily an environmental organization, Greenpeace Poland has been involved in campaigns and initiatives related to coal mining's impact on cultural heritage and local communities.

Kazakhstan

Tangible Heritage Sites. It is important to note that there are some direct overlaps between specific cultural heritage properties and coal mines in Kazakhstan. However, some coal mines are located in the proximity of regions that have cultural heritage significance. For instance:

Saryarka – Steppe and Lakes of Northern Kazakhstan is one of the properties inscribed on the UNESCO World Heritage List in 2008. It is located in the Astana region, close to the "Karagandi" region. There are almost 100 km between the site and two coal mines.

Cultural Landscape of Ulytau which is in the "Karagandi" region, situated very close to the two coal mines is inscribed on the UNESCO Tentative List in 2021.

The Ekibastuz Coal Mine and the Bogatyr Coal Mine are situated near the city of Ekibastuz, relatively close to the Mausoleum of Khoja Ahmed Yassawi in Turkestan. While they are not directly overlapping, they are in the same general region.

The Karaganda Coal Basin is one of the largest coal mining regions in Kazakhstan. The mining activities in this area have shaped the local culture and influenced the development of mining towns and settlements.

Mining Memorials: In cities like Karaganda, there are monuments and memorials dedicated to coal miners. These structures pay tribute to the contributions and sacrifices of the mining community, preserving the memory of their work and impact.

Intangible Heritage Properties.

Oral Traditions. Coal mining in Kazakhstan has influenced the oral traditions and folklore of the region. Stories, songs, and legends are passed down through generations, capturing the experiences and identity of coal miners. Here are examples of coal mining songs and stories from Kazakhstan:

Song: "Shokpar" - This traditional Kazakh folk song is closely associated with the coal mining culture in Kazakhstan. It tells the story of miners working in the depths of the earth, their challenges, and their hopes for a better future.

Story: "The Legend of the Black Diamond" - Passed down through generations, this Kazakh folk tale tells the story of a mythical creature that protects the coal mines. It highlights the significance of coal mining in the cultural narratives of the region.

These songs and stories serve as cultural expressions and reflections of the coal mining communities' experiences, aspirations, and cultural identity. They often convey the hardships, resilience, and pride associated with coal mining traditions and help preserve the heritage of these communities. It's important to recognize and preserve both the tangible and intangible heritage associated with coal mining. These elements provide insights into the historical, social, and cultural aspects of mining communities and their contributions to the overall heritage of Poland and Kazakhstan.

Dialects of Coal Mining Communities. In both Poland and Kazakhstan, coal mining communities have developed their own distinct dialects or language variations influenced by the mining industry and the unique social and cultural environment. Here are some examples in Kazakhstan:

Karaganda Dialect: In the Karaganda Coal Basin region of Kazakhstan, which is known for its coal mining industry, there is a specific dialect known as the Karaganda dialect. This dialect is influenced by Russian, Kazakh, and the local mining culture. It includes unique vocabulary, expressions, and pronunciation patterns that are distinctive to the coal mining communities in the area.

These dialects are not limited to coal mining communities alone but often have a broader regional influence. They reflect the history, traditions, and close-knit nature of the mining communities, providing a sense of identity and solidarity among the people involved in the industry.

NGOs and other organizations working on cultural issues related to coal mines.

Cultural Heritage without Borders (CHwB): Kazakhstan CHwB is an international organization working to protect and preserve cultural heritage. They collaborate with local communities, including those affected by coal mining, to safeguard cultural assets and support sustainable development.

Foundation for the Preservation of Cultural Heritage: This Kazakhstani foundation aims to preserve and promote the country's cultural heritage, including historical sites and traditions that might be affected by industrial activities like coal mining.

Association of Historians and Archaeologists of Kazakhstan: This association focuses on historical research and preservation, which can include advocacy for the protection of cultural heritage in regions affected by coal mining.

Geographical Dimension

2.1 Indicators

Geographical indicators such as surface area, average temperature, air quality, sunny days per year, availability of natural resources, and hydro-geological information are crucial for the energy transition in the following ways:

The surface area of a region. It is important for assessing the potential for infrastructure development. It helps determine the availability of land for renewable energy projects, such as solar and wind farms, as well as the feasibility of building transmission lines and other necessary infrastructure. Understanding the surface area aids in planning the layout and expansion of renewable energy installations.

Average temperature, air quality, and sunny days per year. These indicators provide insights into the solar and wind potential of a region. Areas with high average temperatures and sunny days are favorable for solar energy generation, while regions with strong and consistent winds are ideal for wind power. Assessing these indicators helps identify suitable locations for solar and wind farms, ensuring optimal energy generation and maximizing the utilization of renewable resources.

Availability of natural resources in the region. These indicators related to the availability of natural resources, such as biomass, agricultural residues, and organic waste, determine the potential for biomass energy generation. Identifying regions with abundant biomass resources helps plan the development of biomass power plants, contributing to the diversification of the energy mix and reducing dependence on fossil fuels.

Hydro-geological information, including the presence of rivers, water flow rates, access to the sea, and topography, is vital for assessing the potential for hydropower generation. These indicators help identify suitable locations for the construction of hydropower plants, considering factors such as water availability, elevation changes, and environmental impacts. Utilizing hydropower resources contributes to the renewable energy mix and provides a reliable source of electricity.

Based on these indicators, this paper identified the following opportunities and challenges for the just energy transition in Poland and Kazakhstan.

2.2 Case Study

Poland

Opportunities

Baltic Sea Offshore Wind Potential: Poland has a significant geographical advantage with its access to the Baltic Sea. The Baltic Sea has a high potential for offshore wind power generation, estimated at 33 GW with an expected average annual energy production of 130 TWh. Exploiting this resource can provide abundant clean energy to meet a substantial portion of Poland's electricity demand and contribute to reducing greenhouse gas emissions. By using the total

estimated potential of the Polish part of the Baltic Sea, offshore wind power could meet up to 57 per cent of Poland's total electricity demand by 2040. (PWEA Report)

As part of the work on the Report, 20 new areas, 2,171.5 km2 in total, were identified, including 18 in the exclusive economic zone and 2 in the territorial sea, which have the potential to be used for OWE development. The potential of these areas is 17.7 GW, with an estimated energy production of 70.7 TWh.

Solar Potential: Poland has favorable geographical conditions for solar energy generation. Although the country experiences changing weather and seasons, it still receives adequate solar irradiation for efficient solar panel performance. Expanding solar installations across the country, particularly in regions with high solar exposure, can harness the abundant sunlight and tap into Poland's solar potential.

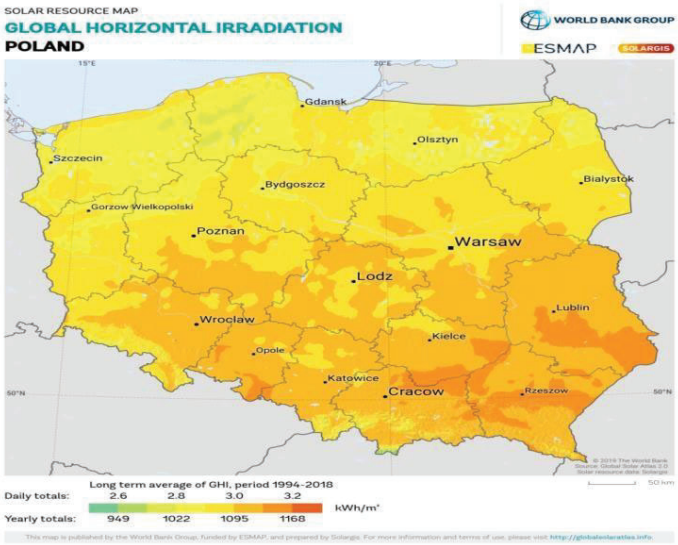


Figure 4. Source: World Bank (2023)

River Hydropower Potential: Poland has numerous rivers that offer potential for hydropower generation. With an estimated technical potential of 12,000-14,000 GWh/year, hydropower can play a significant role in the country's energy transition. Identifying suitable sites for small-scale hydropower plants, especially in regions with rivers and suitable topography, can unlock this renewable energy source and utilize Poland's river networks.

Biomass Resources: Poland has substantial agricultural and forest resources, which can be utilized for biomass energy production. Biomass power plants can generate electricity and heat by utilizing organic waste, agricultural residues, and dedicated energy crops. Identifying and utilizing biomass resources efficiently can contribute to a more sustainable and diversified energy mix.

Geothermal Energy Potential: Poland has geothermal energy potential in certain regions, particularly in the Carpathian Mountains. Geothermal energy can be harnessed for electricity generation and district heating systems. Conducting thorough geothermal resource assessments and investing in geothermal projects can tap into this renewable energy source and provide sustainable heat and power.

District Heating Networks: Poland has an extensive district heating infrastructure, particularly in urban areas. Expanding and upgrading district heating networks to incorporate more efficient and renewable heat sources, such as geothermal, biomass, and waste heat recovery, can improve energy efficiency and reduce reliance on fossil fuels for heating purposes.

Industrial Zones: Poland has several industrial zones that can leverage energy transition opportunities. Promoting energy efficiency measures and facilitating the adoption of renewable energy technologies in industrial processes can help reduce energy consumption and emissions in the manufacturing sector. Encouraging the establishment of renewable energy-based industries within these zones can also drive economic growth and job creation.

Overall, by capitalizing on these geographical opportunities, Poland can harness its natural resources, optimize energy infrastructure, and accelerate the transition towards a sustainable and low-carbon energy system.

Challenges

Transition in Coal-Dependent Regions: Poland's strong reliance on coal for electricity generation presents a challenge for a just transition in regions where coal mining and coal-fired power plants are major sources of employment and economic activity. Phasing out coal in these regions can lead to job losses and economic decline if not accompanied by adequate measures for job creation, retraining, and economic diversification. Ensuring a just transition for coal-dependent regions, particularly in areas with limited renewable energy resources, is crucial to avoid social and economic disparities.

Spatial Distribution of Renewable Resources: While Poland has significant potential for offshore wind, solar, and hydropower, the geographical distribution of these resources may not be evenly spread across the country. Some regions may have greater access to renewable energy resources, such as coastal areas for offshore wind or regions with high solar irradiation. This creates challenges in achieving a balanced energy mix and may result in regional disparities in renewable energy deployment. Addressing these disparities requires targeted investments, grid infrastructure upgrades, and innovative solutions to tap into the renewable energy potential of regions with limited resources.

Grid Infrastructure Upgrades: Expanding renewable energy capacity and integrating it into the grid requires substantial upgrades to the existing infrastructure. In regions with dispersed populations or limited grid connectivity, the cost and feasibility of grid expansion can be challenging. Ensuring adequate investment in grid infrastructure upgrades, particularly in regions with high renewable energy potential, is essential to enable the efficient and reliable integration of renewable energy sources. Grid expansion efforts should prioritize regions facing energy poverty or with limited access to clean energy.

Spatial Planning and Land Use: Identifying suitable locations for renewable energy projects, such as wind farms and solar installations, can face challenges related to spatial planning and land use. Balancing the need for renewable energy development with environmental considerations, land-use conflicts, and community acceptance is crucial for a just transition. Engaging local

communities, conducting thorough environmental assessments, and promoting transparent decision-making processes can help address these challenges and ensure sustainable renewable energy development.

Energy Poverty and Spatial Justice: Geographical disparities in income, housing conditions, and access to energy services can contribute to energy poverty and exacerbate inequalities during the energy transition. Disadvantaged or remote regions may face challenges in accessing affordable and clean energy solutions, including heating and electricity. Addressing energy poverty requires targeted policies, financial incentives, and support mechanisms to ensure equal access to affordable and sustainable energy for all regions, particularly in areas facing geographical constraints.

To overcome these geographical challenges, a just energy transition in Poland should prioritize regional development plans, targeted investments, community engagement, and comprehensive policy frameworks that consider the unique characteristics and needs of different regions. Ensuring equal access to clean energy, job opportunities, and social benefits throughout the country will be crucial for achieving a fair and inclusive energy transition in Poland.

Kazakhstan

Opportunities

Kazakhstan's transition from coal mining towards sustainable energy sources presents several opportunities based on different potential energy options. There are some geographical indicators to be considered when looking at the energy transition.

Wind power holds high potential, particularly in the northeastern part of the country where most coal mining activities are concentrated (over 90 per cent). Geographically speaking, there is nothing to be said against investing in wind turbines and training for the workforce. This can facilitate a smooth transition from coal mining to wind power without significant implications for the local communities.

Solar power offers the most potential in the southern region of Kazakhstan. Utilizing solar power can contribute to the overall energy mix and reduce dependence on coal as an energy source.

Kazakhstan has considerable hydro resources, with major rivers such as Irtysh, Ili, and Syrdarya. The existing hydroelectric power plants (HPPs) currently provide 10per cent of the country's energy needs. Further developing these resources and constructing additional HPPs can significantly increase the utilization of hydro power. The geographic distribution of economically effective water resources also supports the development of hydro power projects.

Bioenergy presents a high potential for Kazakhstan. Converting organic materials, such as crop residues, agricultural waste, wood chips, or dedicated energy crops, into heat, electricity, or biofuels can contribute to a sustainable energy transition.

Kazakhstan's position as the world's leading producer of natural uranium offers opportunities for exploring nuclear energy. With ample uranium reserves and a strong scientific base, the country can consider the construction of a nuclear power plant. Delivering fuel assemblies to China and

engaging in public discussions regarding the optimal location demonstrate progress in the development of this energy option.

Challenges

While opportunities exist, the transition towards sustainable energy sources in Kazakhstan also faces certain challenges.

Water scarcity. Expanding hydro power faces challenges due to water scarcity. Despite having significant hydro resources, limited availability of economically effective water resources hinders the widespread implementation of hydroelectric projects.

Establishing a robust hydrogen industry as a substitution for coal in steel production requires significant investments and infrastructure development. The relative novelty of hydrogen technology and associated costs present challenges in realizing its potential.

Diversifying transport routes for uranium supply is necessary due to geopolitical uncertainties. Additionally, the construction of a nuclear power plant demands careful considerations of safety, environmental impact, and public opinion.

3. Political Dimension

3.1 Indicators

a) Institutional strength

b) Existing legal framework and its flexibility

c) Political setting

d) Strength of civil society.

Political indicators serve as essential tools for policy makers in assessing a country's readiness for a just transition to renewable energy. The political environment plays a pivotal role in either facilitating or impeding progress toward achieving a fair and equitable energy transition.

A political environment characterized by a government that firmly embraces the concept of just transition is more likely to witness a smooth shift to renewable energy. In such cases, robust institutions demonstrate the capacity and commitment to spearhead the necessary changes. The presence of a suitable and adaptable legal framework enables the establishment of transition-enabling institutions within reasonable timeframes, equipped with the necessary competencies to carry out their mandates effectively.

Moreover, a conducive political setting is vital for making the required adjustments to the legal framework, thereby facilitating the creation of new transition-oriented institutions. It also fosters mechanisms that encourage consensus-building among diverse stakeholders, even if they hold opposing viewpoints across the political spectrum.

Furthermore, strength of civil society is an influential factor in promoting a just transition. A vibrant and active civil society contributes to driving and supporting the transition process, amplifying the voices of affected communities, and ensuring that their concerns and aspirations are adequately addressed. Just transitioning from coal to renewable energy means placing the needs of the affected coal reliant regions and the workers at the fulcrum of the process.

Policymakers must carefully consider these political indicators when formulating strategies and policies to facilitate a just transition to renewable energy in the coal mining industry. By aligning the political environment with the principles of just transition, governments can effectively navigate the challenges and opportunities associated with the transition, leading to a more sustainable and equitable energy future.

3.2 Case Study

Poland

Poland is categorized as a Semi-Consolidated Democracy in the Nations in Transit 2023. The Polish Multilateral Development Co-operation Programme for 2021-2030 hosts climate as one of the priority areas. But the Polish government is still committed to coal and transition plans out of coal and in favor of renewables are only slowly being developed. The coal mining sector has been shrinking in the last three decades, so some policies like pre-retirement benefit ("miners'

leave") and welfare allowance have been carried forward. Still, some miners have been reassigned to mines which have continued to operate.

As a member of the European Union, Poland is obliged by the EU climate goals for 2030 (a cut of at least 40 per cent in greenhouse gas emissions compared to the 1990 levels, a share of renewables of at least 32 per cent and a 32.5 per cent improvement in energy efficiency). The Polish National Energy and Climate Plan for the years 2021 – 2030 includes targets to reduce energy consumption and greenhouse emissions. The draft Energy Policy of Poland until 2040 aims at a reduction from 78 per cent to 60 per cent of the share of coal in electricity generation by 2030, 21 per cent renewable energy consumption for the same year, and the implementation of nuclear energy in 2033.

The ministries involved in the implementation of the transition strategies are a) Ministry of Economic Development, b) Ministry of Climate and Environment, c) Ministry of National Assets, d) Ministry of Development Funds and Regional Policy. In the regions, the development of the plans is coordinated by the Marshal Offices and the Regional Development agencies and local governments.

Furthermore, the Mine Restructuring Company (Spółka Restrukturyzacji Kopalń, SRK) is the public agency in charge of closing mines and preparing for their transitions. It also provides a safety net for workers transitioning from coal to new jobs by creating job openings for employees and assists departing workers in finding new employment or self-employment.

Polish civil society organizations like the Polish Green Network, WWF, and Greenpeace Poland play a key role in advocating for climate policies, pushing for changes in environmental laws and improvements in air quality. Other key stakeholders are Coal Mining Trade Unions, one of the strongest labor organizations in Poland, fighting for labor rights and participating in social movements to support local communities and protect the environment. Other key stakeholders include chambers of commerce, business organizations, academia, the affected populations, and the media.

Being part of the European Union, the country has both local and regional legislation affecting the mining industry. Poland's Environmental Protection Law (2001) that sets the governing environmental protection and the use of environmental resources regarding sustainable development complemented by the Renewable Energy Sources Act (2015). Besides the Act on the function of hard coal mining (2007) setting the principles for financial restructuring of mining enterprises, liquidation of mines, rules for employment, subsidies, and corporate governance.

At a regional level, the European Climate Law aims for Climate neutrality in the EU by 2050 and a net domestic reduction in GHE for 2030. The Council of the EU Decision 2010/787 ruled on State Aid to Facilitate the Closure on Uncompetitive Coal Mines (subsidies to existing coal mines must be phased out by 31/12/2018, and the closure of uncompetitive coal mines).

In order to adapt to the Polish legislation for phasing out of coal, reforms have to be made both at national level and at the regional level. From the legislation mentioned, the climate ambitions of the Polish National Energy and Climate Plan and Energy Policy of Poland until 2040 do not comply with the EU's climate goals.

Public consultations have become key since 2019, improving the legislative process, but still are not required to draft laws by MPs, affecting the overall quality of regulations. The persistent threat to the rule of law puts at risk the effective functioning of the justice system and overall institutional stability, impairing the investment climate and sustainability of long-term growth.

The European Union's Just Transition Fund (part of the Just Transition Mechanism) has a Programme for Alleviating Effects of Employment Restructuring in the Coal Mining Sector. The European Commission adopted five programmes of Just Transition Plans in Silesia, Malopolska, Wielkopolska, Lower Silesia and Lodzkie. The JTF supports territories that are particularly affected by the transition towards a climate-neutral economy. It assists the region's inhabitants and aids them during the transition to a green economy, with new job opportunities, worker training in new skills on renewable and climate neutral industries. The fund will help local economic diversification by investing in small and medium-sized businesses working on renewable energy, clean mobility, energy efficiency on public buildings and housing and other green sectors.

The regions of Malopolska and Silesia will receive most of the funding through the Just Transition Fund in Poland. The fact that the government's extended the mining concessions jeopardizes the financial support provided by the E.U.

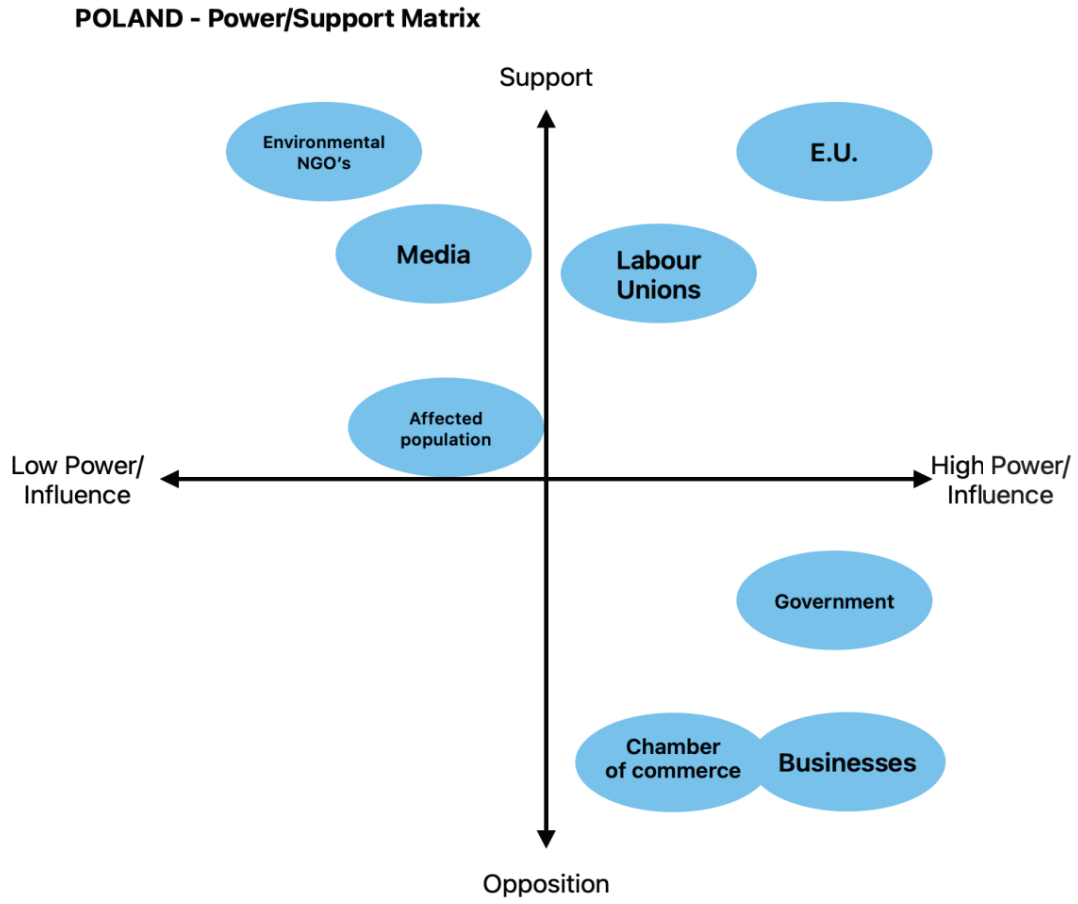


Figure 5.

Kazakhstan

In Kazakhstan, the political environment for a just transition entails government commitment, a strong policy framework, institutional support, stakeholder participation, international cooperation, transparency, accountability, and adequate financial support. These components work together to ensure the successful implementation of long-term and equitable changes in the economy and society.

The Government of Kazakhstan has established long-term development strategies such as Kazakhstan-2050 and Concept for the Transition to a Green Economy (which includes objectives for 2020, 2030, and 2050) (Yerkinbayeva et al, 2021). These strategies establish measurable goals, with an emphasis on economic diversification and a shift away from Kazakhstan's historical reliance on extractive sectors. However, Kazakhstan's objectives have not been matched by actions of the same magnitude. For instance, the Concept's aim of increasing the proportion of wind and solar energy in electricity generation to 3 per cent by 2020 is manifestly unachievable, given that these sources account for less than 1per cent of electricity generation at present. Similarly, the Concept's objective of reducing CO2 emissions in the energy sector to 2012 levels by 2020 appears improbable, given that 2016 levels are 10 per cent higher than 2012 levels and are rising (Yerkinbayeva et al, 2021). Goals and efforts to achieve them are far apart, and allocating more funds to screening procedures that guarantee infrastructure investment decisions at the project level contribute to long-term development and climate objectives would enable Kazakhstan to meet its stated ambitions. To guarantee that infrastructure investment decisions correspond with national sustainable development strategies, project-level screening methods should be supplemented with systems-level planning for infrastructure.

The existing legislation in Kazakhstan clearly establishes a three-tier system of strategic planning papers (Republic of Kazakhstan, 2013). The top tier of national development strategies is occupied by long-term plans like Kazakhstan-2050, whose goals are cascaded down through mid-term plans (like the Strategic Development Plan through 2025), five-year plans, sectoral plans, and subnational development plans. The system's clarity and simplicity facilitate communication of government priorities to residents and investors alike.

The primary infrastructure development strategy of Kazakhstan, Nurly Zhol, the State Programme for Industrial-Innovative Development 2015-2019, and the Concept for the Transition to a Green Economy 2013-2020 all establish budgets for their execution. The Nurly Zhol contains a list of projects and policies along with an estimated budget, the State Programme outlines an annual budget for the programme, and the Concept estimates the cost of the measures it contains (Republic of Kazakhstan, 2013).

Kazakhstan's strategic planning system is very well developed, but the law does not yet require strategic environmental studies (SEAs) of how strategies might affect the environment. The government should draft legislation in accordance with the Espoo Convention's UNECE Protocol on Strategic Environmental Assessment. In 2018, with the assistance of UNECE, Kazakhstan began work on SEA-related legislation for its new Environmental Code, but it has not yet been adopted.

This shift toward greater environmental considerations within Kazakhstan's government could begin by evaluating the implementation of the Concept for the Transition to a Green Economy, as its first phase of targets expires in 2020, providing an excellent opportunity to reassess and revise the Concept (Republic of Kazakhstan, 2013). The government is currently working on the revised draft, which should include Kazakhstan's promises under the Paris Agreement, the Sustainable Development Goals (SDGs), and the OECD Green Growth Declaration (Yerkinbayeva et al, 2021). The government may wish to seize the occasion to incorporate all of its environment- and climate-related strategic documents into the revised Concept in order to produce a unified, comprehensive strategy. The newly constituted Ministry of Ecology, Geology, and Natural Resources has already begun creating a national strategy for low-carbon growth.

Although Kazakhstan's government bodies have more institutional strength than those of its neighbors, better coordination mechanisms are needed to build an integrated infrastructure planning system that could prioritize and screen infrastructure projects in accordance with long-term development and climate goals. Adoption of the new Environmental Code, which mandates EIAs and SEAs, could be the first step toward establishing such a system (Diyar et al, 2014).

Until a few years ago, the institutional structure of Kazakhstan's government lacked robust, impartial environmental and energy agencies. Kazakhstan's present ministries in charge of environmental protection and water policies were the Ministries of Energy and Agriculture, respectively, where they confronted strong competing interests from big industries in the energy and agriculture sectors.

Kazakhstan underwent a number of institutional reorganizations in June 2019, one of which was the establishment of a new Ministry of Ecology, Geology, and Natural Resources, which now includes the departments dealing with the environment and water that were formerly housed in the Ministries of Energy and Agriculture. It also shares responsibility for the mining industry with the Ministry of Industry and Infrastructure Development, now in charge of licensing. This new independent organization may offer a chance to integrate more effectively environmental considerations into mining and energy decisions (Yerkinbayeva et al, 2021).

Civil society organizations (CSOs) and non-governmental organizations (NGOs) in Kazakhstan are classified as nonprofit entities. This classification encompasses a range of organizations, including public associations, noncommercial joint-stock companies, consumer cooperatives, foundations, religious associations, and other similar entities. In the legislation of Kazakhstan, there is no specific definition for the term "NGO," and as a result, the terms "CSO" and "NGO" are commonly used interchangeably in practice. CSOs have a broader scope that encompasses various types of organizations beyond NGOs. These include political parties, trade unions, religious organizations, professional and scientific unions, associations, and even mass media entities. Therefore, CSOs encompass a wider range of organizations compared to NGOs alone. According to the CIVICUS Civil Society Index (CSI) 2008-2010, Kazakhstan's civil society sector was assessed to have a moderate level of development (Republic of Kazakhstan, 2013). At the national level, CSOs demonstrate a high level of knowledge and understanding regarding the

social and economic issues prevalent in the country. Civil society organizations in Kazakhstan play a crucial role in raising awareness about the need for a just transition.

They advocate for sustainable development, social equity, and environmental protection, highlighting the importance of transitioning to a low-carbon and climate-resilient economy. They operate within a relatively well-developed legal framework, have adequate resources, and tend to be open to intersectoral communication. However, most of the active CSOs are concentrated in Almaty and Astana and in the major urban centers of the oblasts. They also often lack funds, the capacity for effective management, human resources, and public relations skills. The primary weaknesses of civil society involve the constrained framework for political competitiveness and participatory democracy, as well as the financial limitations that impede sustained activities of CSOs. Individualistic attitudes and a lack of enthusiasm towards volunteering among citizens are significant inhibiting factors. Consequently, CSOs have limited political impact in terms of enhancing government accountability and transparency. The insufficient financial resources of CSOs pose a major constraint, limiting their engagement on a broader scale. This constraint also hampers the long-term sustainability of CSO capacity, resulting in short-term and project-based activities. According to the CSI 2008-2010, only 14.4 per cent of CSOs have a sustainable human resource base, while many rely on outdated equipment acquired in the early 2000s.

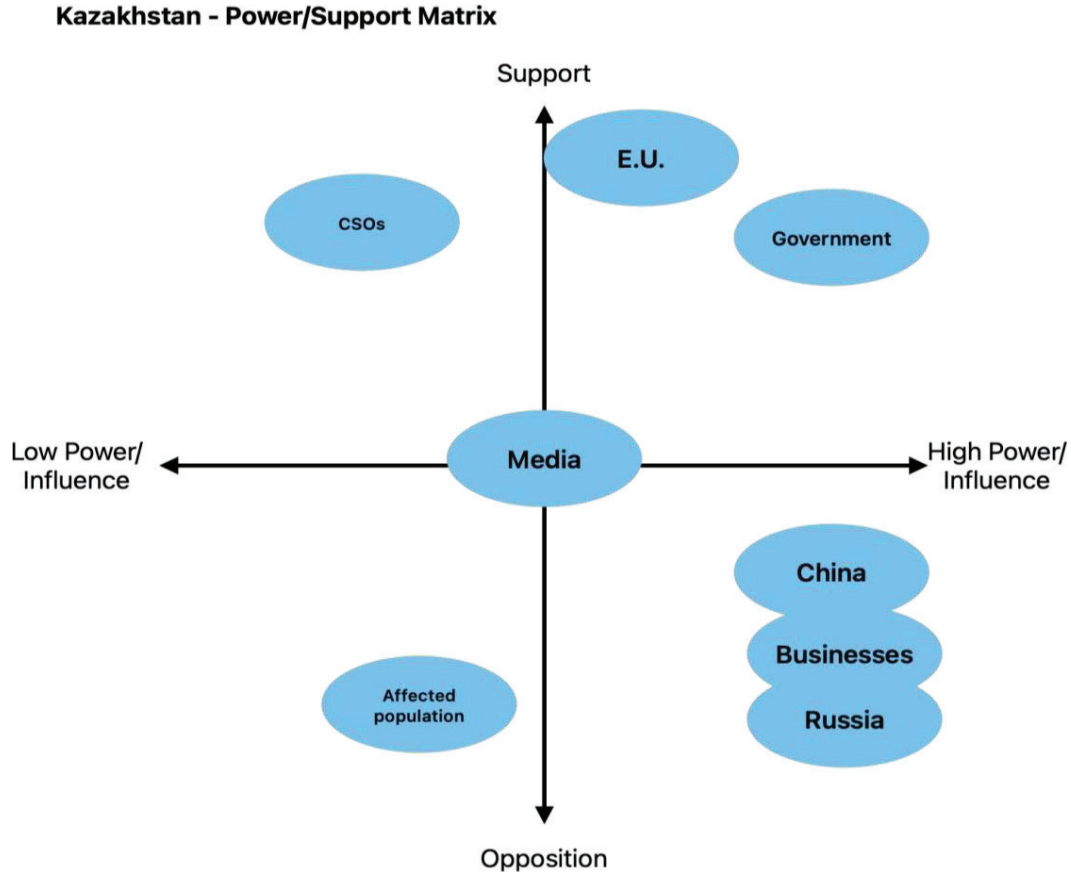


Figure 6.

Discussion

Through our analysis, we have observed that Poland, primarily due to its membership in the European Union, exhibits a higher level of political readiness for a just energy transition compared to Kazakhstan. Poland benefits from the institutional framework provided by the Mines Restructuring Company, which facilitates the process of a just transition. The government is also actively pursuing an energy system transformation, evident in its ambitious offshore wind programme, the implementation of solar photovoltaic energy generation since 2016, and plans for constructing its first nuclear reactor.

However, despite EU regulations and government plans aimed at transitioning the energy system away from coal, Poland has made limited progress in terms of coal mine closures. Furthermore, the government faces challenges in meeting the targeted deadlines for phasing out coal, as the economic impact on the country would be significant. Additionally, the funding provided by the EU for Just Transition Plans is at risk due to the extension of mining concessions by the Polish government.

In contrast, Kazakhstan still faces significant obstacles and has a considerable distance to go in achieving a just transition. The country's heavy reliance on fossil fuels for economic development hampers the actual implementation of comprehensive policies outlined in its policy framework. Moreover, there is a lack of strategies in place to effectively address the socioeconomic impact on workers and communities affected by the shift away from fossil fuels. Inadequate provisions for reskilling, retraining programmes, and creating new job opportunities in the renewable energy sector are apparent shortcomings. As a result, ensuring the protection of workers' rights during this transition appears highly uncertain.

Given these circumstances, Kazakhstan must tackle these challenges head-on to achieve a just transition to renewable energy. Addressing country-specific obstacles and implementing comprehensive strategies and policies are imperative to ensure that no one is left behind in this transition.

4. Technical Dimension

4.1 Indicators

The technical indicators that are considered are the energy mix, GHG emissions of the mix, energy intensity, self-sufficiency, innovation through research and development (R&D), grid connectivity (pipelines and electricity grid), energy demand and supply, energy access and the technical capacity to change.

Energy Mix

GHG Emissions of the mix:

The reduction of greenhouse gas (GHG) emissions is a key objective in the transition to a more sustainable and low-carbon energy system. By prioritizing low-emission energy sources in the energy mix, such as renewables (solar, wind, hydro, geothermal), the overall emissions from the energy sector can be significantly reduced. This shift away from coal-based energy production, which is a major source of GHG emissions, can help mitigate climate change and promote a cleaner environment and preserve biodiversity which improves the quality of life.

Energy intensity:

Energy intensity refers to the amount of energy required to produce a unit of economic output. By improving energy efficiency across various sectors, such as industry, transportation, and buildings, the energy intensity can be reduced. This reduction in energy intensity not only helps in conserving energy resources but also leads to lower operating costs for businesses and households. Consequently, the transition to a more energy-efficient energy mix can create new green jobs, particularly in sectors such as energy auditing, retrofitting, and renewable energy installation.

Energy self-sufficiency:

Energy self-sufficiency can be an important inductor of a just transition of coal mines by reducing dependency on coal, promoting renewable energy sources, and creating new job opportunities. We can explain how the components of domestically generated supply and exported supply (political dependency) contribute to these transitions:

Domestically generated supply:

By focusing on domestically generated energy, a country can reduce its dependence on coal imports and gradually phase out coal mines. This shift toward domestic energy production can provide a more sustainable and resilient energy system.

Developing renewable energy sources within the country, such as wind, solar, hydro, and geothermal, can enhance energy self-sufficiency. These clean energy sources can replace coal as the dominant energy source, reducing greenhouse gas emissions and improving air quality.

Transitioning to a domestically generated supply of energy also creates opportunities for the development of new green industries. This includes jobs in the construction, operation, and maintenance of renewable energy infrastructure, as well as research and development in renewable energy technologies.

A just transition of coal mines involves ensuring that the affected communities and workers are supported in the process. With a focus on domestically generated supply, there is potential to repurpose and retrain coal workers for jobs in the renewable energy sector, thus minimizing job losses and facilitating a smooth transition.

Exported supply (political dependency):

A heavy reliance on coal exports can create a significant political and economic dependency on the countries importing coal. This dependency can be a barrier to a just transition, as it may impede the shift away from coal and hinder the development of renewable energy industries.

By diversifying the energy export portfolio and including renewable energy technologies and resources, countries can reduce their political dependency on coal exports. This diversification opens new markets and opportunities for green job growth in the clean energy sector.

Exporting renewable energy technologies, such as wind turbines, solar panels, and energy storage systems, can contribute to the global transition toward clean energy. This not only helps combat climate change but also creates new employment opportunities in manufacturing, installation, and maintenance of renewable energy infrastructure.

By reducing the reliance on coal exports, countries can enhance their environmental credentials, attract sustainable investments, and contribute to global efforts to reduce greenhouse gas emissions. This, in turn, supports the just transition of coal mines and the creation of new green jobs within the country.

R & D:

Research and Development plays a crucial role in the just transition of coal mines and the creation of new green jobs. By focusing on innovative technologies and solutions, R&D can help facilitate the transition from coal-based economies to more sustainable and environmentally friendly alternatives. Here's how three specific technologies, CCS (Carbon Capture & Storage), Battery Technology, and Nuclear, are connected to the just transition of coal mines and the creation of new green jobs:

CCS (Carbon Capture & Storage):

CCS technology involves capturing carbon dioxide (CO2) emissions from coal-fired power plants or industrial processes and storing them underground, preventing their release into the atmosphere. R&D efforts in CCS can contribute to the just transition of coal mines by reducing the environmental impact of coal use. The development of more efficient and cost-effective CCS technologies can enable the continued operation of existing coal mines while significantly reducing their carbon footprint. Moreover, R&D can help identify new uses for captured CO2,

such as in industrial processes or the production of synthetic fuels, creating new green job opportunities in these sectors.

Battery Technology:

R&D in battery technology is essential for the integration of renewable energy sources into the power grid and the electrification of various sectors. As coal mines transition, renewable energy sources like wind and solar become increasingly important. Energy storage through advanced battery technologies enables the efficient utilization of renewable energy by storing excess energy when production is high and releasing it when demand exceeds supply. R&D efforts can lead to the development of more efficient, affordable, and sustainable battery systems, which are essential for a reliable and resilient renewable energy infrastructure. The production, installation, and maintenance of these advanced batteries can create new green job opportunities in manufacturing, installation, and maintenance sectors.

Nuclear:

While not directly related to coal mines, nuclear power plays a role in the just transition from coal by providing a low-carbon alternative for electricity generation. R&D in nuclear technology can focus on enhancing safety, reducing waste, and improving the efficiency of nuclear reactors. By developing advanced nuclear technologies such as small modular reactors (SMRs) or advanced reactor designs, R&D can help create new opportunities for clean energy generation while minimizing the environmental impact. These advancements in nuclear technology can contribute to the creation of new green jobs in the design, construction, operation, and maintenance of nuclear power plants.

Grid connectivity (pipelines + electricity grid):

Electricity grid connectivity between local regions, countries and potentially continents can promote renewable energy development in regions where it is more available than elsewhere. More connectivity creates the possibility to balance energy grids. Balancing will become increasingly important when more intermittent sources (renewables) are connected to the grid. Furthermore, more connectivity will decrease potential black outs in countries that are vulnerable to it. Gas grid development is important to potentially replace coal by natural gas in order to reduce GHG emissions. Green hydrogen will also become increasingly important to serve as a balancing mechanism and to store excess renewable electricity. This green commodity could also be imported and exported requiring new gas pipelines. All of this contributes to a more Just Transition if local communities are well connected and provided with options to replace their local energy sources by new, more sustainable ones.

Energy demand and supply (regional and local):

How the supply is generated has major economic and political repercussions. For example, a country that has an excess of fossil fuels will become an exporter of these commodities and create wealth through these activities. If one country has to phase out its coal production, it

should create new ways to support its economy by replacing it with a new and sustainable alternative. A Just Transition can only happen if every local community is offered possibilities to match energy demand and supply in another way. Hydrogen is a great commodity to replace fossil fuels export revenues.

Energy access:

Energy access indicates the share of the population that has access to electricity, cooling, heating, telecommunications, etc. It is an important indicator for a Just Transition as it should try to provide basic needs to everyone in a country to increase its development.

Technical capacity to change (e.g., nuclear experts, technical knowledge, funds)

This indicator was at first considered to be important as it combines mostly knowledge and technical aspects. However, it turned out to be difficult to gather data on this indicator.

4.2 Case Study

Poland

Energy Mix:

Poland's energy mix in 2020 consisted of various components, with coal being the dominant source, accounting for 40.6 per cent of the total energy supply. This heavy reliance on coal highlights the need for a just transition away from coal mining and toward cleaner energy sources. Oil contributed 29.6 per cent to the energy mix, followed by natural gas at 17.4 per cent. While these fossil fuels still play a significant role, efforts are being made to increase the share of renewable energy sources. Bioenergy and waste accounted for 9.3 per cent of the energy mix, providing a renewable energy option. Wind energy represented 1.4 per cent, solar 0.3 per cent, and hydro 0.2 per cent, showcasing the potential for expanding these renewable sources.

GHG Emissions of the mix: Poland's energy sector has been a significant contributor to greenhouse gas (GHG) emissions. However, there are ongoing efforts to reduce emissions, increase the use of renewable energy sources, and decrease coal production and demand. The transition away from coal is crucial in mitigating climate change and promoting a cleaner environment. By diversifying the energy mix and prioritizing renewable energy, Poland can significantly reduce its overall GHG emissions, contributing to global efforts to combat climate change and fostering a just transition of coal mines.

Energy Intensity:

Energy intensity, measured as the Total Energy Supply (TES) per capita, was 2.5 tons of oil equivalent per capita in 2020. This indicates progress in reducing energy consumption while maintaining economic growth. Additionally, the TES per GDP (energy intensity) was 83 tons of oil equivalent per USD million, showing improved energy efficiency. Lower energy intensity per unit of GDP signifies reduced environmental impact and presents an opportunity for creating new green jobs in energy auditing, retrofitting, and the development of energy-efficient technologies.

Energy self-sufficiency:

Domestically generated supply: Poland has significant domestically generated energy supply, with coal accounting for 72.9 per cent of energy production in 2020. This highlights the need for a just transition away from coal mining, as coal remains the dominant source of energy production. However, there are other domestically generated sources, such as bioenergy and waste (15.9 per cent), natural gas (6.2 per cent), wind (2.5 per cent), oil (1.8 per cent), solar (0.5 per cent), and hydro (0.3 per cent). Developing renewable energy infrastructure and expanding these clean energy sources can reduce dependence on coal imports, enhance energy security, and create new job opportunities in construction, operation, and maintenance of renewable energy projects.

Exported supply (political dependency): Poland is a net exporter of coal, with major destinations being the Czech Republic and Germany. However, Germany's phase-out of coal-fired generation has led to a decline in coal imports from Poland. Reducing political dependency on fossil fuel exports is crucial for a just transition. By diversifying the energy export portfolio and including clean energy technologies and resources, Poland can reduce political dependency, open new markets for green job growth, and contribute to global efforts in combating climate change. Additionally, Poland's reliance on coal imports, primarily from Russia, emphasizes the need to reduce coal dependency and focus on domestically generated supply.

Energy self-sufficiency: The data indicates that Poland's energy mix heavily relies on domestically generated supply, particularly coal, which accounted for 72.9 per cent of energy production in 2020.

R & D

CCUS (Carbon Capture, Utilization & Storage):

Poland has shown interest in Carbon Capture, Utilization & Storage (CCUS) technology, establishing an inter-ministerial working group to support CCUS pilot projects. While Poland lacks a national CCUS strategy, it aims to update the legal framework to enable industrial-scale CO2 storage. The country has identified potential CO2 storage sites and estimated a capacity of 10-15 Gt of CO2.

Battery Technology:

Poland is also focusing on developing battery technology, aiming to create high-energy density, long-life galvanic battery cells using domestic resources. The government has introduced supportive amendments to the Energy Law, including a clear licensing process and regulatory status for energy storage projects. It has also provided incentives, such as eliminating electricity storage tariffs and offering discounts and exemptions for storage projects. Poland is actively attracting investments in battery manufacturing, with companies like Northvolt establishing battery module factories in the country.

CCS and battery technology are considered areas of growth for Poland in its efforts to reduce carbon emissions, increase renewable energy generation, and support the electrification of demand. While Poland has taken steps to promote these technologies, it is crucial for the country

to develop a comprehensive strategy and incorporate them into its national energy plans for long-term sustainability and successful integration into the energy system.

Grid connectivity (pipelines + electricity grid):

Poland has made significant efforts to enhance grid connectivity, both within the country and with neighboring nations, in terms of pipelines and the electricity grid. Cross-border interconnections enable gas imports and exports, ensuring supply diversity and regional energy integration. The Yamal-Europe transit gas pipeline secures gas imports from Russia and enables virtual reverse flows, enhancing flexibility. Poland is developing projects such as Baltic Pipe and Gas Interconnection Poland-Lithuania (GIPL) to further enhance grid connectivity, strengthen supply diversification, and promote a more interconnected and resilient regional energy market. In terms of the electricity grid, Poland's transmission system, operated by Gaz-System, ensures reliable gas supply to consumers, and transports a significant portion of the country's gas supply. The distribution network, managed primarily by PSG, has been expanding to increase the number of households connected to the gas network, promoting gas availability and affordability for residential consumers.

These grid connectivity initiatives reflect Poland's commitment to ensuring a reliable and diversified energy supply. Strengthening connections with neighboring countries and expanding grid infrastructure support energy security, regional integration, and the efficient and sustainable use of energy resources.

Technical capacity to change (e.g.: nuclear experts, infrastructure, technical knowledge, funds)

Poland has made significant technical advancements in its nuclear power program, as outlined in the Polish Nuclear Power Programme (PNPP). The country aims to commission six nuclear units with a total capacity of 6-9 GW, with the construction of the first unit scheduled to begin in 2026. Site selection is a crucial aspect of the program, with coastal sites in Lubiatowo-Kopalino and Żarnowiec currently favored. To support the nuclear power program, Poland is focusing on developing human resources, upgrading infrastructure, and strengthening the regulatory framework. The government is investing in specific infrastructures like road and rail transport to facilitate the construction and operation of nuclear power plants. The regulatory framework is being enhanced to ensure safety and compliance with international standards. The International Atomic Energy Agency (IAEA) has conducted peer reviews to assess Poland's progress in preparing its physical and regulatory infrastructure for new nuclear reactors. These reviews have confirmed that Poland has made important advancements in meeting recommendations and requirements. Ongoing IAEA reviews will continue to evaluate Poland's capacity to negotiate contracts and progress towards the construction phase.

Energy demand and supply (regional and local)

Poland's energy supply heavily relies on fossil fuels, with coal being the dominant source at 40.6 per cent in 2020. Oil and natural gas contribute 29.6 per cent and 17.4 per cent respectively. Poland is a net importer of oil and natural gas, covering a large portion of its demand. While the share of coal has been declining in recent years, there was a significant increase in coal-fired electricity generation in 2021. Poland is a significant coal producer and has become a net coal

importer since 2018, primarily importing thermal coal from Russia. In terms of energy demand, oil is the largest contributor, followed closely by electricity. The demand for energy is distributed relatively evenly among buildings, industry, and transport sectors. Transport energy demand is driven by oil, while buildings and industry have a diverse range of energy sources. Coal's share in buildings' energy demand in Poland is higher than the average among IEA member countries.

Kazakhstan

Kazakhstan adopted a legislative proposal to become carbon neutral by 2060.

Energy Mix

In 2020, the total energy supply consisted of 50 per cent coal, 31 per cent natural gas and 18 per cent oil. Kazakhstan is thus heavily reliant on coal which is used for electricity and heat generation. Renewable energy sources consisted of less than 2 per cent. By 2025, Kazakhstan aims to increase this share to 6per cent. The main struggle within the energy mix currently is that energy generation from coal is the baseload capacity, but there is a lack of flexible capacity to integrate intermittent renewable energy sources. Most renewable energy sources projects do not include energy storage and the project to create a balancing market is still in simulation although it was planned to be operational in 2008. Currently, Kazakhstan relies on Russia to balance its energy market. More focus on the balancing market and on energy storage could help to accelerate the phase out of coal energy sources. (IEA, 2022)

GHG Emissions of the mix

Due to Kazakhstan’s reliance on coal powered energy, its GHG emissions are 70 per cent higher than the world average (in terms of GDP). 62.5 per cent of the emissions are related to coal consumption, 20.9 per cent to oil and 16.6 per cent to natural gas. To reduce Kazakhstan’s emissions related to energy consumption it will increase its share of renewable and nuclear energy to 50 per cent by 2050. (IEA, 2022)

Energy intensity

Energy intensity in Kazakhstan reduced by 20 per cent in the past two decades as the GDP increased more than threefold while energy consumption only doubled in the same period. (See Figure 8.3) (IEA, 2022)

Self-sufficiency

Kazakhstan is a net exporter of fossil fuels as it has an overall energy surplus. The self-sufficiency levels in 2020 were 737 per cent for oil, 136 per cent for coal, and 131 per cent for natural gas. (100 per cent means equal amounts of production and consumption) (IEA, 2022)

Grid connectivity (pipelines + electricity grid)

Coal will be partly replaced by gas in Kazakhstan and therefore more gas infrastructure is needed. Figure 1 gives an overview of the existing pipelines and planned projects. However, by 2030 it is not expected to have these new plans realized. The electricity grid is mostly connected to Russia whereas it only has three connections to Kyrgyzstan and one to Uzbekistan. (IEA, 2022)

Energy demand and supply (regional and local)

The following figure indicates the total final consumption by source and sector in 2020, giving an indication of where most energy demand is originating. This paper is mostly focusing on the phase out of coal power plants. (IEA, 2022)

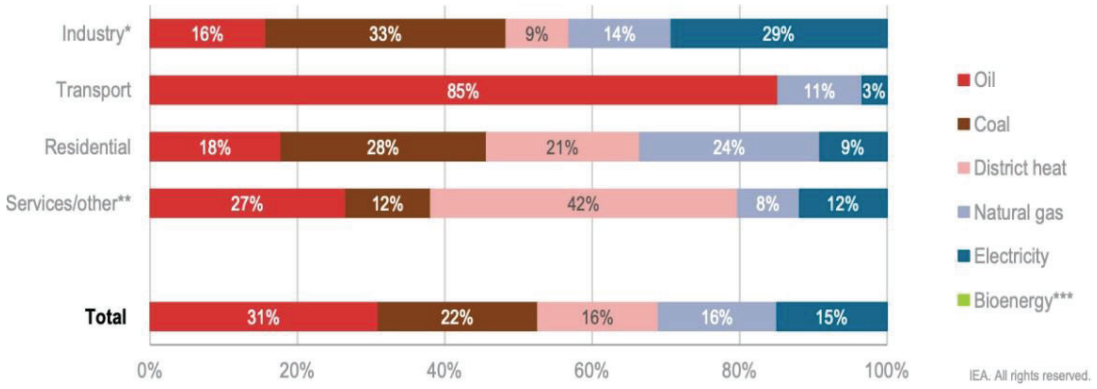


Figure 7. Total final consumption by source and sector, 2020. Source: IEA (2022).

As the self-sufficiency level of coal is over 100 per cent, Kazakhstan exports coal. Figure 4.4 indicates that most of the exports go to Russia. In a Just Transition one has to make sure that coal will not only be phased out, but that the local communities are included within the process of change. Therefore, a possibility is to create a local community that would enhance green hydrogen development which could be the start of an industrial cluster. (IEA, 2022)

Figure 8. Coal exports by country, 2012-2020. Source: IEA (2022).

Energy access

Energy access has been at 100per cent since 2012. (IEA, 2022)

Conclusion

The research highlights the importance of a just and inclusive transition to sustainable energy systems in Poland and Kazakhstan. Socio-economic factors, such as demographic indicators and GDP components, provide insights into workforce trends and economic growth opportunities. Geographical factors, such as renewable energy potential, present opportunities for wind power and bioenergy in Kazakhstan and various renewable sources in Poland. However, both countries face challenges related to transitioning coal-dependent regions, upgrading infrastructure, managing land use, and addressing energy poverty.

Interconnections between Factors

The findings demonstrate the interconnected nature of various factors in the energy transition process. Job creation, retraining, and economic diversification are crucial for coal-dependent regions and require coordination with spatial planning, resource distribution, and grid infrastructure. Addressing energy poverty and ensuring equal access to clean energy involve targeted policies and financial incentives, as well as collaboration among stakeholders.

Opportunities and Challenges

Poland has significant opportunities in offshore wind, solar, hydropower, biomass, and geothermal energy, along with existing district heating networks and industrial zones for promoting renewable energy and enhancing energy efficiency. Challenges include transitioning coal-dependent regions, upgrading grid infrastructure, managing land use, and mitigating energy poverty. Meanwhile, Kazakhstan has potential in wind power and bioenergy, aligning with existing coal mining areas and agricultural sectors. However, challenges exist in terms of transitioning from fossil fuels, including careful considerations for nuclear energy and strengthening infrastructure investments.

Recommendations and the Way Forward

Based on the findings, the following general recommendations are proposed:

Develop comprehensive just transition plans: Create time-bound plans that include measures for job creation, retraining, and economic diversification in coal-dependent regions.

Target investments and infrastructure upgrades: Prioritize investments in regions with high renewable energy potential and ensure efficient integration into the grid for reliable energy supply.

Promote transparent decision-making and land use planning: Facilitate participatory processes in spatial planning, considering environmental factors and community acceptance.

Implement targeted policies and incentives: Address energy poverty and ensure equal access to affordable and sustainable energy through policies, financial incentives, and support mechanisms.

Foster regional development plans: Tailor development plans to meet the unique needs of different regions, promoting clean energy, job creation, and social benefits.

Encourage collaboration and knowledge sharing: Facilitate collaboration between government, industry, and communities to drive innovation, knowledge sharing, and stakeholder engagement.

In conclusion, the research underscores the importance of a just and inclusive transition to sustainable energy systems. The chosen indicators, including socio-economic and geographical factors, help identify opportunities, challenges, and interconnections in the transition process. The recommendations provided offer a pathway forward for Poland and Kazakhstan to achieve a fair and equitable energy transition that benefits all stakeholders, protects workers' rights, and contributes to global climate goals. However, the proposed framework of indicators does not exclude the importance of other factors not included in this research as just transition is a complex process that requires as much holistic approach as possible.

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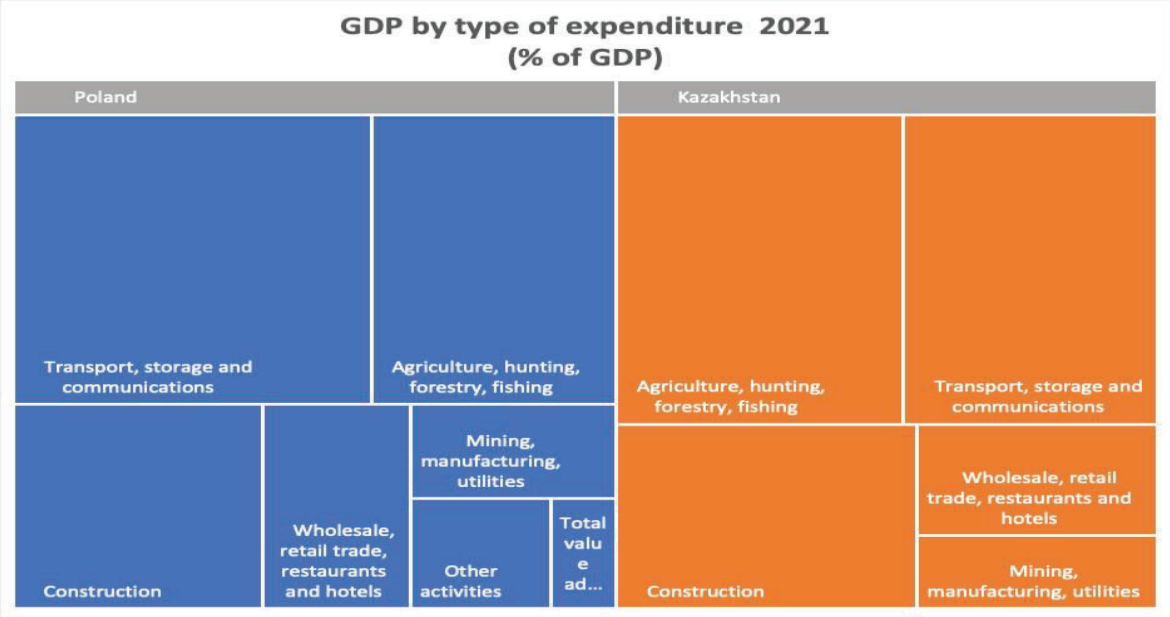
Annexes

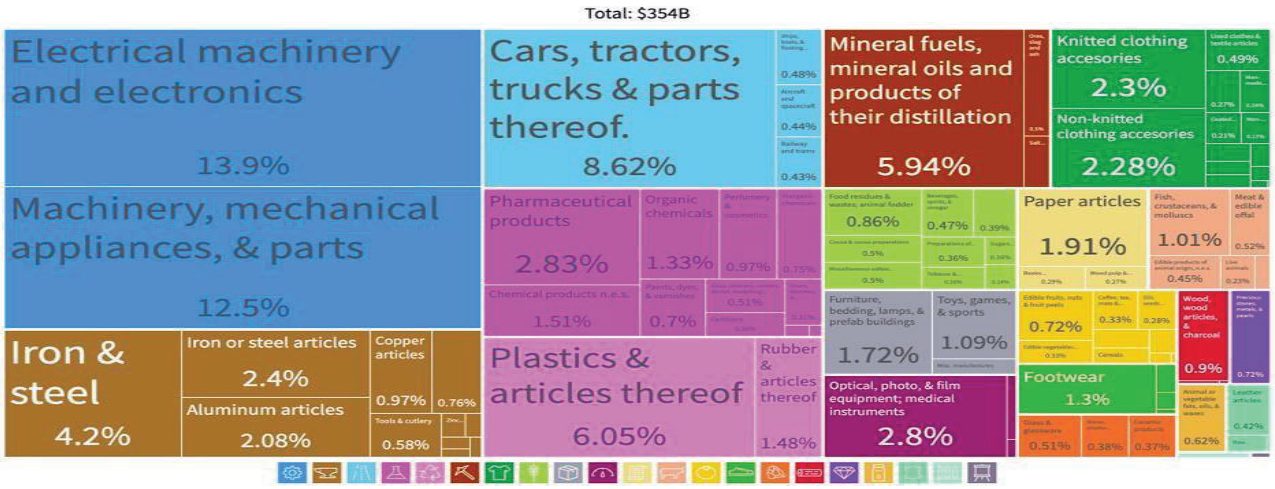
ANNEX 01



UNCDTA Stata (2023). Extract: 07/07/23 https://unctadstat.unctad.org/wds/TableViewer/dimView.aspx

ANNEX 02

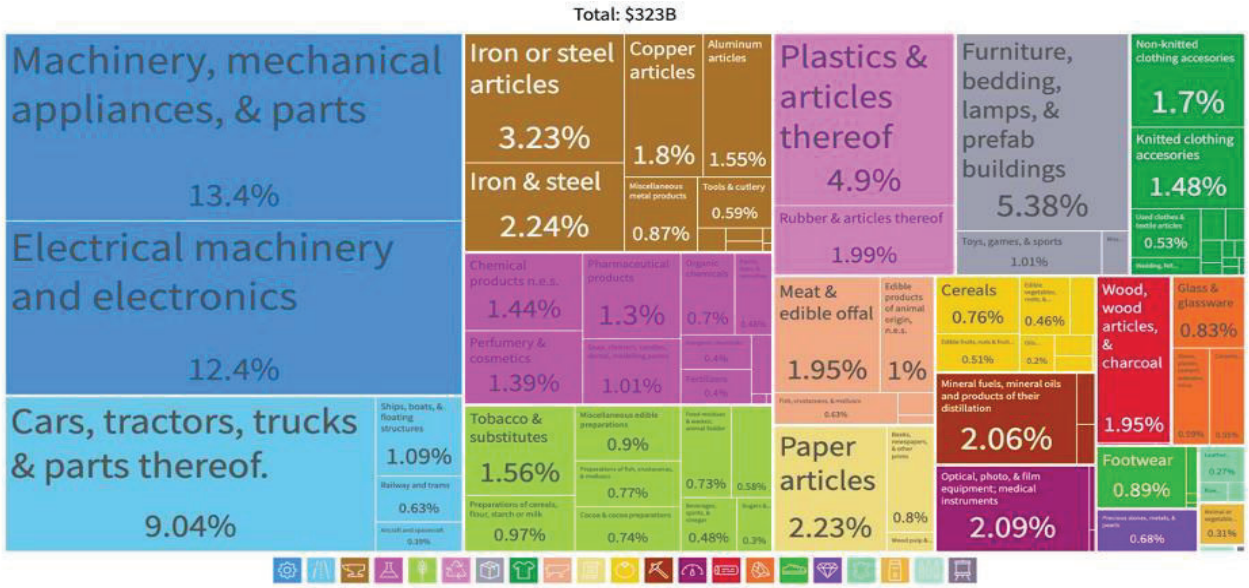
Import Structure Poland (2021)



Source : OEC (2023). Extract : 10.07.23

https://oec.world/en/visualize/tree_map/hs92/import/kaz/all/show/2021/

Poland Export structure 2021

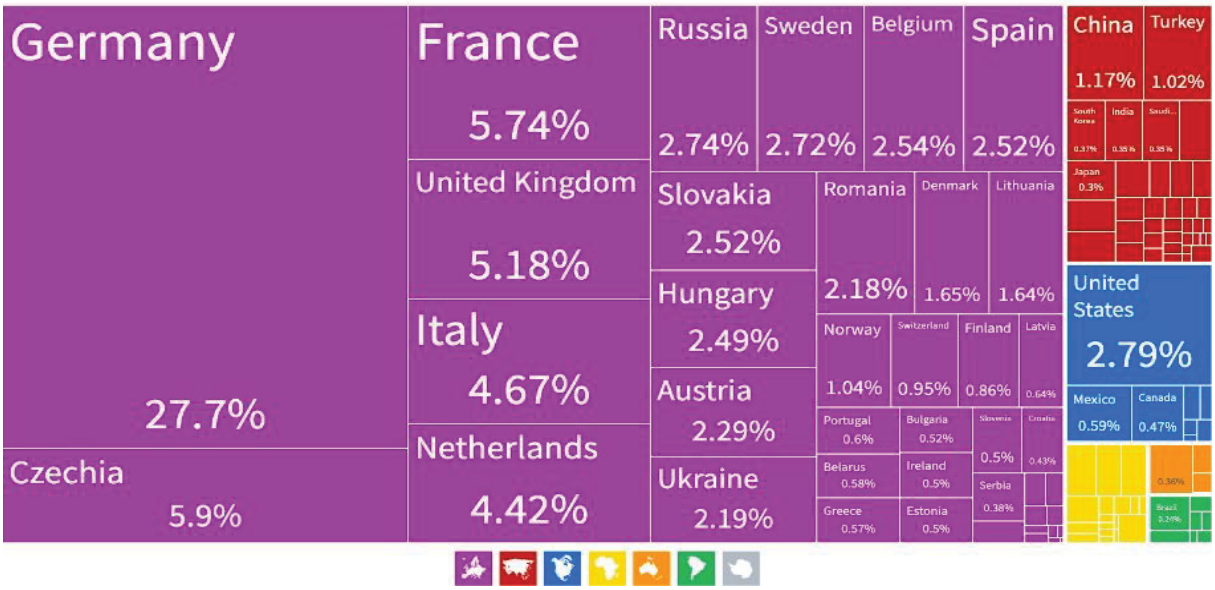


Source: OEC (2023). Extract: 10.07.23

https://oec.world/en/visualize/tree_map/hs92/import/kaz/all/show/2021/

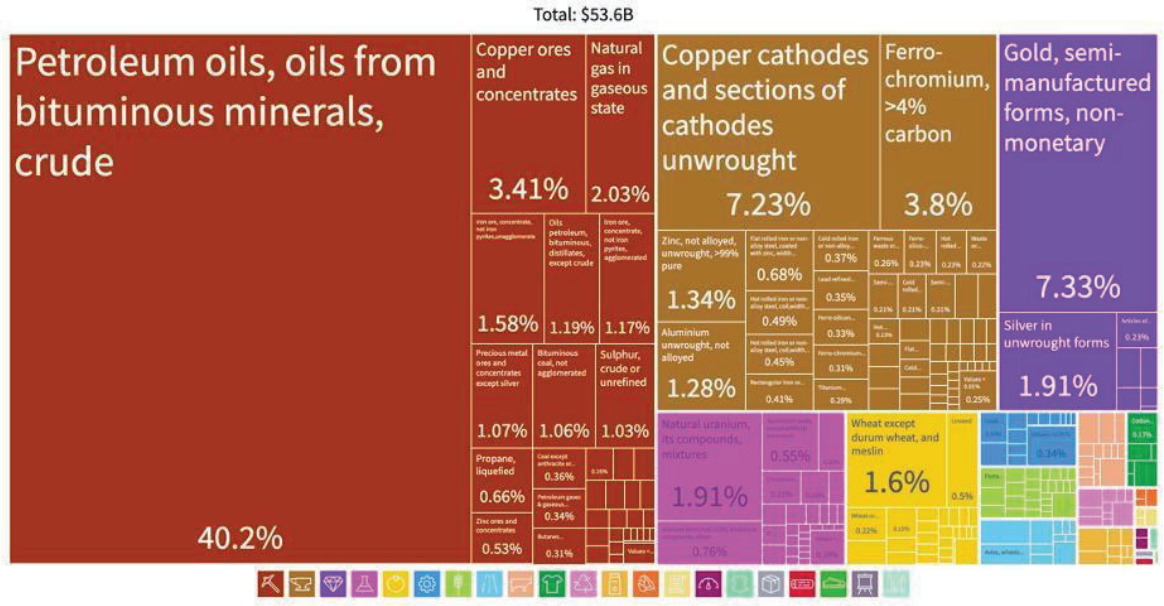
Country main exporters

Total: $323B


Germany
27.7%
Czechia
5.9%
France
5.74%
United Kingdom
5.18%
Italy
4.67%
Netherlands
4.42%
Russia
2.74%
Sweden
2.72%
Belgium
2.54%
Spain
2.52%
Slovakia
2.52%
Hungary
2.49%
Austria
2.29%
Ukraine
2.19%
Romania
2.18%
Denmark
1.65%
Lithuania
1.64%
Norway
1.04%
Switzerland
0.95%
Finland
0.86%
Latvia
0.64%
Portugal
0.6%
Bulgaria
0.52%
Slovenia
0.5%
Croatia
0.43%
Belarus
0.58%
Ireland
0.5%
Serbia
0.38%
Greece
0.57%
Estonia
0.5%
China
1.17%
Turkey
1.02%
South Korea
0.37%
India
0.35%
Saudi...
0.35%
Japan
0.3%
United States
2.79%
Mexico
0.59%
Canada
0.47%
0.36%
Brazil
0.29%

ANNEX 03

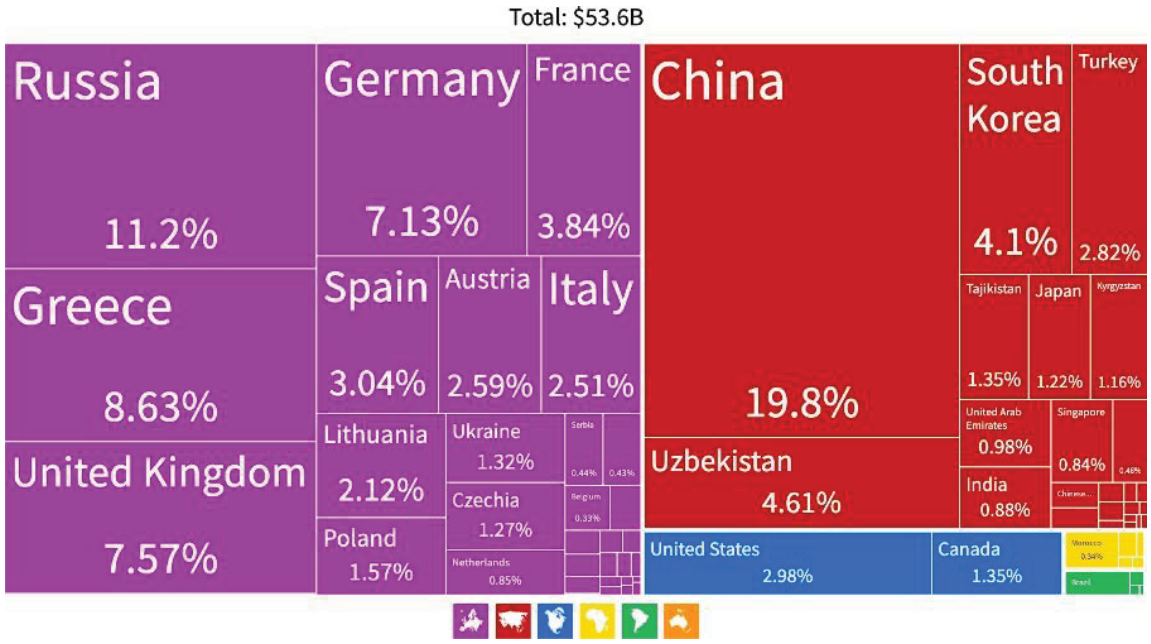
Kazakhstan export structure 2021



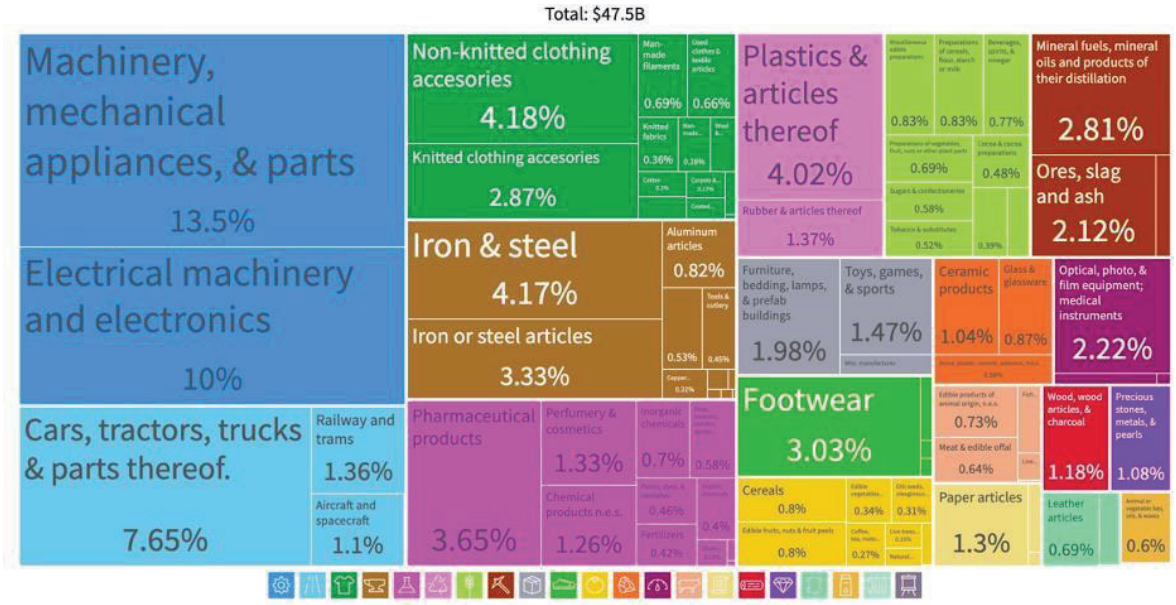
Source: OEC (2023). Extract: 10.07.23

https://oec.world/en/visualize/tree_map/hs92/import/kaz/all/show/2021/

Where does the country export?



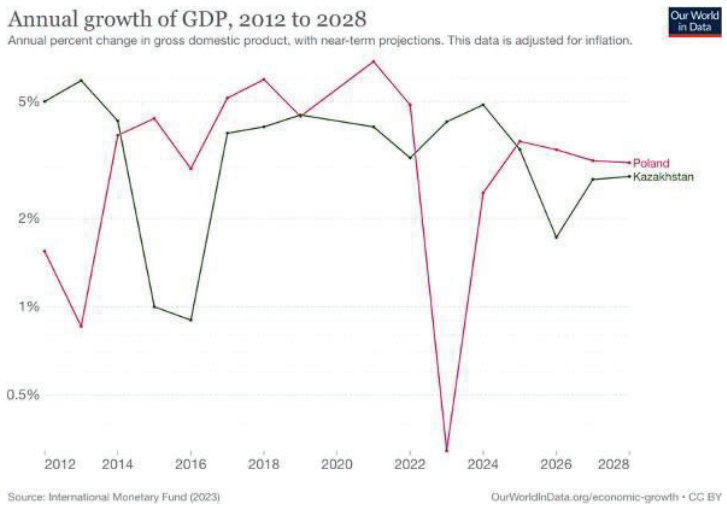
Kazakhstan Import structure 2021



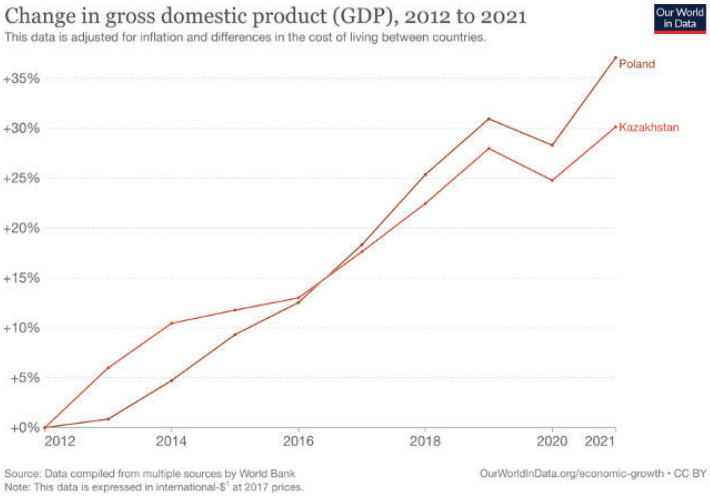
Source: OEC (2023). Extract: 10.07.23

https://oec.world/en/visualize/tree_map/hs92/import/kaz/all/show/2021/

ANNEX 04



ANNEX 05



1. International dollars: International dollars are a hypothetical currency that is used to make meaningful comparisons of monetary indicators of living standards. Figures expressed in international dollars are adjusted for inflation within countries over time, and for differences in the cost of living between countries. The goal of such adjustments is to provide a unit whose purchasing power is held fixed over time and across countries, such that one international dollar can buy the same quantity and quality of goods and services no matter where or when it is spent. Read more in our article: What are Purchasing Power Parity adjustments and why do we need them?

ANNEX 06

POLAND has 17 properties inscribed on the UNESCO World Heritage List and 5 properties in the Tentative List.

UNESCO World Heritage Sites

Cultural

·1. Auschwitz Birkenau German Nazi Concentration and Extermination Camp (1940-1945) (1979)

2. Castle of the Teutonic Order in Malbork (1997)

·3. Centennial Hall in Wrocław (2006)

·4. Churches of Peace in Jawor and Świdnica (2001)

·5. Historic Centre of Kraków (1978)

6. Historic Centre of Warsaw (1980)

7. Kalwaria Zebrzydowska: the Mannerist Architectural and Park Landscape Complex and Pilgrimage Park (1999)

·8. Krzemionki Prehistoric Striped Flint Mining Region (2019)

·9. Medieval Town of Toruń (1997)

10. Muskauer Park / Park Mużakowski (2004)

·11. Old City of Zamość (1992)

12. Tarnowskie Góry Lead-Silver-Zinc Mine and its Underground Water Management System (2017)

13. Wieliczka and Bochnia Royal Salt Mines (1978, 2008, 2013)

·14, Wooden *Tserkvas* of the Carpathian Region in Poland and Ukraine (2013)

·15. Wooden Churches of Southern Małopolska (2003)

Natural

1. Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe (2007, 2011, 2017, 2021)

2. Białowieża Forest (1979, 1992, 2014)

Tentative List

1. Paper Mill in Duszniki-Zdrój 24/10/2019 (Dolnośląskie province, Kłodzko district, town of Duszniki-Zdrój)

2. Modernist Centre of Gdynia — the example of building an integrated community 26/09/2019 (Pomorskie Region)

3. The Augustów Canal (Kanal Augustowski) 20/03/2006 (Augustów poviat)

4. The Dunajec River Gorge in the Pieniny Mountains 20/03/2006 (Coordinates: N 48° - 50°E 20° - 21°)

5. Gdansk - Town of Memory and Freedom 04/11/2005 (Pomorskie Voivodeship, Gdańsk Urban County)

KAZAKHSTAN has 5 properties inscribed on the UNESCO World Heritage List and 14 properties in the Tentative List.

UNESCO World Heritage Sites

Cultural

1. Mausoleum of Khoja Ahmed Yasawi (2003)
2. Petroglyphs of the Archaeological Landscape of Tanbaly (2004)
·3. Silk Roads: the Routes Network of Chang'an-Tianshan Corridor (2014)

Natural

1. Saryarka – Steppe and Lakes of Northern Kazakhstan (2008)
2. Western Tien-Shan (2016)

Tentative List

1. Abylaikit Monastery 25/08/2021 (East-Kazakhstan Region, Ulan District)
2. Cultural Landscape of Ulytau 25/08/2021 (Karaganda Region; Ulytau District)
3. Petroglyphs within the Archaeological Landscape of Arpauzen 25/08/2021(urkestan Region, Sozak District)
4. Petroglyphs within the Archaeological Landscape of Eshkiolmes 25/08/2021(Almaty Region, Koksu District)
5. Petroglyphs within the Archaeological Landscape of Kulzhabasy 25/08/2021(Zhambyl Region, Korday District)
6. Petroglyphs within the Archaeological Landscape of Sauyskandyk 25/08/2021 (Kyzylorda Region, Shieli District)
7. Rocky Mosques of Mangyshlak Peninsula 25/08/2021 (Mangystau Region, Karakiya, Mangystau and Tupkaragan Districts)
8. Silk Roads: Early Period (Prehistory) 25/08/2021 (Almaty Region, Enbekshikazakh, Ile and Kerbulak Districts)
9. Silk Roads: Fergana-Syrdarya Corridor 25/08/2021(Kyzylorda Region (Kazaly, Syrdarya, Zhalagash and Zhanakorgan Districts), Turkestan Region (Otrar District and Turkestan – city of the regional subordination))
10. Silk Roads: Volga-Caspian Corridor 25/08/2021(Atyrau Region (Makhambet District), Mangystau Region (Mangystau District), West-Kazakhstan Region (Bayterek District))
11. Ustyurt: Natural Landscape and Aran Hunting Traps 25/08/2021 (Mangistau Region, Karakiya District)
12. Cold winter deserts of Turan 07/01/2021 (Aral and Almaty Regions, Kerbulak and Panfilov Districts, Kyzylorda Province)
13. Northern Tyan-Shan (Ile-Alatau State National Park) 06/02/2002 (Almaty region)
14. Turkic sanctuary of Merke 24/09/1998 (Zambyl region)

ANNEX 07

KAZAKHSTAN

There are 5 major coal mining in Kazakhstan which locate two main regions called “Karagandi” and “Pavlodar” as follows:

1. Bogatyr Komir Mine is a surface mine located in Pavlodar. It is owned by Samruk-Energy and produced an estimated 43.338 MTPA of coal in 2020.

2. Vostochny Mine. Located in Pavlodar, the Vostochny Mine is owned by Eurasian Resources Group. The surface mine produced an estimated 15.691 MTPA of coal in 2020. The mine will operate until 2046.

3. Shubarkol Mine is located in Karagandy. It is owned by Eurasian Resources Group and produced an estimated 8.457 MTPA of coal in 2020. The mine will operate until 2050.

4. Severny Coal Mine, owned by United Company RUSAL Plc, is a surface mine located in Pavlodar. The mine produced an estimated 6.385 MTPA of coal in 2020.

5. Zhalyn Mine. Owned by Coal Mining Corporation Ltd, the Zhalyn Mine is a surface mine located in Karagandy. It produced an estimated 2.007 MTPA of coal in 2020.

POLAND

There are 8 major coal mining in Poland which locate four main regions called "Konin", "Puchaczów", "Bełchatów" and "Ruda Śląska" as follows:

1. Konin coal mine is a large mine in the central of Poland in Konin, Greater Poland Voivodeship, 186 km north-west of the capital, Warsaw. Konin represents one of the largest coal reserve in Poland having estimated reserves of 466.4 million tonnes of coal.[1]

2. Bogdanka Coal Mine (Lubelski Węgiel "Bogdanka" S.A.) is a coal mine in the village of Bogdanka near Łęczna, in the vicinity of Lublin, 197 km south-east of Poland's capital, Warsaw, in the Lublin Coal Basin.

3. Bełchatów Coal Mine (Polish: *Kopalnia Węgla Brunatnego „Bełchatów"*) is a large open-pit mine in the centre of Poland in Bełchatów, Łódź Voivodeship, 150 km west of the capital, Warsaw.

4. Halemba Coal Mine is a large mine in the south of Poland in Halemba district of Ruda Śląska, Silesian Voivodeship, 273 km south-west of the capital, Warsaw. Halemba represents one of the largest coal reserves in Poland, having estimated reserves of 120 million tonnes of coal.

5. Bolesław Śmiały Coal Mine is a large mine in the south of Poland in Łaziska Górne, Silesian Voivodeship, 172 km south-west of the capital, Warsaw. Bolesław Śmiały represents one of the largest coal reserve in Poland having estimated reserves of 50 million tonnes of coal.

6. Pniówek Coal Mine is a large mine in the south of Poland in Pniówek, Silesian Voivodeship, 350 km south-west of the capital, Warsaw. Pniówek represents one of the largest coal reserves in Poland, having estimated reserves of 101.3 million tonnes of coal.

7. Jas-Mos Coal Mine is a large mine in the south of Poland in Jastrzębie-Zdrój, Silesian Voivodeship, 260 km south-west of the capital, Warsaw. Jas-Mos represents one of the largest coal reserve in Poland having estimated reserves of 34.1 million tonnes of coal.

8. Marcel Coal Mine is a large mine in the south of Poland in Radlin near Wodzisław Śląski, Silesian Voivodeship, 260 km south-west of the capital, Warsaw. Having estimated reserves of 76 million tonnes of coal near Marklowice and Wodzisław Śląski.