



# HUMAN CAPITAL OF THE POLISH MINING AND ENERGY SECTOR

Analysis of the current situation, market trends and  
development perspective



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## **Analysis of the current situation, market trends and development perspectives**

The objective of the analysis was to characterise the human capital employed in the coal and energy industry and to explore potential alternative ways to apply labour resources in regions of coal mining and processing. There are changes and suggestions presented that may help achieve environment and climate goals, mainly through development of the distributed renewable energy system.

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## **Introduction**

Nowadays, planning and construction of new mines, especially lignite mines and power plants that generate electricity from coal and lignite is not only about acting against people and environment, this is also counterproductive for economic growth. Such projects go against modern trends of energy transformation undertaken by highly-developed countries in Europe. The policies of the European Union related to climate and environment are aimed at reducing and in further perspective at elimination of coal-based power industry, which emits carbon dioxide, the main gas responsible for the greenhouse effect. The European Union's energy policies are aimed at generating energy mainly from renewable sources (90% in 2050) and by improvement of efficient energy use of the infrastructure. Still, many enterprises do not plan to close coal power plants despite their environmental and social costs [Last Gasp: The coal companies making Europe sick, 2018]. There are also companies that plan to develop in this area.

In Poland termination of coal use is deemed to be socially unacceptable. This opinion arises from different assumptions, most of them stereotypical. Coal is the “Polish gold” and a miner is a national hero who works hard for the well-being of the nation and keeps the nation warm. Another common opinion reiterates the myth that there are very many miners and termination of coal mining and use would lead to tragic consequences, depriving millions of people of their livelihood. Data and facts presented in this report prove otherwise.

## **Characteristics of the human capital and working conditions in the mining and energy industry in Poland**

In the first quarter of 2018, there were 128 enterprises operating in the entire mining and extraction industry and as on 31<sup>st</sup> July 2018, they employed 137 thousand people (81.2 in the public sector and 52.9 in the private sector). This number corresponds to only 0.36% of the overall population of Poland. The largest coal and lignite centres in Poland are located in the following voivodeships: Silesia, Lower Silesia, Major Poland, Łódź region, Masovia and Lublin region.

Employment in the coal sector is declining, as in 1990 it was about 388 thousand people. Similarly, last year a decrease in employment was recorded: by 4.5% in mining and 0.6% in the sector specialising in generation and supply of electricity, gas, steam and hot water [Zatrudnienie i wynagrodzenia w gospodarce narodowej w I półroczu 2018 r., 2018]. Despite the drop in the number of employees, miners as well as extraction machines and equipment operators represent professions of supply analogical to the demand on the labour market [Barometr zawodów 2017].

Table 1. Employment and remunerations in the entire mining and extraction industry, 1<sup>st</sup> quarter of 2018.

WYSZCZEGÓLNIENIE SPECIFICATION		Ogółem Total	O wysokości przeciętnego miesięcznego wynagrodzenia brutto w zł					6000,01 i więcej & more
			By average monthly gross wages and salaries in zł					
			do 2100,00 up to	2100,01 – 3000,00	3000,01 – 4000,00	4000,01 – 5000,00	5000,01 – 6000,00	
<b>Górnictwo i wydobywanie</b> .....	<b>a</b>	<b>128</b>	<b>1</b>	<b>10</b>	<b>29</b>	<b>31</b>	<b>21</b>	<b>36</b>
<b>Mining and quarrying</b>	<b>b</b>	<b>100,0</b>	<b>0,0</b>	<b>0,8</b>	<b>4,9</b>	<b>7,4</b>	<b>2,2</b>	<b>84,6</b>
w tym wydobywanie węgla kamiennego i węgla brunatnego (lignitu) .....	<b>a</b>	14	–	1	2	4	–	7
<i>of which mining of coal and lignite</i>	<b>b</b>	100,0	–	0,4	0,2	2,1	–	97,3
<b>wytwarzanie i przetwarzanie koksu, produktów rafinacji ropy naftowej</b> .....	<b>a</b>	21	–	–	1	5	3	12
<b>manufacture of coke, refined petroleum products</b>	<b>b</b>	100,0	–	–	0,5	7,9	5,9	85,7

Source: Employment and remunerations in the Polish economy in the 1st half of 2018, Statistics Poland, Warszawa 2018.

The average gross remuneration in this sector reached 7,201.16 PLN (7,352.10 PLN in the public sector and 6,972.80 PLN in the private sector). Compared to the 1st half of 2017, mining and extraction sector recorded the highest increase of the mean remuneration, by 11.1% on the average, exceeding the results for construction industry, as well as healthcare and social assistance (increase by 8.4%), agriculture, forestry, hunting and fishing (increase by 7.8%), accommodation and catering, information and communication, administration and supporting services (increase by 7.7%) [Zatrudnienie i wynagrodzenia w gospodarce narodowej w I półroczu 2018 r., 2018].

Labour resources in the coal and energy sector are focused in the following areas:

- technical engineering staff and staff of coal lignite mines and power plants: teams of very experienced and highly specialised employees,
- research staff in academic centres of specialised technical universities which provide high-quality education for future employees of coal and lignite mining,
- research staff at industrial institutes employing specialist teams in the following areas: mining design, technology and equipment, coal procession technology, environmental protection,
- technical maintenance staff at specialised industrial companies which guarantee maintenance of the high/relevant technical level of extraction systems used at mining plants,
- schools offering vocational training in professions related to mining and energy industry, located in regions where there are operating lignite mines: Bełchatów, Turów, Konin.

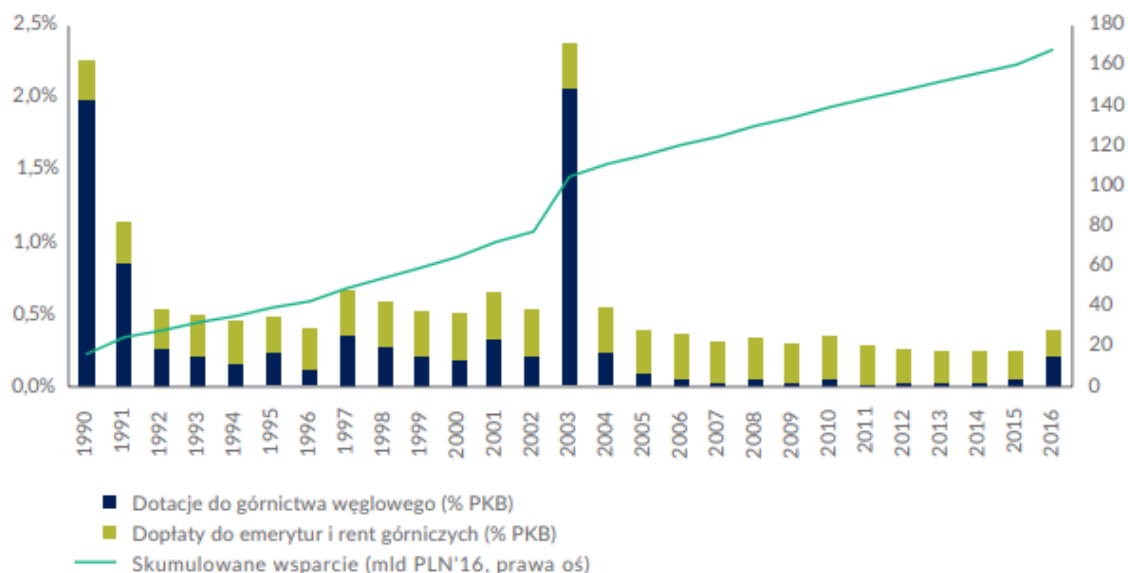
As shown in “Kapitał Ludzki 2016-2018”, ancillary workers in mining are the group of employees with the lowest time of education as compared to other professions (10.7 years). This group is also among the least satisfied with their jobs. Despite many benefits and bonus social payments, such as early retirement after 25 years of work underground regardless of age, only 32% of the respondent employees declared satisfaction in the job they perform [Kapitał Ludzki w Polsce 2012-2016, 2017]. This may suggest that this group of employees will be more willing to change their occupation after reskilling.

## Costs of the coal sector

The coal and extraction industry in Poland had and has low profitability. As shown by the report by WiseEuropa "The Hidden Bill for Coal 2017" between year 1990 and 2016 Poles spent almost 230 billion PLN on mining and coal power industry. A detailed analysis of data for the latest four years shows prominent rise in the subsidies. The cumulative value of this support rose by 7% as compared to 1990–2012.

The quoted amount includes direct financial support (estimated at 81 billion PLN) recorded in official reports, but also benefits arising from legal provisions which favour mines and which transfer a significant part of the costs of their operations onto the society, e.g. in the form of miners' social insurance. It should be highlighted that miners obtain benefits on more favourable conditions than for employees of other industries - with each single PLN paid by a miner in premiums, the pension system is obliged to pay 1.5 or 1.8 PLN depending on the type of job performed by the miner. These costs are estimated at 19% of the entire support. [Siedlecka, Śniegocki, Wetmańska 2017].

Chart 1. Subsidies for coal mining and additional payments for miners' pensions, 1990–2016 as % of GDP and support amount accumulated until 2016 (billion PLN).



Source: Siedlecka U., Śniegocki A., Wetmańska Z., The Hidden Bill for Coal 2017. Wsparcie górnictwa i energetyki węglowej w Polsce - wczoraj, dziś i jutro, Energia, Klimat i Środowisko, Warszawa 2017.











An attempt to determine actual costs of the sector's operations should consider the above listed amounts, but also external costs, related to deteriorating health and degraded natural environment. In this context, the hidden bill for coal goes up to almost 2 trillion PLN.

Estimation of external costs is important especially in the case of lignite, as its extraction requires significantly less labour than in the case of coal, and therefore lignite mines in Poland do not face the problem of structural unprofitability of mining. They also receive much lower support from the state budget compared to hard coal mining. The main form of financial support for lignite mining is indirect funding by additional payments in social benefits for miners. However, it should be highlighted here that construction and functioning of lignite open-pit mines involves major environmental and social costs (compensations for farmers for lower or no crop due to draining of areas in the range or adjacent

to pumping depression, costs of treatment in diseases caused by smog generated in the process of lignite combustion, costs of re-cultivation of post-mining areas). These costs are difficult to quantify in financial value, and this is why they are frequently omitted in calculations and expert analyses, and they shouldn't be, as these are huge costs and the state may be forced to bear them for many years. Presentation of the scale of these costs may be assisted by case studies of economic consequences of lignite extraction in open-pit mines held by Lignite Mine Konin. These operations cause losses in agricultural production of about 62 million PLN per year in areas covered by pumping depressions and almost 400 million PLN per year in the entire area of the mine's adverse impact. These amounts include both lost crop and reduced animal production due to lower supply of fodder. In both cases losses result from disturbed water relations in the neighbourhood of the open-pit mine [Pepliński 2018].

Another attempt to capture the amount of external costs of mining was taken by authors of the report titled "Last Gasp: The coal companies making Europe sick". The report shows data on impact of particular enterprises of the coal power industry on people and environment. The list of 10 biggest coal polluters in Europe includes three Polish corporations: PGE, ENEA, ZE PAK. Among the 30 biggest polluters, there are three more companies from Poland. The report provides estimation of numbers and amounts which are highly worrying. Most importantly, it is estimated that these companies are responsible for deaths of more than 1,830 people per year. From the perspective of the labour market, the number of lost working days in the production-age population seems especially worrying. Currently coal tycoons are responsible for 380,000 days of sick leave per year in total. The total cost of adverse effect on people and environment was estimated at 2,900 million euro [Last Gasp: The coal companies making Europe sick, 2018].

Table 2. Modelled levels of indicators related to the negative impact of coal enterprises on people and environment.

Rank	Company	Main country of coal	Premature Deaths	Asthma symptom days in children	Chronic bronchitis in adults	Hospital admissions due to respiratory or cardiovascular symptoms	Work days lost, working age population	Total Cost High Case [€M]	Total Cost Median Case [€M]	Health cost rate (€/MWh)
1	RWE		1880	30000	690	1320	500000	€5,400	€2,800	€48
2	EPH		1460	27000	680	1150	520000	€4,200	€2,200	€62
3	PGE		1180	20000	510	960	370000	€3,400	€1,800	€53
4	CEZ		730	13000	330	590	260000	€2,100	€1,100	€70
5	Uniper		520	9000	210	370	150000	€1,500	€800	€42
6	Endesa		410	14000	300	340	150000	€1,200	€700	€52
7	ENEA		410	6000	160	330	110000	€1,200	€600	€54
8	STEAG		370	6000	140	260	110000	€1,100	€500	€55
9	ZE PAK		340	6000	150	260	100000	€1,000	€500	€106
10	BEH		310	7000	150	240	80000	€900	€500	€93
<b>Top 10</b>			<b>7600</b>	<b>137000</b>	<b>3320</b>	<b>5820</b>	<b>2350000</b>	<b>€22,000</b>	<b>€11,500</b>	<b>€56</b>

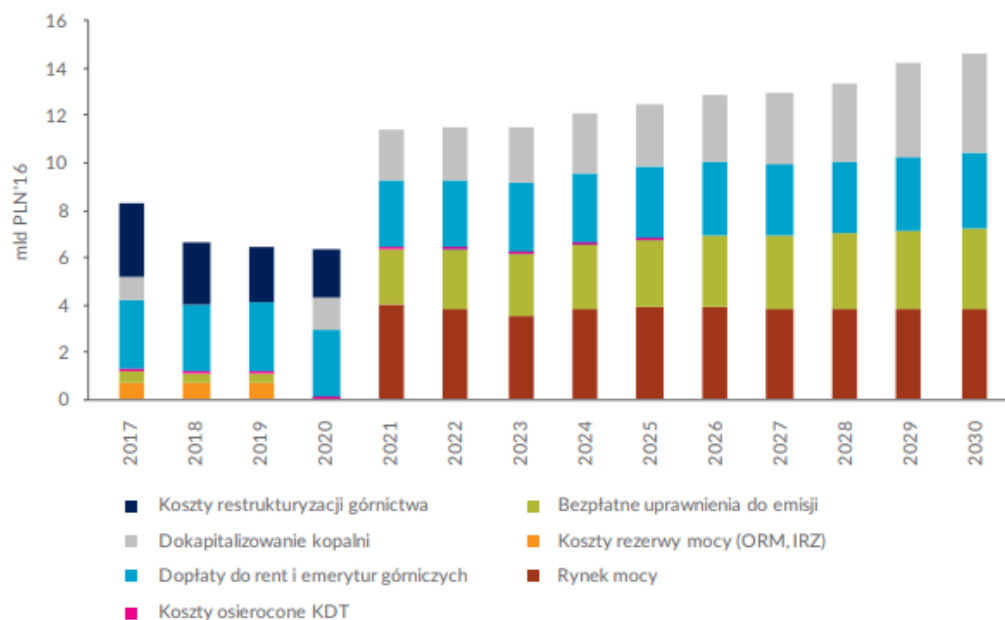
Source: Last Gasp: The coal companies making Europe sick, 2018.

### Forecasts

The authors of the report "The Hidden Bill for Coal 2017" estimated selected costs of coal power generation in particular years. It was shown that even a cautious analysis indicates an increase of state

support for the futureless coal power sector until 2030. Introduction of new additional payments and subsidies by the government, support for coal power generation and mining will amount to 11 billion PLN a year, which is 30% more than nowadays [Siedlecka, Śniegocki, Wetmańska 2017]. Even now the government has announced additional compensations for electricity price increases for households. Supporting citizens is a right decision, however this signifies more state expenditure, obviously causing further costs, including administration costs instead of systemic investments in development of distributed renewable energy industry or other projects.

Chart 2. Forecasted potential costs of support for coal mining and power industry in 2017–2030, billion PLN, year 2016.



Source: Siedlecka U., Śniegocki A., Wetmańska Z., The Hidden Bill for Coal 2017. Wsparcie górnictwa i energetyki węglowej w Polsce - wczoraj, dziś i jutro, Energia, Klimat i Środowisko, Warszawa 2017.

Detailed analyses show that achievement of the objective set in the Paris Agreement will be possible in Poland only by reducing consumption of coal by 20% between 2015 and 2030 and further by 55% between 2015 and 2050. According to estimations, such reduction would result in a decrease in employment in mining by 47% between 2015 and 2030 and by 77% from 2015 until 2050. Macroeconomic simulations show that the natural outflow of employees (i.e. through retirement) matched with limited inflow of new staff, may suffice for reduction of employment in mining, as necessary to achieve objectives defined in the Paris Agreement. The sector's transformation requires effort and resources, but its success seems relatively certain. It can be made easier with relevant training schemes, professional courses, employee benefits and social policy instruments [Witajewski-Baltvilks, Lewandowski, Szpor, Baran, 2018].

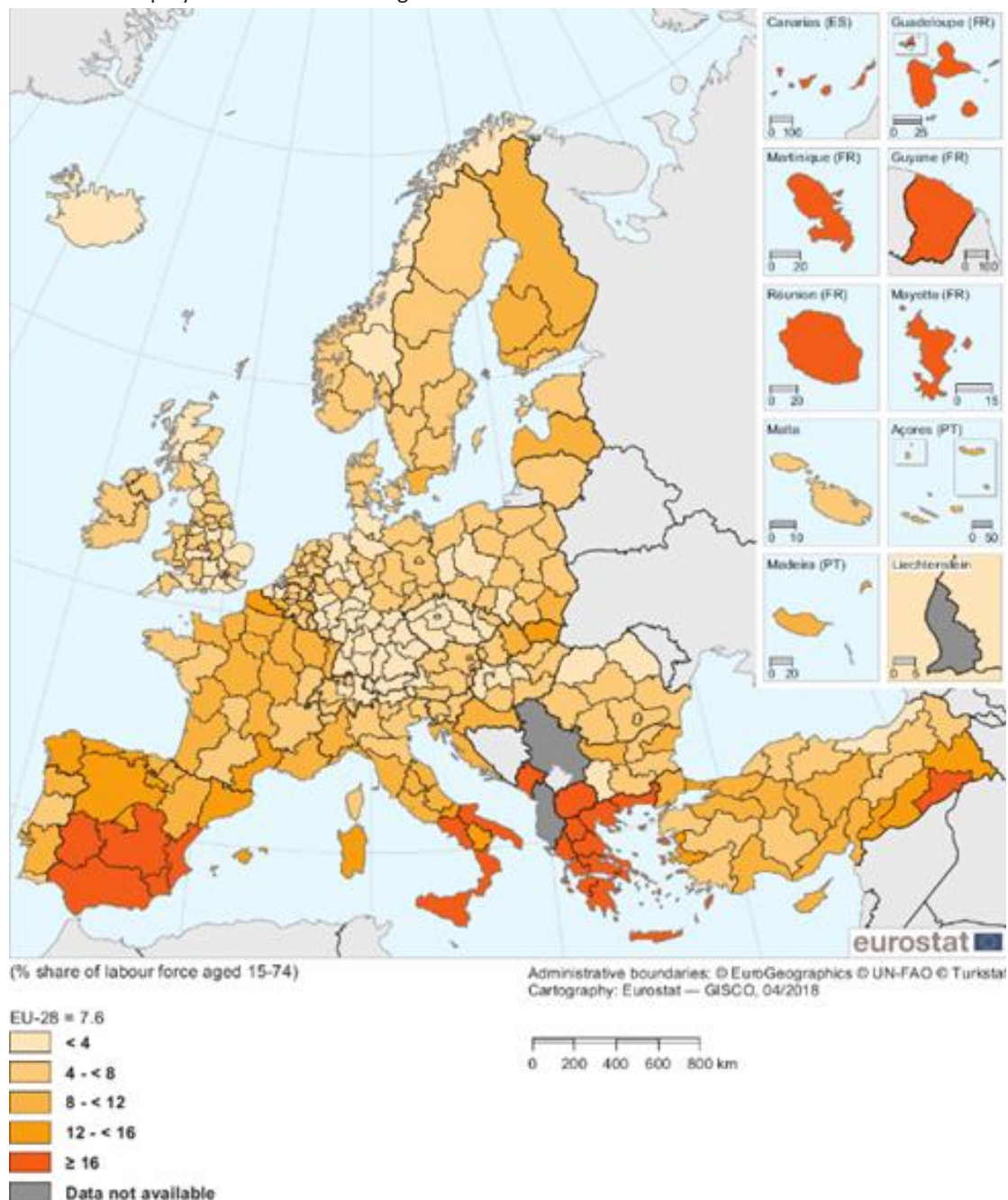


### Labour market in Poland

According to another common argument, coal cannot be waived, because there are very many miners and termination of extraction would lead to tragic consequences with millions of people deprived of their livelihood. This is one of major stereotypes, as data and facts show otherwise.

The unemployment rate in Poland is at a multi-year low of 4% and keeps falling. There are regions where unemployment rate is consistently below 4%. This concerns also areas where there are functioning mines or deposits that might potentially be used for extraction. Most coal companies are based in areas where the rate of people without jobs ranges from 4 and 8%.

Chart 3. Unemployment rate in NUTS regions in 2017.



Source: Eurostat 2017.



There are areas and industries where employers report deficiencies of employees, limiting their production and development capacity [Manpower Group 2018]. The strongest effect is noted in construction, transport and forwarding, catering and processing industries, as well as health care. For Silesia, forecasts provide for more professions with human resources shortages than surpluses. These are such professions as: truck drivers, welders, cooks and bakers, car mechanics, roofers and sheet-metal construction workers, bricklayers and plasterers and carpenters, construction installations assemblers, cutting devices operators, finishing works staff in construction, construction workers, electricians, electric mechanics and electric installation assemblers, sellers and cashiers. The forecast for Lublin region records increasing demand for such professions as nurses and midwives, occupation teachers and practical training teachers, online sales staff, truck drivers and tractor unit drivers, as well as physical therapists and masseurs. According to the forecast, in 2018 in Łódź region there will be no problem in finding job for concreters and steel fixers, construction carpenters, bricklayers, plasterers and construction workers. In the catering industry, companies seek employees with no occupational training to perform responsibilities of kitchen help or to prepare fast food dishes. In Greater Poland in 2018 the deficiencies will concern such professions as non-specialised blue-collar workers, as well as specialists in developing industries. In a majority of poviats of Greater Poland there will be insufficient number of qualified confectioners, hairdressers and barbers, cooks, car mechanics, tailors and clothes production staff (e.g. needlewomen), as well as upholsterers. In Lower Silesia in 2018 no surpluses in any professions are forecasted in the regional scale (last year economists were indicated as the only surplus profession). The share of professions with observable shortages in all assessed categories was estimated at 37.5%. Major professions listed in this group are: drivers with other categories of driving licenses than "B", nurses and midwives, doctors and many professions in services. [Barometr zawodów 2017].

Employment in industry keeps growing – in 2017 it was 3.2% higher than the year before. This trend was visible especially in industrial processing and water supply. A radical increase of average employment was also noted last year in car, truck and semitrailer production - by 8.2%, computer, electronic and optical devices production - by 5.4%, metal production - by 5.3% and in furniture production - by 0.5%. Meanwhile, a decrease was noted in coal and lignite mining – by 6.7 proc., pharmaceutical production – o 2.5% and production of clothes - by 0.7%. [Górnictwo maleje...2017].

A good situation at the labour market is also confirmed by other research and statistics, e.g. analysis of job offers in online services. One of the biggest jobs portals in Poland Pracuj.pl shows that the highest number of jobs offers in 2018 was noted in Masovia, Lower Silesia (14,935), Lesser Poland (13,461), Silesia (13,025) and Greater Poland (12,814).

This is another factor contributing to the necessity to find and create an energy alternative for coal, especially by development of renewable sources of energy and improvement of efficient energy use in construction. Development of both areas will require significant human resources.

It has been shown that there are perspectives for employment. It is optimistic that gaining competences in most of these professions does not require specialist or long-lasting re-skilling programme.

## **Social trends on the labour market**

Observation of current social changes and trends on the labour market is another important issue in the discussion concerning coal sector transformation.

As the overall population in Poland and Europe decreases, another observable trend involves a changed proportion of people in pre-productive, productive and post-productive age. The share of non-employable population grows, while the proportion of people in the productive age is falling. According to demographic forecasts, this trend will continue in future. [Barometr zawodów 2018].

The number of people who currently seek employment keeps falling both in Poland and Europe [World Employment and Social Outlook. Trends 2018]. There are not enough employees [International Labour Office 2017], and consequently their importance is growing. It is necessary to make up for deficiencies on the labour market by competing for talents and the most competent employees, even from other countries, which is a long-lasting and difficult process in view of cultural differences.

People have become more mobile with political and cultural globalisation, development of internet and information technologies, as well as with possibilities of fast and cheap transport. For employers it means that employees are easier to lose, but easier to find, too. Environmental contamination and degradation are progressing, mainly due to increasing emissions of carbon dioxide and growing quantities of wastes and plastic. There is a noticeable climate change. The society notices the occurring threats and there is a growing anxiety about life quality.

The idea of responsible companies committed to sustainable development has suddenly gained popularity [Deloitte 2018, Cone Communications 2016, Global Challenge Insight Report 2016]. Employees expect more from their employers. This concerns work health and safety conditions, but also increasing attention is paid image and prestige of the company and its social responsibility. Performing a purposeful job in a sustainable manner is especially important for younger generations (generations Y and Z). A vast majority of respondent employees (in Poland and in the world) would like their employer enterprise to act in a sustainable manner. [GlobeScan Radar 2016, Cone Communications 2016, Sustainable Brands 2016, Edelman 2018, Kubicka 2017].

## **Recommendations**

Ever deteriorating condition of the air and environment, changing attitudes and expectations among citizens lead to inevitable and irreversible changes in regional and international law with stricter environmental requirements for enterprises, especially in the coal industry.

Considering the provisions of the Paris Agreement concerning elimination of carbon dioxide, coal sector companies are recommended to give up investments in coal or lignite power plants. This concerns not only new power plants, but also investments in existing power plants or planned and existing mines - this would reduce destruction of forests and forced displacement of inhabitants.

Coal companies should close all power plants relying on coal and lignite by 2030. They should not sell their coal power plants, but they should take responsible decisions to terminate their operations and announce dates for their closing along with just transformation plans. Coal companies are required to waive lobbying for coal, especially lobbying aimed at increasing or derogation of BREF contamination norms and to refrain from campaigning for a capacity market. Coal companies should actively cooperate with stakeholders in the effort to eliminate coal use, while minimising the social and economic impact of closing of power plants and mines. These objectives can be achieved only with well-considered and approved business plans to guarantee actual observance of provisions of the Paris

Agreement designed to avoid temperature increase over 1.5°C. [Last Gasp: The coal companies making Europe sick, 2018; Witajewski-Baltvilks J., Lewandowski P., Szpor A., Baran Jan, Antosiewicz M., 2018].

Support and determination of the authorities are important to ensure actual motivation and ability of enterprises to change. The government should develop and approve strategies and solutions to guarantee closing of coal power plants by 2030. The strategies should also provide for development of renewable energy sector, with swift preparation of renewable energy schemes and energy storage development, implementation of the "supply in response to demand" principle and investments in efficient energy use. Solutions should be introduced to increase financial pressure on coal business: stricter air pollution norms, higher charges on carbon dioxide emissions and cutting additional payments for coal-based business, including capacity market. The government should develop and implement a programme of fair transformation for coal sector employees and related communities [Last Gasp: The coal companies making Europe sick].

## **Conclusions**

Costs of the coal industry are enormous. They are estimated at about 11 billion per year and they will keep growing in the coming years. One should consider the potential of actual and positive changes to be implemented with such a budget. From the perspective of entrepreneurship and labour market, maintaining the coal power sector means loss of existing chances in other developing sectors, due to insufficient human resources, while those are wasted in the coal sector. Further, new financial costs occur, related to sick leave time reflected in reduced efficiency of operations.

Also, potential profit is lost, as it could be obtained, if state subsidies were invested in profitable enterprises and modern technologies. Lost alternative profit is also an important value which should be included in the sector's profitability analysis.

Taking into account the available data and statistics of multiple labour market studies, there is no reason to panic or worry about the labour market impact of a decision to terminate the sectors development and phase out the existing enterprises. This applies both to the general national level, as well as particular voivodeships or regions. It shouldn't be perceived as a major barrier to transform the energy sector, either. Re-skilling of the mining sector employees is not an easy task and it won't be one, however, providing for professional cooperation between experts, enterprises, temporary employment agents, head-hunters and other stakeholders, such a change can be introduced as a fair transformation.

Of course, one may accept arguments that coal and the entire coal sector contribute to development of road and railroad infrastructure, public utility objects, they stimulate internal demand, development of services, construction, schooling etc., that they are also a source of important income due to taxes and charges paid to voivodeships and communes or improve regional macroeconomic output. However, all these benefits can be similarly achieved through development of the renewable energy sector and efficient energy use, with less environmental and social damage.

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