

Mining coal production in Slovakia

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The paper aims to describe the development of mining and utilization of black coal in the territory of the Slovak Republic. The authors also try to analyse the state of the financial health of black coal mining companies in our territory. The result of the paper is to provide a compact view of the development of coal mining in the context of the financial health of enterprises in this sector. We compare the development of coal production in Slovakia with the development of coal production in the Czech Republic, Hungary, Poland, Austria and Ukraine. We analyse the development of coal production within the Visegrad group along with the neighbouring state - Ukraine. Mining production in Slovakia decreased 15.70 per cent in November of 2018 over the same month in the previous year. Mining Production in Slovakia averaged -1.08 per cent from 2001 until 2018, reaching an all-time high of 135.30 per cent in July of 2007 and a record low of - 57 per cent in July of 2008.

Keywords: coal, mining production, financial health, Slovakia, Ukraine, Austria, Czech Republic, Poland.

Introduction

In 2010, more than 20 countries in the world had already reached maximum capacity in their coal production (peak coal production) such as Japan, the United Kingdom and Germany (Lin, 2010). An estimate for world coal production, in the long run, would be helpful for developing policies for alternative energy sources and climate change. This production has often been estimated from reserves that are calculated from measurements of coal seams. We show that where the estimates based on reserves can be tested in mature coal regions, they have been too high and that more accurate estimates can be made by a curve that fits the production history (Rutledge, 2011). After 2011, the production rates of coal and CO₂ decline, reaching 1990 levels by the year 2037, and reaching 50 % of the peak value in the year 2047 (Patzek, 2010). The model of Mohr (2009) indicates that worldwide coal production can peak between 2010 and 2048 on a mass basis and between 2011 and 2047 on an energy basis. The Best Guess scenario assumed a URR of 1144 Gt and peaks in 2034 on a mass basis, and in 2026 on an energy basis.

Although coal may be viewed as a dirty fuel due to its high greenhouse emissions when combusted, a strong case can be made for coal to be a primary world source of clean H₂ energy. Apart from the fact that resources of coal can outlast oil and natural gas by centuries, there is a shift towards developing environmentally benign coal technologies, which can lead to high energy conversion efficiencies and low air pollution emissions as compared to conventional coal-fired power generation plant (Shoko, 2006). A global peak in coal production can be expected between 2020 and 2050, depending on estimates of recoverable volumes. This is also compared with other forecasts. The overall conclusion is that global coal production could reach a maximum level much sooner than most observers expect (Hook, 2010). Coal and natural gas, the other fossil fuels, have played and will continue to play important roles as the United States works towards a comprehensive sustainable energy policy. That being said, coal will continue to be replaced by natural gas, and natural gas in the long-term will be replaced by wind and solar energy sources (Kuhns, 2018).

State of the problems

The research of coal production in individual countries is dealt with by several authors. India's coal demand is expected to grow at a rapid pace in the future due to the country's economic and population growth. According to Wang (2018), predicted demand shows that domestic production of coal will be insufficient to meet the country's rising coal demand, with the gap between demand and production rising from its current value of about 268 $\frac{M}{Y}$, it will reach 300 $\frac{M}{Y}$ in 2035, and 700 $\frac{M}{Y}$ by 2050. This increasing gap will be challenging for the energy security of India.

China has the largest coal production in the world due to abundant resource requirements for economic development. In recent years, the proportion of opencast coal mine production has increased significantly in

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China. Opencast coal mining can lead to many environmental problems, including air pollution, water pollution, and solid waste occupation (Zhang, 2018). As the most significant material flow in China, coal resource flow has many problems, including unnecessary CO₂ emission and energy waste (Liu, 2018). Liu (2015) find that total energy consumption in China was 10 % higher in 2000–2012 than the value reported by China's national statistics that emission factors for Chinese coal are on average 40 % lower than the default values recommended by the Intergovernmental Panel on Climate Change, and that emissions from China's cement production are 45 % less than recent estimates. China is facing the problem of a decline in coal demand in recent years. Traditional coal production has suffered from excess capacity and higher inventory in China since 2012. The development of the coal industry in China will change to rely more on quality and efficiency, developing scientific capacity, and achieving clean utilization (Bai, 2018).

Even in China and the USA, countries that have or had temporary bans on new coal mines, climate considerations played second fiddle, and there is little to no evidence that normative ideas regarding coal extraction have shifted, assisting in the emergence of a global anti-coal mining norm. Instead, the current Chinese and US coal extraction policies can best be explained as strategic moves to protect the industry from the headwinds it is facing. The Chinese moratorium's main purpose was to serve as an industrial policy to combat growing overcapacity, and it might be easily overturned (Blondeel, 2018).

According to Ozonoh (2018), South Africa has a large deposit of coal that supports about 95 % of electric power generation in the country. The fuel is fast depleting, though the current reserve may serve for the next century. However, the emissions from the coal project massive threat to the environment. □

Russian coal industry possesses all capabilities to become an advanced branch of economy with high-quality products. Russian coal mining companies have many competitive advantages in the framework of the domestic fuel and power sector: tremendous coal reserves; significant experience in utilisation of this type of energy resources, especially in crisis situations; opportunity to come into the world market; high potential to enhance efficiency; diversity of coal products; adaptability to varying market environment; tight integration into priority lines of innovative economic development; essential contribution to the regional energy security. Russia is according to Zhaglovskaya (2017) one of the world leaders in coal production.

According to Litvin (2017), there is no method of coal losses regulation under challenging conditions, in particular in mining coal seams in tectonically disturbed zones. For deposits having hard conditions of stratification, the creation of this technique is a very urgent task. The author proves the necessity for the creation of this document.

On December 2015, more than 190 countries adopted the Paris Agreement, the most ambitious climate change pact to date. The document lays out a plan to curb greenhouse gas emissions, among other climate-related initiatives. Participating countries must now find ways to translate those ambitions into policy, and answer important questions about financing, transparency and accountability, national implementation, and accelerated emissions reduction goals, to name but a few. However, one issue looms large – coal (Boersma, 2016).

In 2011 (Germany) the conservative government announced the Energiewende - energy transformation and decided to reduce the number of fossil fuels from 80 % of the energy supply to 20 % by 2050. However, while the verdict on nuclear was unequivocal with a final phase-out date of 2022, the share of coal in the electricity market did not decrease, and the amount of carbon dioxide released into the air slightly increased from 2011 to 2013 (Renn, 2016). According to Vogele (2018) reasonable management in Germany of the niche technology "coal-fired power plants" could include protection of space for ensuring a smooth removal of the links between the regime and the technology with respect to, for example, social and environmental aspects. The phase-out pathways for the coal-fired power plants elaborated on in this paper help to better inform policy-makers to design transformation processes not only for coal-fired power but also for other declining technologies. The analysis of Stojiljkovič (2014) of the measurement data allows us to improve control of existing and newly opened coal mines, as well as their ancillary products that act as polluters. Emil (2000) dealt with the problems of liquidating buildings of former underground mining, especially of shafts of closed and damped mines. It is stated that strict maintaining the Decree of the Czech Bureau of Mines (ÈBÚ) No. 52/1997, Collection of Laws, has its justification for deep and gassy hard coal mines, but it cannot be absolutely valid in the full extent for shallow ore, and mainly brown coal mines. Soong (1998) described some technical aspects of triboelectrostatic separation and the results of the application of this process in the treatment of three types of coal, namely Cígel', Handlová and Nováky. It has been found that the separation efficiency is very closely related to the second part of the coal. The first results demonstrated the correlation between the efficiency of ash separation in coal. Cehlár (2019) describes a new tool, the brownfields methodology, which can help revitalize old mining areas as part of their technological modernization and underground full extraction with environmental damage reduction.

Several authors have dealt with the issue of the financial performance of enterprises that make up the mineral resource. Peng (2018) analysed the scale efficiency, efficiency and projection value of 17 coal enterprises, meanwhile, make a horizontal comparison of the environmental performance level among coal enterprises. Gonenc (2017) investigated the relationship between environmental and financial performance of

fossil fuel firms. To this extent, we analyse a large international sample of firms in chemicals, oil, gas, and coal with respect to several environmental indicators in relation to financial performance. Strouhal (2015) determined the linkage between CSR and financial performance within two countries in the CEE region – Czech and Estonia – using data from 2012 – 2013. We compare the return on assets and normalised market value added of listed companies. Based on the results, we can state that the implementation of a standalone CSR report does not have any direct linkage with the financial performance of the tested companies. Manová (2018) researched of the evaluation in the contribution presents cluster analysis, through which we determine companies' clusters from chosen sectors according to chosen financial indexes. The results confirm that the position of the analysed companies in the frame of the sector is satisfactory. Improvement of the economic activity of industrial companies determines conditions for the possible improvement of mining and metallurgical business activity and finds the sources of companies' growth. Tworek (2018) analysed to give an overview of the risk management problems experienced by coal mines, with the focus on the integrated enterprise risk management (IERM) concept, as well as proposing that the concept should be implemented in coal mines operating in Poland and the Czech Republic. In particular, it proposes that the traditional approach to the risk management process, i.e. Enterprise Risk Management (ERM), should be modified and transformed into an integrated process. Cehlár (2011) gave some information about risk management and its significance for financing project in the mining industry. The projects in the mining industry are very exacting for financial sources. Vaněk et al. (2017) benchmarked the mining companies in a 5-year period: from 2009 to 2014. Six financial indicators were used to achieve the ROE, ROS, ROA, Debt to Equity Ratio, Asset, and Cash Flow Liquidity Ratio of four coal mining companies in the Upper Silesian Coal Basin located on the border of the Czech Republic and Poland: OKD a.s. operating in the Czech Republic and three Polish entities, Jastrzebska Spolka Weglowa S.A. (JSW), Katowicki Holding Weglowy S.A., and Kompania Weglowa S.A.

The finding of the significant positive effect of CO₂e intensity on firm financial performance contrasts with the findings of previous studies carried out in several developed countries. The finding of the research is that the mediating variable of customers' responses strengthens the effect of CO₂e intensity on ROS (Rokhmawati, 2017). Vilamová (2016) analysed an economic evaluation of using a geopolymer from coal combustion as a possible alternative raw material. The results of the analysis show possible reducing of cost, which is possible through the replacement of cement by fly ash more than 18 % of the material.

Methodology and data

The aim of the paper is to describe the state of coal production in Slovakia and neighbouring countries (Czech Republic, Poland, Hungary, Austria and Ukraine). We focus on the development of production in countries through different trends analysis. We also focus on the financial situation of the selected company Hornonitrianske bane Prievidza from the perspective of the financial health of the year 2017. In the first place, we focus on the comparison of the financial indicators with the average values of financial indicators of economic activities in the Slovak Republic. We analyse the indicators of liquidity, activity, profitability and company indebtedness.

The data comes from the sources of the Statistical Office of the Slovak Republic, Eurostat, the World Bank or other annual reports of the organizations, ministries and multinational companies engaged in coal mining or trade with this commodity.

In the present case study, we use several specific methods of financial analysis (Zalai, 2016). Among the most represented methods, we consider the methods of financial ratios. The construction of these indicators consists of several items of assets and liabilities, costs and revenues. The system of financial ratios itself has a low informative value. It would only be a group of numbers that didn't tell us anything. Therefore, it is important to compare the individual indicators with other companies, in our case with the whole industry. Based on this, we find out how the company has stood the competition and find its location in space. As a result, the company may be worse off than the industry average. If it is better, it needs to be compared with the upper quartile - with a better quarter of the industry. In addition to the methods of financial analysis, we also use methods of graphical representation of development trends.

Results

According to the data of Statistics office, mining represents one per cent of total industrial production in Slovakia, which also includes mining of coal and lignite. The trend of this mining has a declining tendency in Slovakia. The largest coal producer in Slovakia is Hornonitrianske bane Prievidza. Hornonitrianske bane Prievidza in 2018 delivered to customers over 1.5 million tonnes of brown coal. Coal is mined by the deep-mined method in three mining areas (Handlová, Nováky and Čáry.) The entire mining production consists of dust coal for energy purposes.

Coal and lignite generated 11.8 % of electric energy in the Slovak Republic in 2015. The others are nuclear energy (57.6 %), gas (5.9 %), oil (1.0 %) and waste and renewable energy sources (7.6 %). Overall, the energy mix within the national energy policy is balanced with the support of domestic brown coal and renewable energy sources. Considering the high share of nuclear energy in electricity production, Slovakia's dependence on imported energy sources (60.9 %) is only slightly above the EU average, despite almost 100 % dependence on imported oil and natural gas. For example, in the Eastern of Slovakia, there is the Vojany Power Station, where boilers (4 x 110 MW) are located for the use of imported semi-anthracitic hard coal from Ukraine. In the years 2014-2015, due to the conflict in Ukraine, there were problems with this supply of this coal.

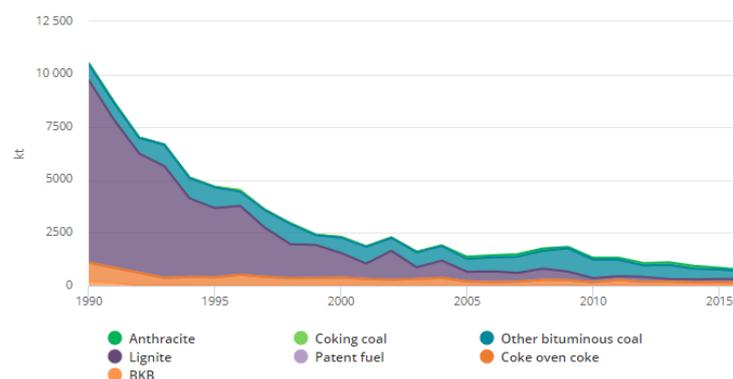
Lignite sources are estimated at over 400 million tonnes, and another 500 million tonnes should be available in the future. Usable reserves of lignite, including brown coal, are estimated at 100 million tonnes. In 2015, 1.8 million tonnes of lignite were produced. Lignite is mined by two companies in four underground mines, located in the central and western part of Slovakia. More than 90 % of total lignite production is used for generating electricity and heating.

In the following chart, we may notice the development of the production of mining companies in Slovakia during the reference period from January 2018 to November 2018. The graph reflects the development in this area – a decrease, which is expressed as a percentage. We see a decline in January of 23.3 %, while the only increase of 0.7 % is in April, then again the decrease was recorded.



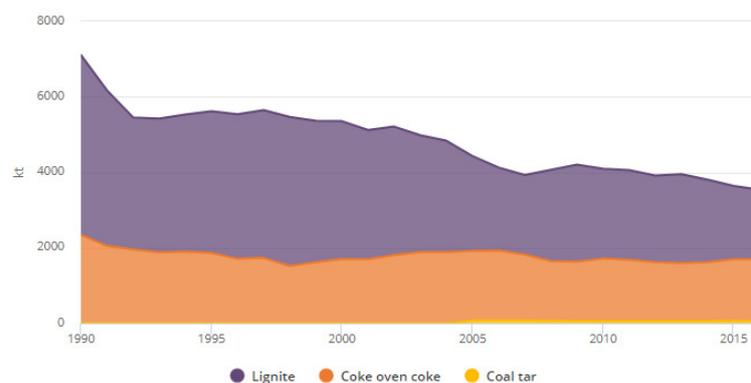
Graph. 1: Mining production in Slovakia
Source: Trading Economics

In the following graph, we can monitor the final consumption of coal in the Slovak Republic from 1990 to 2015. In the 1990s, almost the whole part of coal consumption creates brown coal, predominantly for heating and electricity production. Small consumption represented the production of coke, attraction and bituminous coal.



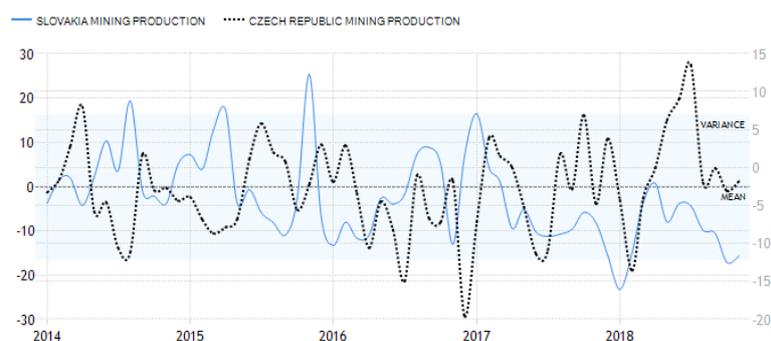
Graph. 2: Coal total final consumption by type (Slovak Republic)
Source: International Energy Agency

The production of coal in Slovakia from 1990 to 2016 is shown in graph no. 3. We can say that there has been an overall decline in production and also in brown coal. The level of coke over coke is the same. Since 2004, there has been a noticeable increase in the production of coal tar.



Graph. 3: Coal production (Slovak Republic)
Source: International Energy Agency

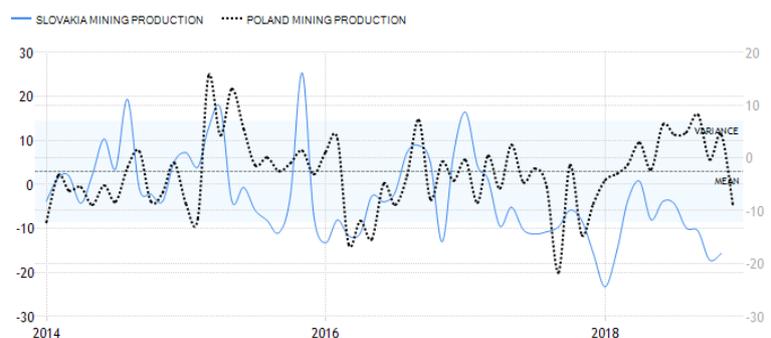
In the following section, we compare the production of coal between the Slovak Republic and the neighbouring countries. Differences that occur between countries can be caused by many factors that can arise from multiple areas. First of all, there are the conditions of distribution of natural resources – coal fields in the analysed countries. The second area is the policy, which is conducted in the field of coal mining, also through the influence of the EU, which does not affect Ukraine. Another important factor is the need for coal mining for the country's economy – the question is how to use coal (energy, trade, sales), with which imports and exports are related.



Graph. 4: Comparison of coal production between Slovakia and the Czech Republic in %
Source: Trading Economics

Production of coal compared to production in the Czech Republic in the years 2014 and 2015 resembled and fluctuated at approximately the same intervals. More significant changes can be observed in the last two analysed years when production in the Czech Republic increased significantly compared to the production of the Slovak Republic.

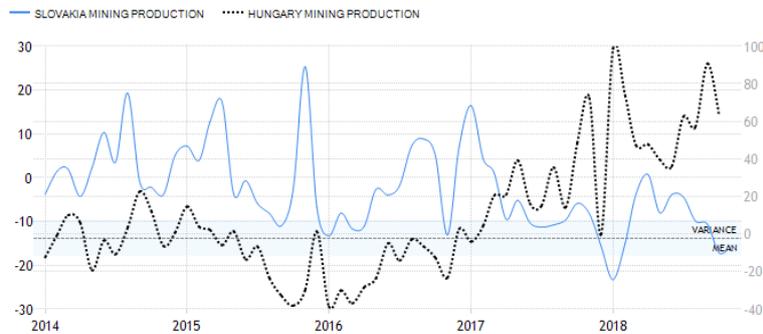
In the decision from October 2015, the Government of the Czech Republic corrected its raw material and energy policies by modifying the scope of the territorial ecological limits placed on the mining of lignite. Such action is impacting the energy sector operating in the North Bohemian Basin, the largest region for lignite production in the Czech Republic (Sivek, 2017).



Graph. 5: Comparison of coal production between Slovakia and Poland in %
Source: Trading Economics

By comparing production with Poland, we can also say that compared to Slovakia, coal production is higher in 2018, 2017 and 2016. Lower production of coal compared to Slovakia is recorded in 2014.

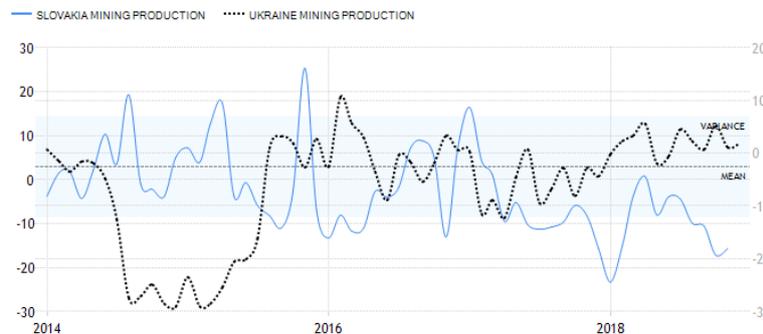
In Poland, contemporary policymakers mobilise a national imaginary inherited from communist times – encapsulated in the slogan ‘Poland stands on coal’ – that fuses infrastructures of coal extraction and combustion with the fate of the nation. This socio-technical imaginary provides support for coal futures, even in the face of contradictory evidence for domestic resource depletion, poor regional air quality, and global climate change (Kuchler, 2018).



Graph. 6: Comparison of coal production between Slovakia and Hungary in %
Source: Trading Economics

The Slovak Republic, compared with the production in Hungary, achieve higher production of coal from 2014 to half of 2016, which is replaced by a reduction in coal production in Slovakia.

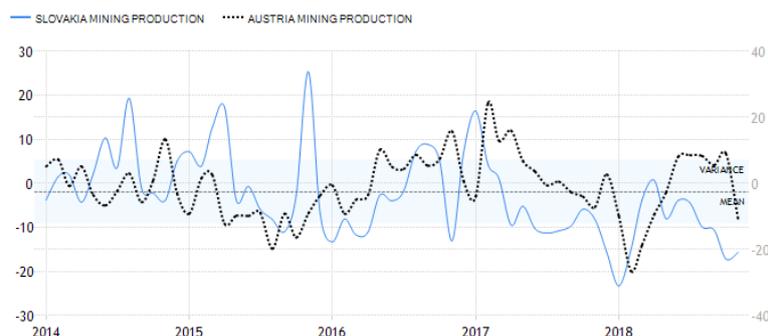
In Hungary, there is great uncertainty about Hungary's energy policies and security of supply, with the role of coal, gas and renewables in the energy/electricity mix still not settled. Their future is expected to be heavily dependent on political decisions rather than energy market factors, though energy market uncertainties are also high (Weiner, 2017).



Graph. 7: Comparison of coal production between Slovakia and Ukraine in %
Source: Trading Economics

By comparing the production of Slovakia with Ukraine, we can say that production is also affected by ongoing conflicts in Eastern Ukraine, which leads to a decrease in production in 2014 and 2015. However, in the last two years, Ukraine has achieved higher production than Slovakia.

According to Snihur (2016), the current state of Ukraine coal mining industry and prospects of its development for the period until 2020 are considered. The analysis of Ukraine mine fund conditions is carried out. Statistical data of gross coal production at state-maintained and private mines are given. The reasons for low profitability and coal production decline in the country are considered.



Graph. 8: Comparison of coal production between Slovakia and Austria in %
Source: Trading Economics

Austria's production is quite similar to the Slovak production in recent years (2017 and 2018). However, production is still higher in our neighbours, but we achieved better results from 2014 until the beginning of 2016.

The next part is devoted to the financial health of the most important employer and producer of coal in Slovakia – Hornonitrianske bane Prievidza. The most important coal buyer is Slovenské elektrárne, Elektrárne Nováky. In the position of the leading domestic coal producer and the guarantor of the supply of brown coal for combined heat and power, Hornonitrianske bane Prievidza supplied 1 507 193 tonnes to the Elektrárne Nováky. Hornonitrianske bane Prievidza supplied it smoothly, in the required daily quantity and quality. Out of the Elektrárne Nováky the company dispatched 29 855 tons of energetic coal.



Graph. 9: The occurrence of lignite in Slovakia
Source: Trading Economics

The year 2018 was a breakthrough in the sale of coal in the history of the company. After the end of coal mining in mine Cigeľ, at the end of 2017, Hornonitrianske bane Prievidza finished the production and sale of sorted coal for small consumers and households. The quality and heat value of domestic brown coal (9 to 14 MJ / kg) used for energy purposes is standard, comparable to coal from other European Union countries. In the neighbouring countries, brown coal and lignite are mined with significantly lower heating capacity (Greece – about 4 to 9 MJ / kg, Romania – 7 to 8 MJ / kg, Germany – 8 to 11 MJ / kg, Poland – 8 to 11 MJ / kg) and significantly higher annual mining than in Slovakia (Hornonitrianske bane Prievidza, 2019).

Within the analyses of the financial health of the selected company, we focus on several financial indicators of the company, and we compare them with the average values of the financial indicators in the Slovak Republic. We have calculated the financial indicators from the company's publicly available financial statements, which are in the database of Slovak accounting records. The analysed indicators can be found in the following table, and because our company ranks among companies with assets exceeding of 5 million Euro and with turnover over 3,3 million Euro, we use the relevant indicators taking these criteria.

From the results of the previous table, we can say that the majority of the financial indicators of the enterprise achieved worse results than those in sector B: Mining. In particular, these indicators are indicators of profitability, inventory turnover time, debit collection and other activity indicators. Compared to the industry, the company is financially well in the area of debt and liquidity. The decline in the mining industry, as well as the low demand for coal may in the future lead to worse business results, which can also be reflected in financial indicators.

Table 1: Comparison of the mean values of indicators in the mining sector

Financial indicator – values of 2017	statistical characteristics	unit of measure	Recommended values	
			property over 5,0	turn over 3,3
	Lower Quarter		1.17	1.19
Liquidity of 2. degree	Median	coefficient	1.67	1.26
1,65	Higher Quarter		5.28	1.91
	Lower Quarter		1.48	1.26
Liquidity of 3. degree	Median	coefficient	1.95	1.77
1,83	Higher Quarter		7.20	2.36
	Lower Quarter		11.97	8.74
Inventory turnover time	Median	day	25.50	24.77
9,87	Higher Quarter		34.06	34.06
	Lower Quarter		51.73	50.69
Receivables turnover time	Median	day	71.88	66.76
119,82	Higher Quarter		87.89	75.33
	Lower Quarter		51.25	48.26
Short-term receivables turnover time	Median	day	60.04	57.14
75,24	Higher Quarter		71.26	70.07
	Lower Quarter		52.93	47.49
Liabilities turnover time	Median	day	71.59	63.32
121,46	Higher Quarter		199.08	105.92
	Lower Quarter		27.81	27.81
Short-term liabilities turnover time	Median	day	39.72	43.70
41,11	Higher Quarter		56.25	62.39
	Lower Quarter		0.46	0.70
Turnover of assets	Median	coefficient	0.59	0.95
0,82	Higher Quarter		0.73	1.73
	Lower Quarter		11.42	20.65
The total indebtedness of assets	Median	%	29.06	42.43
38,8	Higher Quarter		48.59	57.00
	Lower Quarter		1.06	0.76
Long-term indebtedness of assets	Median	%	8.89	6.73
13,5	Higher Quarter		23.67	22.01
	Lower Quarter		5.83	5.06
Return of assets	Median	%	7.43	7.96
1,8	Higher Quarter		12.55	11.58

Source: own processing according to accounting information and database of mean values of indicators 2017

Discussion

In relation to coal mining, total CO₂ emissions in the energy sector decreased by five per cent in 2018. This process has driven the gradual downsizing of coal production, primarily in Germany and the United Kingdom. In Britain, the share of electricity produced from coal has fallen from 40 % in 2012 to 5 % in 2018. In Germany, it fell from 19 % to 13 % in the same period. In the European Union in 2018, coal production fell by 6 % year-on-year, compared to 30 % in 2012. The analysis thus confirmed the rapid decline of coal in electricity production across European countries. The study noted that countries that are planning to eliminate black coal have usually plans to expand their electricity production from renewable sources. An example may be Austria. Last year, solar energy accounted for only four per cent of the European Union's total energy mix. However, according to the study, the newly built solar infrastructure has increased the solar electricity production capacity by more than 60 % to almost 10 gigawatts. The study assumes that by 2022, this number can be multiplied by three times. We have experienced a decline in coal production in the Slovak Republic, but in Hungary and Ukraine, for example, the coal production trend has a growing tendency.

Summary

The result of the paper is the clarification of the issue of coal production in Slovakia. We have presented the results of the comparison of coal production in Slovakia with individual countries – Czech Republic, Poland, Hungary, Ukraine and Austria. We have found that the Slovak Republic has experienced a decline in production over the last two years. On the other hand, countries such as Ukraine and Hungary are increasing coal production in 2017 and 2018. We also analysed the largest enterprise dedicated to coal mining in Slovakia. We have assessed the financial health of the company, with the result that the company achieved good result in the area of solvency and liquidity, as well as its indebtedness. However, the company has achieved worse results in indicators of profitability and activity. Excessive inventory turnover time and receivables collection represent a risk for the future, and the analysed company should consider the change of its receivables policy.

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