Part I

Phasing out coal
Chapter 1
The changing role of coal in the Polish economy – restructuring and (regional) just transition

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Introduction

Poland is often referred as the *enfant terrible* of EU climate and energy policy. The pertinent question remains: is it going to change? Poland’s traditional reliance on coal in the energy sector, its famous unilateral vetoes of the EU 2050 Roadmap and the controversial coal exhibition in the Polish pavilion during the COP24 in Katowice are building an image of the country as the main saboteur of an ambitious EU climate policy.

Indeed, the key domestic stakeholders of energy policy – trade unions and the private sector – hold dear the status quo in which the state protects the coal mining sector and a coal-based energy system against EU climate and energy policy. Instruments of protection, such as the special pension system for miners or the capitalisation of coal mining by state-controlled companies, makes it difficult to hold the sector accountable and transparent. Even so, these public policies still appear to be politically justified as climate concerns in Polish society remain relatively low while issues such as energy prices or energy security, as limitations of ambitious climate goals, continue to prevail.

In this chapter, we first explain the historical background of Polish coal mining and the coal-based energy sector as it is key to understanding the current position of Poland with regard to climate policy. We go on to outline different perspectives on the impact of the coal-based energy system on CO₂ emissions to highlight Polish weaknesses in terms of climate targets but, at the same time, we also show how this (non-)policy regarding climate goals reflects social beliefs. In the next part, we explain some of the miners’ motivations and ways of defending their jobs in the coal sector. Then, we characterise coal regions and look at the factors which may determine their resilience to the possible phasing out of coal. We then summarise the current government’s strategies regarding the energy sector and CO₂ emissions and discuss the challenges in the context of EU targets before concluding with suggestions of possible solutions for a faster and more effective transformation.

1. The historic role of coal in the Polish economy

Historically, coal has played a role as a guarantor of economic wealth and development in Poland. For the Silesia region – the main coal mining region in Poland – it was also a trigger of different, positive processes such as industrialisation, urbanisation and the propagation of social rights movements. The decline of the sector began
with a delay compared to other coal-producing countries such as the UK, France or Germany. In Poland, this decline was strongly influenced by the inefficient central planning system under the communist regime established after World War II. With the fall of communism in 1989, the sector became one of the key challenges for the economic and political transformation of the country (Szpor and Ziółkowska 2018).

In the last three decades, the domestic consumption of coal (including lignite) and also its production has been decreasing, but it is still the main component of the Polish energy mix, currently representing one-half of the Total Primary Energy Supply (TPES), as Figure 1 shows. The decrease in the role of coal has been driven mainly by the transformation of the economy (improvements in energy efficiency and the development of services at the expense of industry). The increase in oil supply during this period is related to the development of transport.

Figure 1  Total primary energy supply (Mtoe), 1990-2016

Coal played – and still plays – an even more important role in electricity production, as shown in Figure 2. Until the late 1990s, it was responsible for almost the entirety of electricity production. Under the influence of the EU, the use of renewable energy sources (RES) has increased, with biomass (the majority being biofuels) and wind, in particular, being implemented on a larger scale since the 2000s. In 2016, all RES combined represent around fourteen per cent of total electricity production. It is also noteworthy that coal-based energy generation, in terms of absolute value, remained practically at the same level (131 TWh in 1990 and 133 TWh in 2016) during the whole of this 26-year period, as Figure 2 also shows. With some ups and downs, the contribution of other fuels (wind, biofuels, gas) covers roughly all the increase in electricity production over the period.

Figure 2  Electricity production (TWh), 1990-2016

The role of coal and lignite mining in the total economy has fallen rapidly during the last few years. Between 2005 and 2017, the gross value added (GVA) of coal and lignite mining in industry decreased from 6.9 per cent to 3.7 per cent. In nominal terms, this meant a growth of 10 per cent, whereas the GVA of industry as a whole doubled in the same period.1

For many years, Polish reliance on coal was justified by the limited availability of alternatives. Poland has never developed nuclear power and, unlike in many EU15 countries, the ‘dash for gas’ option was not seen as viable due to the geopolitical risks related to Russia. The existing gas infrastructure does not allow the import of gas from other countries, while a reliance on Russia could repeat politically motivated gas switch-offs or price setting. Poland has extensive domestic coal reserves and only limited domestic resources of gas, so this policy seemed to be reasonable from an economic viewpoint. However, in recent years, the gas infrastructure, thanks to the European Strategic Energy Technology Plan, has substantially enhanced interconnections with neighbouring countries as well as securing a new LNG terminal. It is expected that, as long as the price of emissions allowances does not radically increase the costs of this fuel, it could, together with biofuels, cover the necessary baseload and thus allow the wider deployment of intermittent RES in Poland.

The mining of coal and lignite in Poland is state-controlled and highly concentrated. The majority of hard coal mining takes place in four state-controlled companies: PGG in Silesia is the largest; followed by JSW (with seven, partly-integrated mines); Bogdanka (one coal mine, but a large one); and Węglokoks (a large industrial company owning one coal mine). Another three hard coal mines belong to Tauron – an energy company in which the Treasury is a minority shareholder – while three coal mines are in private hands (Eko-plus, Silesia and Siltech). In the lignite sector, the major producers are PGE (a state-controlled energy company owning two mines) and ZE PAK (a private company, also owning two mines). Both companies are responsible for almost the entire domestic production of lignite. Section 4 of this chapter, Figures 11 and 12, covers the regional distribution of mines.

The concentration of the coal sector is extremely high compared to other segments of industry. Despite significant imports of coal in recent years, the price of domestically-produced coal is substantially higher. This has been possible due – among other things – to state-owned electricity power plants having concluded long-term contracts with Polish mining companies which has limited the impact of the international price.

PGG, the biggest mining company in Europe and the biggest employer in the region of Silesia, with twelve partly-integrated mines,2 is the best example of state involvement in coal mining in Poland (see its ownership structure in Figure 3). The company was created as the result of a restructuring programme which started in 2016 and under which two coal mining companies in a difficult economic situation were merged. The

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1. In the same period, the whole sector of ‘mining and quarrying’, which includes coal and lignite but also, for instance, the much more profitable copper mining industry, grew by thirty per cent.
2. Integration of mines can take a physical and/or a legal form and is aimed at the unification of mines in order to reduce their costs (e.g. in PGG there is one mine integrating four formerly independent mines; and another two, each of which integrate two formerly independent mines).
programme included the liquidation of the least profitable mines, the organisational integration of others and the capitalisation of PGG by state-controlled companies in the sectors of energy (PGE, Energa, Enea), mining (Węglokoks, PGNiG) and finance (TFS, FIP-TFI). The total capitalisation of the company was €0.6bn from shareholders and €0.3bn from the banking sector in form of bank bonds.

**Figure 3**  
Holders of the share capital of PGG – the main hard coal mining company in Poland (per cent), 2018

Furthermore, the energy sector is, to a large extent, also controlled by the state. There are four major energy companies which play an important role in energy production and distribution: PGE; Tauron; Energa; and Enea. The Treasury is a majority shareholder in three of them – PGE, Energa and Enea – while it owns directly thirty per cent of the shares of Tauron, the fourth (Table 1). In 2017, a major takeover took place by PGE and Enea of the generation assets of the French multinational companies, EDF and ENGIE. The result is that the concentration level, in terms of the installed capacity and volume of energy introduced to the grid, has grown respectively by 37 per cent and 39 per cent, facilitating its depiction as ‘high’ or just below ‘high’ (URE 2017). These movements are generally perceived as part of the broader political programme of the governing party to create national champions among state-owned or state-controlled companies, able to compete on international markets even if this is at the cost of lower competition on the domestic market.

In the recent decade, the contributions of the hard coal mining sector to the public finances have not covered state support for the sector. The report of the Supreme Audit Office (NIK 2017) states that total contributions to public finances (mainly to the state budget and to the Social Insurance Institution) reached €15.9bn between 2007-2015. In the same period, state support, directed mostly to supplementing the special retirement pension system\(^3\) for miners), amounted to €16.1bn. Thus, even if the sector is still making a profit in economic terms, the cost of the pension system (due to the

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\(^3\) Retirement is granted to a miner after 25 years of work, which means that a miner who starts work at age 18 can retire at 43 even though the regular pension age for a man is 65 years.
shorter working lives of miners) gives it a ‘neutral’ balance in respect of the public finances (or even a slightly negative one).

Similarly, the trade balance of the coal sector has been rather negative in recent years. Figure 4 shows the value and volume of coal exports and imports since the mid-1990s. During the most recent decade (2008-2017), the value of coal exports has been lower than the value of imports, while the accumulated trade deficit was $2.7bn. Compared with data from the late 1990s or early 2000s, this suggests a decline in the competitiveness of Polish coal.

Moreover, the trade in mining equipment seems to indicate that Poland is strongly dependent on imports. Domestic production of equipment is at a level of €390m, while the export value is €658m and the import value €775m. To put this into perspective, with the value of net exports being -€117m, Poland has the largest trade deficit among coal-producing EU member states (Alves Dias et al. 2018).

Table 1 Shareholders in the other main mining and energy companies in Poland (per cent)

<table>
<thead>
<tr>
<th>The main energy companies</th>
<th>Treasury</th>
<th>Enea SA</th>
<th>TFI PZU SA**</th>
<th>KGHM polska miedź</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGE</td>
<td>57.39</td>
<td></td>
<td></td>
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<tr>
<td>Tauron</td>
<td>30.06*</td>
<td></td>
<td></td>
<td>10.39</td>
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<tr>
<td>Energa</td>
<td>64.09</td>
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<tr>
<td>Enea</td>
<td>51.50</td>
<td></td>
<td></td>
<td>9.96</td>
</tr>
<tr>
<td>The main coal and lignite mining companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JSW SA</td>
<td>55.17</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ZE PAK</td>
<td></td>
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<td></td>
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<tr>
<td>Bogdanka SA</td>
<td></td>
<td></td>
<td>66.00</td>
<td>9.76</td>
</tr>
<tr>
<td>KGHM polska miedź***</td>
<td></td>
<td></td>
<td>30.79*</td>
<td></td>
</tr>
</tbody>
</table>

* The remaining shares belong to minor shareholders and are free floating.
** The Investment Fund Company is 100 per cent owned by the largest Polish insurance company PZU, of which the Treasury owns 35 per cent of the shares while the rest are free floating.
*** The copper mining company of which the Treasury owns 32 per cent and foreign insurance companies ten per cent, while the rest are free floating.
Source: Giełda Papierów Wartościowych, 16.03.2018.

One important economic factor supporting the role of coal is the assumed low cost of electricity produced from this fuel. According to the analysis of Strupczewski (2015), the levelised cost of electricity from coal in Poland was around $75/MWh and this was the lowest of all other fuels. The next cheapest sources were nuclear, with a cost of $82/MWh and offshore wind, $93/MWh, while all other sources were above $100/MWh. Given, however, that the costs of RES have decreased since the analysis was performed, while the costs of CO₂ emissions permits have grown, the current costs of coal-based electricity are likely to be less competitive. The recent study by IRENA (2018) confirms the low levelised cost of electricity for coal as it predicts that, in 2025, it will be the

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This is without the external costs and system costs which are also listed in the publication by Strupczewski.
second cheapest source of electricity, at €92/MWh, although overtaken by onshore wind, at €78/MWh.5

Figure 4  The trade in coal: value ($m); and volume (millions of tonnes), 1994-2017

The weakness of the levelised cost of electricity analysis is that it (in this case and in the majority of other studies) does not include taxes, tax exemptions, subsidies, etc. for any energy source. Therefore, it answers only partly to the relevant policy question about the actual cost of energy derived from different fuels.

2. CO₂ emissions in Poland – recent trends and current challenges

The continued decoupling of economic growth from CO₂ emissions in Poland can be considered as a success. CO₂ emissions, at absolute level, have been reduced from 470 Mt in 1990 to 390 Mt in 2016. By 2015, emissions were down by around one-fifth, despite the economy’s strong dependence on coal, while GDP grew to two and half times its 1990 level (Figure 5). Emissions decreased until 2002, when they reached their lowest level, since which point they have oscillated around the level of 400 Mt. Poland was among the six member states that, by 2016, had not achieved national emissions reduction targets under the effort sharing mechanism (EEA 2018).

5. RWE Polska had prepared a study in 2016 in which the levelised cost of electricity for coal in Poland was €67/MWh, onshore wind €80/MWh, offshore wind €150/MWh and solar €150/MWh.
In terms of CO₂ emissions per capita, Poland was, in 2014, slightly above the EU15 average (with seven member states having higher levels) but was more significantly above the average for the EU as a whole (Figure 6).

On the negative side, Poland remains one of the most carbon intensive economies in the EU and it does not support domestic businesses in profiting from the megatrend of developing the green economy. The result is that Poland is expected to remain a weak spot in the EU’s decarbonisation policy which will have negative consequences in political terms as well as in terms of lost synergies from those same EU policies.

Although the pace and scale of CO$_2$ emissions reduction in Poland has been the most significant among other central and eastern European countries (CEEC), it still has the highest CO$_2$ intensity in the Visegrad 4 group$^6$ and is significantly above the EU28 average (Figure 7). In the 1990s, Poland was the most carbon intensive economy (except for Estonia) in CEE, which is partly due to its lack of nuclear power (alongside, for example, the cases of Hungary, Slovakia and Czechia). As with other transformation economies, the radical downscaling of inefficient industrial facilities during the system transformation was not only an essential part of the economic transformation process but also made a large contribution to the significant reduction of emissions during the 1990s. Yet, with a rapidly growing economy, the costs of reduction were also increasing. From a political perspective, it was becoming equally difficult to keep up the pace of transformation – among the highest in CEECs – and face down the concerns of miners about the future of their sector.

The achievements of Poland in terms of CO$_2$ emissions reduction during the 1990s were, therefore, rather a side effect of the economic transformation than the results of a planned climate policy. Both the (non-binding) Rio targets and the Kyoto Protocol targets were achieved by Poland with a substantial surplus. According to the Rio

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$^6$ The Visegrad 4 group includes Czechia, Hungary, Poland and Slovakia.
targets, Poland was expected to stabilise its emissions level by 2000 at the 1988 level: it not only achieved that but also reduced its emissions by 33 per cent. The Kyoto targets, aiming at a reduction in emissions of six per cent between 2008-2012 with regard to the 1988 levels, were also achieved as Poland reduced emissions by thirty per cent. Even so, climate policy was never a part of any government strategy and neither were climate goals ever internalised by government strategies. Furthermore, the process of monitoring and reporting CO$_2$ emissions, especially during the 1990s, was clumsy and delayed (Karaczun et al. 2000), becoming more transparent and ordered only in the recent decade.

The lack of a climate policy in Poland is, in domestic political terms, legitimate. Opinion polls indicate some progress in terms of public awareness of climate change (although the trend is not clear) (CBOS 2018). Other research (ESS 2018), however, indicates that Poles, among 23 other mostly European countries, are below average in terms of the share of population who believe climate change to be a fact, that it is caused at least partly by humans and that it will have a bad impact. More importantly, Poles (together with Russians) are the least opposed to coal and gas as a source of energy and the most sceptical about a fossil fuel tax. The result is that, on the domestic political agenda, strategic documents related to the energy and coal sector do not tackle the problem of reducing the number of coal mines or jobs as this would be instantly opposed by the trade unions and could endanger the stability of any government.

A further research study (Poushter and Huang 2019), conducted in 26 countries around the world, indicates that climate change is the most feared of the presented choices in one-half of the countries in the study. Interestingly, in only three other countries (Russia, Israel and Nigeria) is climate change feared less than it is in Poland. Instead, Poland’s concern over Russia’s power and influence is the highest among all countries and, domestically, this concern is the highest of all the eight concerns addressed in the poll.

In the absence of a strong internally-motivated agenda for the reduction of CO$_2$ emissions, the main challenge for domestic policy can be formulated in terms of how to reduce the CO$_2$ intensity of the economy in order to comply with the EU’s climate and energy policy. With 0.4 kg of CO$_2$ emissions per dollar of GDP (PPP), Poland is the second most carbon intensive economy in the EU. As national emissions come mostly from the energy and heating sector which in turn – again – is fuelled mostly by coal, coal mining will inevitably continue to face strong pressure from the EU for a more rapid winding down.

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7. The list of 23 countries is: Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.
8. The list of 26 countries is: US, Canada, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Spain, Sweden, UK, Russia, Australia, Indonesia, Japan, Philippines, South Korea, Israel, Tunisia, Kenya, Nigeria, South Africa, Argentina, Brazil and Mexico.
3. Employment in the coal sector and related industries

Making politically-acceptable reductions in employment has been one of the main challenges in the coal sector transformation since the early 1990s. By 2017, the number of miners employed in hard coal had fallen by eighty per cent (from 388,000 in 1990 to 83,000 in 2017) and in lignite by seventy per cent (from 29,000 to 9,000) (Figure 8). The scale and the pace of employment reduction were driven by economic and political factors: the former acted in favour of employment reduction, while the latter (mostly with regard to hard coal) slowed this process.

Figure 8  Employment in hard coal and in lignite mining in Poland, 1990-2017 (thousand)

The reduction of employment in the coal sector (particularly in hard coal) has been achieved by different types of instruments. The first (quasi-)instrument, applied in the early 1990s, was natural attrition (i.e. the limitation of new employment and relying on the outflow of workers who had reached pension age). Since the mid-1990s, natural attrition has been reinforced by such instruments as early retirement or redundancy payments. To keep up the pace of employment reduction, more and more generous conditions for these instruments were offered, such as increasing the value of early retirement payments or reducing the age limit for eligibility. Widespread use of these instruments ended in the early 2000s, correlating with the decreasing pace of employment reduction (Szpor and Ziółkowska 2018).

The attractiveness of the mining sector is sustained by relatively high wages. Salary in hard coal and lignite mining\(^9\) is almost fifty per cent higher than in the construction sector and almost forty per cent higher than in manufacturing and across the whole economy (Figure 9). The high salary seeks to compensate for the risk of accidents and the onset of health conditions as well as for the specific skills required in hard coal mining which are not entirely applicable in other sectors.

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\(^9\) In 2017, around twenty per cent of workers in the sector ‘Mining and quarrying’ were from other industries than coal and lignite.
Salaries in mining are indeed substantially higher although the level of education required remains comparable to that in the other sectors. The share of miners with tertiary education is lower compared to elsewhere, being one-half of that in the whole economy; yet the number of workers with secondary education is higher, as Figure 10 shows.

Strong trade unions are another factor preserving the employment structure in the mining sector. In some Polish mines, the level of unionisation reaches over 100 per cent (a miner may belong to more than one trade union) compared to fifteen per cent in the whole economy. Trade union strength is used – among other things – to preserve a complicated remuneration system in which a number of additional payments and benefits function for different groups within the sector. Keeping this non-transparent helps trade union leaders and company management limit the external and internal pressure on the sector.
Coal and lignite mining is also strongly supported by workers in other dependent sectors. Employment in supply chains for the coal sector was quantified in 2017 by the European Commission’s Joint Research Centre (Alves Dias et al. 2018) in an input/output analysis. This indicated around 49 thousand jobs in intra-regional supply chains and 88 thousand in inter-regional ones. Another recent study, also based on input-output analysis, shows a proportion of employees in the sector and in supply sectors of roughly 1:0.5 (Kiewra et al. 2019). This contradicts other estimates of proportions ranging from 1:2 to even 1:4 (Wydawnictwo Gornicze 2017).

4. **The regional dimension**

Despite the declining role of coal, its production takes place to varying degrees in almost one-half of Polish regions (see Figure 11). Production of hard coal (thermal and coking coal) takes place foremost in the Silesia region (48 Mt; with 27 mines), but also to a lesser degree in Lubelskie region (7 Mt; one mine) and Malopolskie region (2 Mt; two mines). Lignite is mined in four other regions – in Łódzkie (45 Mt; one mine), Wielkopolskie (12 Mt, two mines) Dolnośląskie (7 Mt; one mine) and Lubuskie (0.08 Mt; one mine). Among these coal producing regions, only in Silesia is coal being used on a wider scale in industry more generally as opposed to purely in energy generation; in other coal producing regions, either the scale of production of hard coal is insufficient or the type of coal (lignite) simply excludes this as a fuel other than in energy production.

Figure 11  **Hard coal and lignite production (in kilotonnes) by region (2017)**

Source: Own visualisation based on data from PIG (2018).

10. According to the data of Alves Dias et al. (2018), coal-fired power plants in Poland employ thirteen thousand workers.
Polish coal-producing regions also differ greatly regarding the number of direct jobs in coal mining, as Figure 12 shows. This is related, firstly, to the number of mines in a region and, secondly, to the type of coal produced. Hard coal mining is far more labour intensive since Polish geological conditions mean that it is deep underground while lignite mining is a surface mining activity. That is why in Silesia, where the majority of coal mines exist, there are almost 80 thousand workers employed in hard coal mines. In Lubelskie and Małopolskie, employment in hard coal mining is much lower due to the number of mines (one and two, respectively). Employment in Łódzkie, Wielkopolskie and Dolnośląskie regions, where lignite mining takes place in opencast pits, is lower and fairly proportional to the quantity of coal produced. Other important factors in the scale of employment in each region relate to the individual geological conditions of the mines and to their ownership.

A simplified index of coal regions’ resilience after the winding down of coal was outlined in the Joint Research Centre report (Alves Dias et al. 2018). The degree of regional resilience is measured in several steps. Firstly, an index, based on the ratio of regional GDP per capita to national GDP per capita, is established to assess the general economic condition of particular EU regions. In the majority of cases, it indicates the inferior position of EU coal regions as opposed to non-coal regions. In the next step, based on forecasts for the decommissioning of coal mines and coal power plants, the rate of jobs at risk is calculated as a percentage of the working population. This rate is correlated with the unemployment rate. In wealthy coal regions with low unemployment, negative shocks caused by the closure of mines and coal power plants are expected to be absorbed easier than in others.
Silesia is an example of a region whose internal strengths may help to cushion the negative consequences of a phase-out of hard coal. Of all 41 coal regions in the EU, Silesia records the highest number of jobs at risk up to 2030 (41 thousand) (Alves Dias et al. 2018). At the same time, its relatively high economically active population (reaching almost two million people), low unemployment (slightly above five per cent), as well as its above-average GDP in comparison with other Polish regions, gives it a chance that, with the right policy, it will manage the transformation.

Unlike in Silesia, mining activity in other mining regions is geographically concentrated in one particular sub-region. Among the existing twelve coal sub-regions, seven belong in Silesia while each of the other five lays in a different region. Their socio-economic situation, in terms of GDP per capita and unemployment, vary: the Piotrkowski and Lubelski sub-regions are prospering better than their wider regions; whereas the Oświęcimski, Jeleniogórski and Koniński sub-regions are doing rather less well than the rest of their regions. In-depth study has not been conducted into this issue, but other economic factors which may have an influence on the level of prosperity at sub-regional level are the type of coal (hard coal or lignite) which is, in turn, partly accountable in terms of other factors – diversification of the economy, level of urbanisation, transport networks, etc.

One of the examples of lignite-based economic and social monoculture is the Koniński sub-region (part of the Wielkopolska region). In this sub-region, lignite mining and lignite-based electricity production constitute the most significant economic activity.\footnote{Lignite is a fuel which can be used only in electricity production and, due to high humidity, its transportation is possible only over very short distances. Hence, unlike hard coal, which can also be used in steel production or chemistry, it does not have the potential to create diversified industrial production and neither does it stimulate the development of a transport network. The impact of a lack of urban development is that vast areas are left in a rural setting, often remote, and with a number of social problems.}

Compared to some hard coal mining sub-regions of Silesia (e.g. Katowicki or Gliwicki), it is less diversified in economic terms, less urbanised and less connected with other large or medium cities. It is thus more vulnerable to the negative consequences of transformation. The decline of its mining sector, without the right preventive steps, would mean a substantial decrease in incomes for its local government and a worsening of the quality of life of local inhabitants (Kiewra and Szpor 2018). Despite the tools to resolve the problems within a region laying largely at regional level (mainly in the form of EU funds), sub-regional initiatives to engage private capital will also be necessary. Konińskie sub-region has already taken some initial steps in this direction.

\section{Energy objectives and policies}

There are currently two major strategic documents framing Polish energy and climate-related policies. The first document, 'Polish Energy Policy until 2040' (PEP 2040) was drafted at the end of 2018.\footnote{Initially, a concept for a Polish energy policy up until 2050 was drafted in 2015, yet the change of government in that year led to a re-launch of the analytical work which, under the current government, has lasted for more than three years. Interestingly, CO$_2$ emissions targets for 2040 are, according to both plans, set at the same level (299 MtCO$_2$ eq). The differences with regard to 2030 (350 MtCO$_2$ eq and 366 MtCO$_2$ eq) can be attributed to a delay in the introduction of nuclear power.} It sets long-term perspective goals for the energy sector
and is in line with the overarching government document, the ‘Strategy for Responsible Development until 2020’. The second document is the ‘National Energy and Climate Plan for 2021-2030’ (NECP), drafted at the beginning of 2019. This has been created to respond to the EU requirement for all EU member states to share efforts with the aim of achieving EU climate and energy goals for 2030. Both documents are currently the subject of public consultation, with their final version due for adoption in 2019.

As declared in the draft PEP 2040 document, there is only limited synergy with the NECP. The major differences relate to the role of onshore wind which, in the NECP, is envisaged as being higher than in PEP 2040; and the planned winding down of hard coal power plants which, in the NECP, would be undertaken faster than in PEP 2040. The differences between the documents may come from different assumptions as well as hidden agendas. On the one hand, in 2019 there are elections both to the European Parliament and the Polish Parliament, and the strategy thus needs to take into account the strong domestic coal lobby. On the other, the NECP is to be negotiated with the European Commission and thus it also contains some assumptions that may be subject to change.

The main goal of the energy policy as formulated in PEP 2040 is energy security while ensuring the competitiveness of the economy, energy efficiency, the reduction of the energy sector's impact on the environment and the optimal use of domestic energy resources (Ministry of Energy of the Republic of Poland 2018a).

‘Directions’ for achieving PEP 2040 goals

Among the seven ‘directions’ which create the operational matrix of PEP 2040, the optimal (rational) use of domestic energy resources is the first. It insists on improving the profitability of hard coal mining and on the development of innovation both in hard coal and lignite production. It also underlines the need for the diversification of gas and oil supplies but also the search for new sources of energy. The second direction is about the development of electricity generation, based on domestic non-intermittent, flexible and environmentally-friendly technologies (other than coal). Separately, it underlines the need for increasing the share of RES and introducing nuclear. Among the other directions is enumerated the development of pipeline networks; the development of energy markets; the implementation of nuclear power; the development of heating and co-generation (universal access to heating and low-emission heat generation across the whole country); and, finally, the improvement of the energy efficiency of the economy.

Source: PEP 2040.

According to PEP 2040, hard coal will remain the single most important source for electricity production by 2040, although its role will be decreasing. By means of the

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13. The ‘Strategy for Responsible Development until 2020 (with a perspective to 2030)’ is an overarching strategic document, set in a medium- and long-term perspective, adopted by the government in 2017. The main goal of the Strategy is ‘Creating the conditions for an increase in the incomes of Poland’s inhabitants while increasing cohesion in the social, economic, environmental and territorial dimensions.’

14. Given that the NECP was published after the consultation on PEP 2040 had been concluded, we have assumed that the data published in the NECP are more accurate and thus we have used them in this text.
modernisation of the energy sector, and thus the more efficient use of coal, it is believed possible for the quantity of electricity generated to be sustained from a declining coal production. Furthermore, its production for industry (energy and steel) will be shifting from thermal to coking coal for profitability reasons. Meanwhile, demand from the residential sector will be lowered by the promotion of district heating schemes, thus reducing consumption in individual households. This will also contribute to a decrease in energy poverty and in air pollution. In segments which are not covered by domestic production, the import of coal will be allowed to meet domestic demand.

Figure 13 shows the projected fuel mix of Polish electricity generation until 2040 according to the NECP. The expected growth in demand for electricity amidst the decline in the role of coal will be covered foremost by gas, wind, solar and, at a later stage, also by nuclear. In 2030, coal will still be responsible for almost sixty per cent of electricity

* Together with coking gas and blast furnace gas
** Methane natural gas and nitrogen rich gas, methane drainage gas from mines, gas accompanying crude oil
*** Inorganic industrial and municipal waste
Source: NECP (2019).
production although, by 2040, its share will decline to just below thirty per cent. In the decade up to 2030, the share of wind and gas will become more prominent while, in the decade up to 2040, nuclear and solar energy will also contribute substantially to meeting the expected increase in electricity demand.

The postponement of goals with regard to CO₂ emissions reduction targets thus depends primarily on the development of nuclear energy, whose implementation has already been delayed by ten years and in which further delay is therefore possible.

6. Commitments and targets in response to EU climate policy

Polish greenhouse gas (GHG) emissions come mostly from the energy sector. In 2020, the sector is expected to produce 93 per cent of total GHG emissions and, twenty years later, only five percentage points fewer. Within the energy sector, the bulk of emissions are produced by what the IPCC defines as energy industries,¹⁵ while transport, manufacturing and construction and other sectors altogether play a smaller role.¹⁶ From the perspective of 2040, transport emissions will record the slowest decline, and emissions from energy the fastest; yet the energy sector will still be responsible for almost one-half of total emissions (Figure 14).

According to the NECP, by 2030 overall GHG emissions are to be limited by ten per cent compared to 2020; and, in 2040, by 45 per cent compared to 2020. The scale of emissions reduction in the second decade of the transformation would be larger due to a faster winding-down of coal and, at the same time, due to the introduction of nuclear and the wider use of wind and solar.

The current targets within the climate and energy policy for the EU as whole assume substantially higher goals than Poland is declaring to achieve. In the NECP, the Polish target with regard to GHG emissions is to reduce them from 468 MtCO₂ eq¹⁷ in 1990 to 367 MtCO₂ eq in 2030; that is, by 22 per cent compared with the forty per cent target at EU level. Under the Effort Sharing Regulation, this overall EU 2030 target is broken down into emissions reduction in ETS sectors of 43 per cent, and reductions in non-ETS sectors by thirty per cent, compared to the base year of 2005. For Poland, the respective 2030 targets are nine per cent in ETS sectors and seven per cent in non-ETS sectors (also on a 2005 basis). For 2040, the corresponding Polish reduction targets would be 33 per cent and sixteen per cent respectively (again compared to 2005), as Figure 15 shows. The situation of Poland as a less wealthy and historically

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¹⁵ The basic sectoral division by IPCC includes the following sectors: 1) Energy; 2) Industrial processes; 3) Solvents and other product use; 4) Agriculture; 5) Land use change and forestry; 6) Waste; and 7) Other. The ‘Energy’ sector includes two sub-sectors: A) Fuel combustion activities and B) Fugitive emissions from fuels. The bulk of emissions globally, and also in the case of Poland, comes from sub-sector A, which is further divided into three sub-sections: 1) Energy industries; 2) Manufacturing industries and construction; 3) Transport; 4) Other sectors; and 5) Other not specified elsewhere.

¹⁶ Energy industries can be further broken down into three categories: 1) Public electricity and heat production; 2) Petroleum refining; 3) Manufacture of solid fuels and other energy industries. However, the first category is by far the most important (e.g. in 2016 it was responsible for 97 per cent of the emissions of energy industries).

¹⁷ Excluding LULUCF.
coal-dependent country is understood by the European Commission (and included for instance in the derogation package of the EU ETS Directive), but it is expected that the European Commission will insist on more ambitious targets in the final version of the Polish NECP.

The slow pace of the reduction of CO₂ emissions is correlated with a slow pace in achieving the two other targets. According to the NECP, the share of RES in 2030 will reach 21 per cent compared to 32 per cent across the EU; while energy efficiency will, according to the NECP, increase by 23 per cent compared to 32.5 per cent.\textsuperscript{18} As some analysts have pointed out, lowering the ambitions of Polish commitments within the

\textsuperscript{18} Compared to PRIMES 2007.
Energy Union may cause unpredicted costs. The evolution of legislation over the next
decade may result in the indicative targets at EU level being more directly transposed in
member states and this would end for Poland with the necessity, for instance, of buying
permits for CO₂ emissions abroad or importing renewable energy (Świrski 2018).

Figure 15 GHG emissions [Mt CO₂eq] by ETS and non-ETS sectors in the Climate and Energy
Policy Scenario (PEK), 2005-2040.

Current EU climate and energy targets for 2030

Current targets within the Energy Union for 2030, set in 2018, include CO₂ emissions reductions
of forty per cent compared to 1990, which translates into a 43 per cent reduction in ETS sectors
and thirty per cent in non-ETS sectors (both compared to 2005). Furthermore, the EU is to achieve
a share of RES in gross final energy consumption of at least 32 per cent. Finally, the EU has set an
overall target for the Union as a whole which aims at increasing energy efficiency by 32.5 per cent
(compared to the prognosis from 2007). This translates into a reduction of 26 per cent in terms of
primary energy consumption compared to 2005, or a reduction of twenty per cent in final energy
consumption compared to the same year.

Despite the installed capacity of RES slowly, but steadily, growing in recent years, its
share in electricity production is not sufficient in terms of the faster growing demand
for electricity. Furthermore, it will not be enough to cover for the declining share
of RES in transport. This is important since, according to the Renewable Energy
Directive (2009/28/EC), the share of RES in total final consumption (that is, energy
consumption from transport, heating and electricity) should rise to 15 per cent in
Poland by 2020.
7. Challenges and possible solutions

The coal sector has an ambiguous position in the Polish economy. On the one hand, it provides relatively cheap fuel (although without consideration of the different forms of subsidies and taxes), contributes to energy security and ensures highly-paid jobs and payments to local governments. On the other, its low productivity translates into a decreasing contribution to GDP and – at the country level – its public support costs about the same amount as the payments it contributes to the public finances. It further creates external costs in the form of environmental, health and housing damage which, however, is not currently being assessed in a comprehensive manner.

Government policies regarding the coal sector are balanced between influential trade unions and pressure from the EU to achieve ambitious climate goals. Coal mining and energy companies are pushing towards a target between these two extremes which they see as the sector’s restructuring and modernisation perspective. Meanwhile, regional but most particularly local governments are anticipating a restructuring strategy that is based on broader policies embracing not only restructuring but also issues like revitalisation and recultivation. There is a growing number of cases in which local governments, despite direct profits from mining activities, are opposing the further development of mines due to issues like damage from mining activities, air quality, water management, impacts on health, etc.

The draft strategies of the current government regarding energy and climate policy remain incoherent, but will be subject to substantial revisions over 2019 during negotiations with the European Commission. The pressure for a stronger reduction of the carbon intensity of the Polish economy, and consequently for reducing the role of coal, is inevitable. The final version of national strategies will, most probably, further reduce the use of coal in the future energy mix and, consequently, the number of jobs in the sector will also decline faster.

The expectations of coal miners that the status quo in the sector be sustained will be confronted with the conditionality of future funds for the restructuring of coal regions. A more sustainable and diversified economic structure (including the energy sector), as a direction of regional transition, has already been determined. Thanks to the activity of the Coal Regions in Transition Platform, this will, in all likelihood, materialise in a special fund set up for this purpose within future structural funds. With a view to more ambitious transformation, the expectations of the Polish government and the energy sector will, however, reach further and encompass structural funds, the Connecting Europe Facility, SET Plan, etc. The latter which, so far, has substantially supported Polish transformation, especially regarding the switch to gas, could be used to develop the internal gas infrastructure. On the other hand, funds for the deployment of RES in a future financial perspective may, however, be blocked due to the likely gap in meeting Polish RES targets.

In the face of the rather low unemployment rate in most coal regions, there is no policy framework for managing employment transitions and the ‘contingency measures’ addressed to miners are rather limited. They embrace traditional monetary
instruments like mineworkers’ pensions, early retirement and redundancy payments (although the latter two have recently been used only on a limited scale). There are virtually no schemes for re-employment in alternative workplaces and only a very limited number of projects are addressed to miners’ families and local communities. A more progressive use of such schemes and projects seems to be indispensable if a just transition is to take place.

As for the workers, especially miners, the schemes need to correspond to different job skills, miners’ current wages and the social and economic context. Further, they need to be elaborated with the participation of local and regional stakeholders so that the specificity of mining communities is rightly reflected and their needs and aspirations answered. It does, however, require political courage to speak openly of a further decrease in the role of coal and of the inevitable consequences that follow from such a decision.

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