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COMPETITIVENESS OF SLOVAK POWER PLANTS IN CONNECTION WITH GLOBAL CHANGES IN THE DEVELOPMENT OF ELECTRIC ENERGY PRICES

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A cost framework we applied to provide an overview of bioenergy issues related to the process with renewable fuels and focuses on several possible profitability scenarios and the future development of Slovak power plants in a competitive electricity market. The aim of the paper is to propose alternative scenarios and forecast the development of Slovak power plants. The economic benefits of transitioning to alternative biofuel were analysed within the research in cooperation with the Vojany Black Coal Power Plant (EVO). To confirm the most economically efficient types of fuels used in the combustion process was used Data Envelopment analysis (DEA). Within the methodology used were also identified the factors influencing the price of electric energy (EE) on the market and subsequently the profitability of power plants. Scenarios for the future development of EE prices were identified using the statistical method FORECAST.FUNCTION. Despite the predicted increase in the market price of EE we conclude that the use of co-combustion fuels is socially beneficial compared to the use of biofuels under a wide range of assumptions regarding technical, economic and environmental characteristics. The relationship and extent of influence between coal, emission allowance and oil prices, determining EE prices were quantified by regression analysis and Analysis of Variances (ANOVA). The paper contains current data from available databases and market forecasts and the absence of analyses for economic development, sustainability, and competitiveness of Slovak power plants in the unfavourable period of the ongoing COVID-19 pandemic and war conflict Russia-Ukraine.

Keywords: merit order principle, electric energy, combustion process, sustainability, competitiveness

JEL Classification: Q21, Q31, Q41, Q47

1 INTRODUCTION

After the turbulent end of 2021, the markets expected the new calming to come. However, it did not take long and there was a shock not only for the stock exchanges. It remains to say that Russia's invasion of Ukraine is pushing markets to new extremes. With lower production costs, the wholesale price of electricity is falling, despite the growing use of intermittent renewable energy, while retail electricity prices are rising. This has triggered the debate on the cost-effectiveness of this source of energy. Part of the price rise was also caused by the EU's decisions to invest in green energy. However, in February of this year, it became clear how sensitively commodity markets react to geopolitical events. Currently, it is very difficult to buy energy for customers and suppliers are unable to provide their customers with fixed, so-called forward prices. Customers can order energy at spot prices, i.e., prices that are very different and less predictable in a day-to-day comparison [1]. In previous years, power plants gradually sold electricity, but today they have suspended sales because it is not clear whether Russia will supply enough gas for heating and electricity generation. Since the beginning of the conflict, a higher volume of gas has been flowing into the EU from Russia, which is helping to calm the situation. However, if gas supplies were to fall, the market would react immediately to soaring prices. Currently, the stability of supplies for the near future is particularly important.

2 THEORETICAL BACKGROUND

Encouraging investments in energy efficiency can be considered a strong strategy to achieve a successful transition to low-carbon energy systems in line with the Paris Agreement. If companies want to improve and develop a sustainable policy in the national and international market, it is necessary to understand its principles and work in accordance with these requirements to support their performance.

2.1 Merit order electric energy pricing principle

To understand the impact of renewable technologies on pricing, it is necessary to describe the functioning of liberalized electricity markets. Liberalized electricity spot markets using the marginal approach prevailed in Europe. The EU market structure is characterized by a high degree of liberalization and integration, given the diversity of national energy policies and mixes. The Slovak competitive environment is not isolated but can be determined in certain circumstances by the markets of Germany, France, Austria, the Czech Republic, Poland, Hungary, and the Balkans [2]. EE pricing in wholesale markets is determined based on the merit order principle (Figure 1).

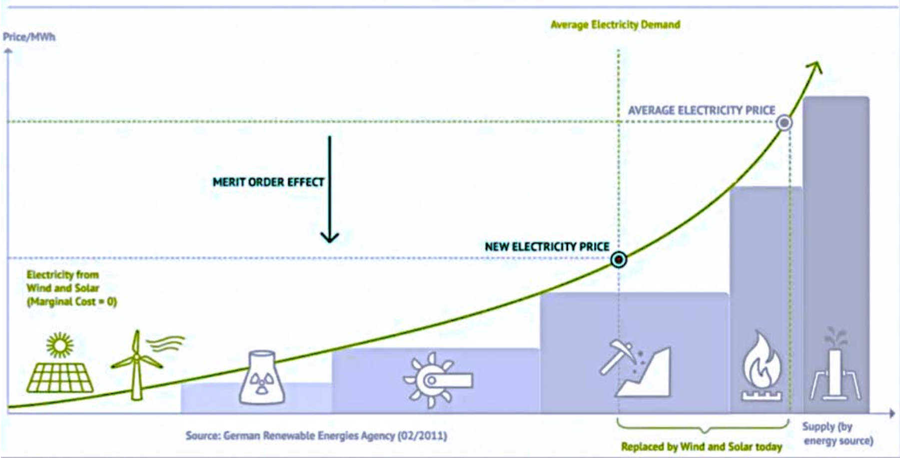


Figure 1 Scheme of merit order principle

Source: Research according to [2], [3]

The electric power price is set by the “merit order”, of which the sources with the cheapest marginal costs will be sold more quickly. Conventional electric power sources (coal and gas) are crowded out along the merit order. That is why wholesale prices in Germany, for example, have fallen sharply since the beginning of the energy transformation. Also in Belgium, wholesale prices have fallen in recent years. This does not necessarily translate into lower electricity bills for the final consumer, as the energy component makes up only one third of the bill. The other two thirds are taxes, levies, and distribution tariffs [4].

Investment in production capacity is key to security of supply. Network operators may introduce capacity mechanisms to reduce investment risks in generation capacity [5].

The variable costs mainly occur as a result and balance of energy production and consumption as well as from other minor factors such as wear [6]. This is followed by nuclear power plants and, at current fuel and emission allowance prices, lignite, and hard coal power plants. Gas-fired power plants are currently the most expensive and are therefore operated at the lowest rates [7].

The market EE price reflects the amount of variable costs of the last power plant, which is still needed to cover the demand (so-called price-setting or marginal plant) and is valid for all producing power plants (on the spot market it will be paid all satisfaction in the business hours) [8]. The surge in EE will encourage energy conservation and investments in renewable energy, but the manyfold rise in natural gas prices could lead to a persistent switch towards coal [9].

2.2 Development of electric energy prices

The possibility that the world will impose an embargo on Russian gas, coal and oil sent electricity prices higher in mid-March. Over the past year, weekly average electricity prices have risen from around 50 to almost 350 e/MWh. [10].

Energy prices are now heavily influenced by the geopolitical situation in Ukraine, from which various concerns and threats are emanating, and these enter energy prices through an extremely high-risk premium. The main risk is the reduction or complete interruption of gas and oil supplies from Russia. This possibility raised the prices of gas and electricity to historical records. [11].

Another critical assumption of the forecast is that the development of gas prices, as well as the main competitors of coal and gas on the electric energy market, will be filled by the so-called the "heat gap", what means the difference between electricity demand and nuclear and renewable electricity generation [12].

Wholesale electricity prices have been reaching all-time highs, triggering considerable political and social concerns in an increasing number of Member States. During the last years, wholesale prices have been passed through faster to household retail prices in some countries (from zero to one month, e. g. Germany, Estonia, Spain), while in others takes a longer period (from one to two years e. g. Bulgaria, Malta, Poland). The use of future contracts is also a strategy used to hedge prices by utilities (Belgium, Czech Republic, Italy, Netherlands) with a considerably level of responsiveness found with the retail energy component. In general, in markets with high levels of competition, retail prices tend to correlate best (follow the movements) with the wholesale market. [13].

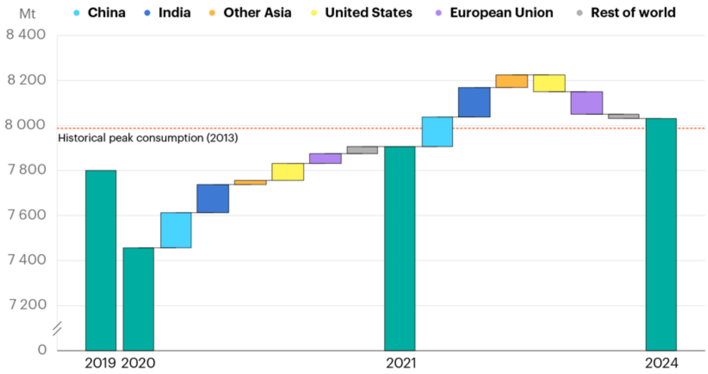


Figure 2 Changes in coal consumption by region, 2021-2024

Source: Research according to IEA (2022)

In recent years, the concept of circular economy has received a lot of political attention in the EU and its member states. The cornerstone of the EU's circular economy action plan is the waste hierarchy, which sets out a clear ranking of social preferences for different waste treatment methods. It states that residues should not be landfilled but should be prevented, reused, recycled or used as fuel [14]. In the case of the European market, where electricity prices are determined based on the merit, the fuel costs of marginal power plants are decisive. It follows that the more often a coal-fired power plant is a marginal power plant, the greater the impact of coal prices on electricity prices, regardless of the share of black coal in total electricity production (in the case of the EU, the proportion of black coal in electricity production is about 18 %) [15].

The effect is amplified by the high level of integration and liberalization of the European market. The high impact of coal prices on electricity prices is particularly visible in the case of the United Kingdom, Germany and Eastern Europe. In the case of the USA, this relationship has been observed for decades, in Europe it is not so long ago. The impact increased with the development of expensive renewable energy sources (RES). Purchase prices of RES have changed the principle of merit order and therefore coal-fired power plants are increasingly the marginal power plant.

3 METHODOLOGY

Within this study, possible future forms of the regional EE market are described and alternative scenarios of the operation of Slovak power plants are developed. Based on these scenarios, power plant owners can then decide on their future, adapting to market developments affected by new key factors in globalization, such as the ongoing COVID-19 pandemic and the Russian conflict in Ukraine. The main reasons for the closure of power plants are the environmental impacts of EE production from coal and, despite the current rise in EE prices, they generate unsatisfactory economic results for power plants at the current rising coal prices and related emission costs.

3.1 Materials and Methods

The aim of the contribution is to propose the construction of alternative scenarios and future forecasts of the development of Slovak power plants in the context of achieving their sustainability and competitiveness in the current economic conditions. Using an analysis of the current state of the market and selected factors, the current reference scenario of the current development of EE was constructed.

The authors formulated two hypotheses for this study:

1. Combustion of solid recovered fuel at the EVO is more cost-effective than combustion of black coal.
2. There is potential to produce synthetic fuel from pellets and biomass at the EVO.

As a part of the analysis of the profitability of co-incineration of 100 % solid recovered fuel, were assessed the economic possibilities of fuels in the boilers and the CO_2 emissions at the EVO. Based on the current prices and fees for CO_2 produced on the market of operational fuels, were calculated the price of the cost per 1 MWh of a specific fuel. There was calculated the price for produced CO_2 only in the case of fuels for which fees are not forgiven by the state and the legislation of the Slovak Republic. The price per tonne of CO_2 with the number of tonnes of CO_2 per 1 MWh was identified that EVO would produce if it replaced biomass with coal. To confirm the combustion efficiency of individual types of fuels, were used DEA.

The input-oriented model used operates in such a way that it tries to achieve the required efficiency of inefficient units by reducing the input values, which is also the desired goal of the EVO. This model based on rising costs caused by the rising price of transporting black coal from the Russian Federation, increasing emission quotas and the falling price of electricity. The model is compiled in accordance with the production characteristics of the EVO, which we used to select the input and output variables. The input variables represented the number of employees, the operating costs of fuels (water, additives, etc.), the costs of CO_2 emissions and the purchase price of fuels with transport. The monitored outputs were the amount of electricity produced, total sales (including revenues from support services and regulated electricity) and the amount of fuel produced per year. Based on the identified position, it was possible to recalculate different development scenarios. Thus, a choice can be made as to whether the EVO will continue working on the most effective economic growth.

The significance of the factors influencing the production of EE was confirmed by regression analysis. ANOVA was used to evaluate variability, which is a generalization of simple F and T tests on the agreement of variances and means. Subsequently, an analysis of scenarios was performed based on determining factors influencing the profitability and competitiveness of coal-fired power plants in the form of the development of EE prices. In the next step, possible future values of these factors were determined and using them, scenarios of future development of the situation are constructed. The development of EE prices with the prediction of their development was monitored using the statistical method FORECAST.FUNCTION, based on which the conclusions were drawn in the context of the impact on profitability, sustainability, and competitiveness of the analysed power plants.

4 RESULTS AND DISCUSSION

EE trade and the regulatory framework for competitive markets need to be adapted to accommodate flexible conditions where an increase in EE prices reflects the social costs for the consumer, which should act as a signal for cleaner energy, as the associated marginal costs should be reduced, while the environmental benefits increase.

4.1 Measuring the Economic Efficiency of Operational Fuels

Solid recovered fuel brings an opportunity for the EVO, which has produced electricity from black coal for many years. Since 2009 the EVO produces electricity also from biomass. Due to the high proportion of CO_2 in black coal, a possible alternative is solid recovered fuel with an admixture of biomass and ash from the plant sludge, needed to maintain the stability of the fluidized bed. Tests with solid recovered fuels began at the end of 2019 and continued at the plant in 2020 with the co-combustion of solid recovered fuel and biomass. At the same time, the ecological burden from the volume of the sludge pond was reduced. The authors performed the tests during normal operation according to the approved schedule. The intention was to analyse the potential use of these mixtures in the production of electricity, with solid recovered fuel, biomass and ash from the sludge added to the black coal to maintain the stability of the fluidized bed. The results obtained based on the DEA model with input characteristics are shown in Table 1. The characteristics of the input-oriented model were similar. The main factors for the energy security of the Slovak Republic are rationalizing energy consumption and optimizing the mix of energy sources.

Table 1 Solution of non-parametric data envelopment analysis (DEA) method of measuring eco-efficiency

DMU	Efficiency
1 – coal	0.57281
2 – biomass	0.81490
3 – pellets	0.92152

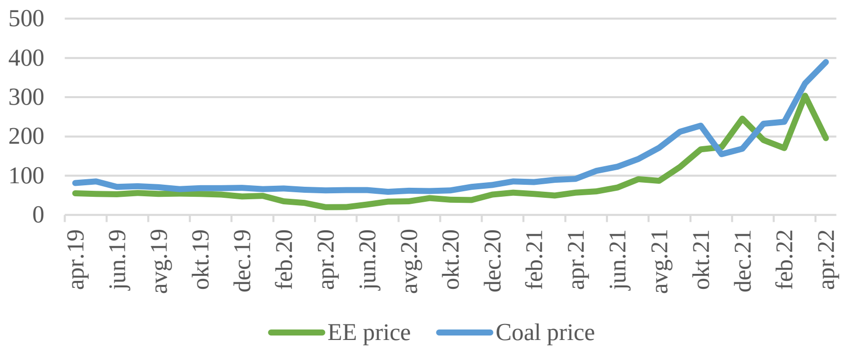
Source: Own processing.

Combustion of combined fuels took place in 2019 - 2020. Overall inefficiency is shown by decision making unit (DMU) 1, black coal. EVO must take certain measures to make the combustion process ultimately efficient. It can reduce inputs (by reducing operating costs related to expensive transport) or try to increase outputs (by increasing the amount of energy produced). However, with the current global challenges associated with cleaner production, this solution is environmentally inefficient. In order to determine the economic and environmental efficiency and profitability of heat production from biomass, it is necessary to analyse cost items and revenues and compare them between potential alternatives. In the years 2019 - 2020, pellets from solid recovered fuel and bulk pellets in combination with wood chips had the highest combustion efficiency.

4.2 Determinants of electric energy price development

Obviously, the systemic shocks include the exogenous shock from the global COVID-19 pandemic, which, in line with Clausewitz's dictum that war is just the continuation of politics by other means, represents the endogenous shock of the Russian-Ukrainian conflict. of the current geopolitical imbalance and international competition for political supremacy [16].

The impact of black coal prices varies from country to country according to the ratio of coal costs to total variable costs, the frequency of coal-fired power plants as marginal power plants, the fuel mix and cross-border interconnections. The effect is amplified by the high level of integration and liberalization of the European market. The impact increased with the development of expensive renewable energy sources. Purchase prices of RES have changed the principle of merit, and therefore coal-fired power plants are increasingly a marginal power plant.



Graph 1 Development of electric energy prices and coal prices (€)

Source: own research

Looking at price developments in the long run, price stability is visible. Especially before the corona crisis, were recorded sharp price jumps with the onset of the Russian-Ukrainian conflict. With this economic crisis, EE prices have risen, as has the increase in RES and limited global coal supplies, which have tightened further as Western sanctions have made trade in Russian coal more difficult. Electricity prices developed in parallel, graph 1 shows a very strong correlation between EE and coal prices.

Table 2 Regression analysis (1)

Regression Statistics	
Multiple R	0.873329221
R Square	0.79672183
Adjusted R Square	0.761669121
Standard Error	36.31819122
Observations	37

Source: own research

Below the first value in Table 2, labelled "Multiple R," lies the Pearson correlation coefficient, which tells us how interdependent EE and hard coal prices are. A value of -1 represents an indirect dependence, 0 indicates independent phenomena, and a value of 1 represents a direct dependence. In the observed period, the correlation coefficient is closer to 1, so we are talking about a direct dependence. We can therefore confirm that the analysed EE prices in the observed period are directly dependent on the prices of hard coal.

The second value in the "R Square" table is the coefficient of determination (square root of the correlation coefficient) and represents how many % the result is correct. With our coefficient of determination R^2 = 0.778341337, the regression function can estimate the result correctly at about 77.83 %.

Table 3 ANOVA (1)

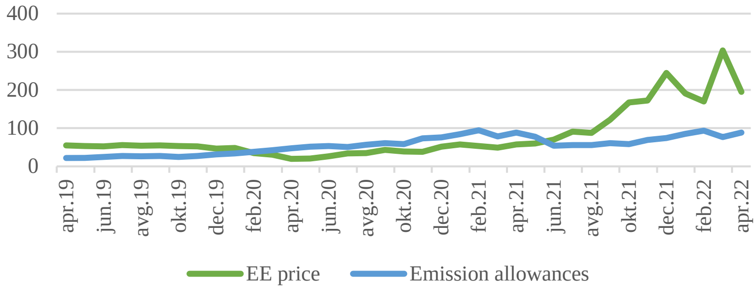
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	171381.72	181290.73	133.80	0.03958
Residual	35	53628.46	1564.10		
Total	36	241828.32			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	30.736289	9.82137413	3.208371	0.002861	10.7903271	51.01724	10.267925	51.147249
X Variable 1	1.0617398	0.08368271	11.19515	5.329300	0.84921814	1.362113	0.9427180	1.1629131

Source: own research

Another important result of the regression analysis (Table 3) is the significance value F. If this value is less than 0.05, the results can be considered statistically significant. If the significance value of F is greater than 0.05, the results are statistically insignificant, for example due to insufficient data. Our result is roughly at the level of significance F = 0. 03958, so the results are statistically significant. It can be seen from graph 2 that in most cases the prices of hard coal and electricity moved together, or with a short time lag, so we observe a strong correlation between the prices of both commodities.

The Emissions Trading Scheme (EU ETS) is a key instrument of European environmental policy. It is a form of carbon tax designed to support lower-emission technologies.



Graph 2 Development of electric energy prices and emission allowance prices (€)

Source: own research

In Graph 2, we observe a weak correlation between EE prices and emission allowance prices. However, a possible increase in the prices of allowances has an impact on the price of electricity, as the price of allowances is affected not only by the demand for allowances, but mainly by political interventions in the system. We also support these arguments with Karimi et al., who explain the favourable impact of this factor through the environmental Kuznets curve, which suggests that economic activity initially worsens the environment, but with maturity the economy shifts to cleaner production. Electricity is an important source of production and fossil fuels are used to produce energy. However, the vulnerability of energy production can be reduced by increasing the share of renewable energy [17].

Table 4 Regression analysis (2)

Multiple R	0.464837921
R Square	0.715316329
Adjusted R Square	0.17186482
Standard Error	20.68013576
Observations	37

Source: own research

In the observed period, the correlation coefficient is 0.464837921 (Table 4), so we speak of a weak direct dependence. We can therefore confirm that there is a dependence between the analysed quantities, but other external factors also intervene. The results may be due to the "non-standard" course of these last years. The second value in the "R Square" table estimates the result correctly at about 70.64 %.

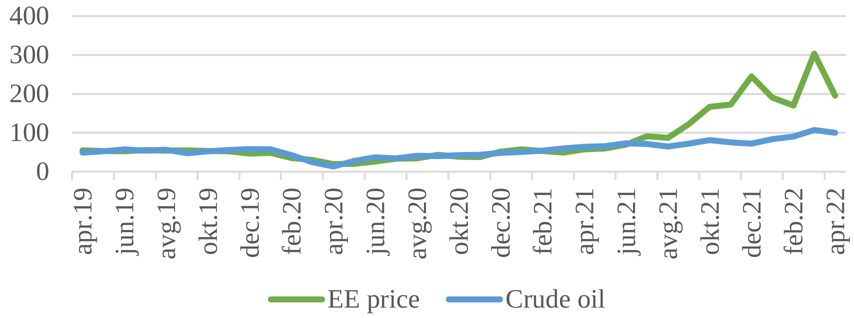
Table 5 ANOVA (2)

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3766.19	3857.29	9.31	0.004821285
Residual	35	15731.83	431.51		
Total	36	19757.32			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	42.61821866	5.49141927	8.28531381	1.1374	32.492154	53.42134	32.71915	54.32144
X Variable 1	0.161334438	0.14387539	3.02625198	0.0058	0.0612778	0.264272	0.081226	0.135482

Source: own research

The result of the F-test value is roughly at the significance level of 0.004821285, and thus we can conclude that the results are statistically significant. The price of oil affects other raw materials, especially coal and natural gas. The connection with natural gas is mainly due to the historical valuation method associated with oil prices.



Graph 3 Development of electric energy prices and oil prices (€)

Source: own research

Graph 3 shows a significant correlation between oil and EE prices, which proves the previous statement. Given Russia's large share of oil exports, the Russian invasion of Ukraine is likely to lead to shocks in energy supplies and a steady rise in energy prices. This effect may be exacerbated if Russia imposes a retaliatory ban on energy exports.

Table 6 Regression analysis (3)

Multiple R	0.847075545
R Square	0.717536979
Adjusted R Square	0.709466607
Standard Error	10.81752495
Observations	37

Source: own research

The closer 1 the coefficients calculated by regression analysis (Table 6), the stronger the correlation between the quantities. Prior to the Russian invasion of Ukraine, energy prices rose due to several factors, such as the COVID-19 pandemic, energy shortages and growing tensions between Russia and Ukraine. During this period, oil prices were stable in the price range of $ 80 to $ 95 before the invasion, so we assume, like Nesteruk, that higher oil prices will mainly affect consumer spending as households spend more on their final energy consumption [18]. The increased electricity trade with neighbouring countries induces costs and benefits. This will affect consumer spending as a major component of GDP and consequently reduce the rate of global growth.

Table 7 ANOVA (3)

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	10427.25	10404.25	87.94	0.045677
Residual	35	4186.65	128.02		
Total	36	13378.70			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	37.161742	2.867824	13.1631	3.2384	31.40729	42.82794	31.281527	42.973781
X Variable 1	0.3625271	0.027807	9.43818	3.9478	0.208468	0.124859	0.1762591	0.3138209

Source: own research

Since the value of F is less than 0.05 (Table 7), the results can also be considered statistically significant. The difference compared to the correlation between the prices of EE and hard coal is mainly in the fact that oil is not an important source of EE and so this correlation is rather secondary. It is the result of the above-mentioned valuation of natural gas linked to oil prices and, in turn, its substitute, hard coal, and at the same time oil is a significant input in the production costs of coal mining. These factors may mean, for example, a time shift in this correlation, or a different degree of price change. Ozili came to similar conclusions in his analysis of the impact of oil prices on electricity prices. The price of electricity is not rising as smoothly as the price of oil, but rather alternates between slow and rapid growth, which is accompanied by higher volatility than in the case of oil [19].

4.3 Analysis of scenarios of electric energy price development

A favourable scenario is a situation where the price of EE on the market will increase and the production costs of power plants will fall, which will make the power plants profit\ and the owner will continue to operate. The uncertain scenario assumes stagnation of consumption caused by average economic growth and a gradual increase in energy efficiency. Such stagnation will not cause a significant increase in demand or EE prices. It also assumes an increase in quota prices, which will increase the variable costs of coal-fired power plants, but based on the correlation, there should also be an increase in the market price of EE. With such an increase in the price of quotas, gas power plants would already be favoured, but there would be no change in order based on the principle of order of merit.

Furthermore, we assume a similar situation with the prices of coal, which are correlated with the price of oil and where there are significant changes in their market price and thus also in the market price of EE. Maintaining approximately the same amount of the supplement for burning coal would be a continuation of the situation for Slovak power plants, where the operator has only partially covered the production costs and is forced to produce even without an adequate profit. Adopting a change to the system of preferential access to RES in the system would not really help to remove market distortions in favour of RES, but the result would probably be better than the current situation. An uncertain scenario is a situation where EE prices in the market are at the limit of the operating costs of the power plants, so that the owner will hesitate to decide whether to continue operating the power plants or shut them down. The unfavourable scenario assumes a decrease in consumption caused by a slowdown in economic development and a significant increase in energy efficiency. This decrease will reduce both demand and EE prices. A significant increase in the prices of quotas will bring about an increase in the variable costs of coal-fired power plants and will benefit gas-fired power plants, based on which they will alternate on the principle of merit. The drop in oil prices will also suppress EE prices on the market. The factor of low values of the price of black coal will also push down the price of EE on the market.

Graph 4 Expected development of electric energy consumption in SR (€)

Source: own research

Future trends for the energy mix in different scenarios may vary in magnitude due to intrinsic differences in how the models are set up and how sensitive they are to changes in energy efficiency and emission reduction targets. Given Russia's large share of oil exports, a Russian invasion of Ukraine is likely to lead to disruptions in energy supplies and continued increases in energy prices. While evidence shows that energy consumption and GDP are positively correlated, increased firms' expenditure on raw materials increases their production costs and consequently increases the price of outputs [20], [21]. Therefore, there will be a decrease in aggregate demand due to a decrease in the purchasing power of consumers, which means less incentive for suppliers to produce more, therefore aggregate supply will also decrease, so this decrease in supply leads to a decrease in economic performance and growth [22].

5 CONCLUSION

EVO produced energy mainly from the combustion of black coal with an admixture of wasted wood chips until 2019. The device has a technology enabling the co-combustion of fuels made from solid regenerated fuel. The EVO energy from the CO_2-producing fuel is released into the atmosphere. On the other hand, some solid regenerated fuels have a partially closed cycle, which means that the release of CO_2 into the air during combustion is somewhat less than that of black coal. EVO focuses on the greening of electricity production, as evidenced by the replacement of low-emission burners on EVO II and the B1 and B2 units of EVO I, as well as the use of wood chips in the production of electricity units B5 and B6, which are currently in operation.

When estimating the economic results of the power plant, a certain probability of the development of the price and the amount of electricity produced was calculated. The results of the study confirm the hypothesis of a more cost-effective burning of solid recovered fuel on EVO compared to black coal. With this solution, the thermal power plant can achieve sustainable environmental and economic results.

According to the results achieved, the hypothesis that the power plant has the potential to produce synthetic fuel from pellets and biomass can be confirmed. This is evidenced by experiences from foreign studies as well as the fact that the Slovak Republic is moving in a suitable sustainable direction in this area. We propose the following measures for the future:

- to expand the production capacity by purchasing machines of the production of solid recovered fuel,
- to present the production of solid regenerated fuel near the plant as a good business opportunity,
- to achieve the best possible conditions with the suppliers of these fuels and try to get the lowest possible price for solid recovered fuel.

The contribution focuses on current issues of competitiveness of Slovak coal power plants. Slovak power plants EVO is currently in a difficult situation due to their insufficient economic results. By reducing the regulatory burden on coal-fired power plants, the Government of the Slovak Republic can help find a solution to maintain production in these plants.

The set aim of the contribution is achieved based on the performed analyses and forecasts of the development of EE prices in comparison with other influential commodities on the profitability, sustainability, and competitiveness of power plants. The advantage of EVO is their regulatory scope, thanks to which they also have secured revenues from support services. At the same time, unlike nuclear power plants, they sell their production on short-term markets, so they are also more affected by price volatility. The achieved results presented in this contribution represent the basis for further direction of research in the field of EE price development and monitoring of significant factors that increase the intensity and frequency of global extremes resulting from events in international markets.

Based on the above findings and critical research, we can say that co-incineration of solid recovered fuel in the production of electricity is possible from a technical, legislative and economic point of view. In the next stages of research, it will be possible to set up a concept that knows aspects of the dimensions of sustainable development and determines an acceptable way to implement new technologies at the EVO. The idea of using this solution is also the result of long-term intensive cooperation between Slovak power plants and the Faculty of Business Economics at the University of Economics in Bratislava with seat in Košice and proves the usefulness of connecting academia with business.

6 ACKNOWLEDGMENT

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