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## CHALLENGES OF THE GREEN TRANSITION: IMPLICATIONS FOR THE OPERATION OF ENERGY COMPANIES

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### Abstract

The effects of climate change are being felt in all parts of the world. Ways to predict future climate change and reduce the impact of humans on the climate have been the subject of numerous studies. The transition towards climate neutrality at EU level is the backbone of the European Green Deal. It is about the goal of reducing greenhouse gas emissions by 55% by 2030 and achieving a climate neutral Europe by 2050. Energy companies are responsible for three quarters of greenhouse gas emissions in the European Union, especially those that produce energy from fossil fuels. The paper examines the impact of efforts to reduce greenhouse gas emissions through investments in renewable energy sources, implemented as a result of the adoption of the regulatory framework, on the business and financial performance of three energy companies (Hrvatska elektroprivreda – the HEP Group, Holding Slovenske elektrarne – the HSE Group, and the Slovenské elektrárne a.s. – the SE Group) from the European Union over a three-year period (2017-2019). The main objective of this paper is to determine how adapting to the new European Union regulatory framework in terms of the green transition affects the operation of energy companies, focusing on profitability, liquidity, and financial stability. The paper revealed that the companies observed plan to invest in renewable energy sources and reduce or abandon the use of fossil fuels in electricity generation in line with the European Union's objectives. The analysis of their businesses showed that they approach changes in business models differently with regard to the specifics of the business environment

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and the development of energy infrastructure, which affects success and stability of their businesses.

**Keywords:** business analysis, energy companies, renewable energy sources, green transition.

## Introduction

The increased presence of carbon dioxide (CO<sub>2</sub>) in the Earth's atmosphere due to the consumption of fossil fuels and the increasing amount of solid particles in the air are causing growing concern. Renewable energy sources are a substitute for fossil fuels, which are one of the biggest polluters of the environment, and in the last 15 years, European Union (hereinafter referred to as "the EU") legislation has been intensively dealing with this issue and the promotion of ecologically acceptable "green energy" in order to reduce greenhouse gas emissions to a minimum.

The original Renewable Energy Directive (Directive 2009/28/EC) was adopted in 2009. It set the goal of ensuring that 20% of energy consumption in the EU came from renewable sources by 2020, while national goals in the field of renewable energy sources differ for each country, taking into account their characteristics and potential. The revised Renewable Energy Directive (Directive (EU) 2018/2001) entered into force at the end of 2018. The aim of the directive is to help EU Member States fulfil their obligations in terms of the required reduction of greenhouse gas emissions within the framework of the Paris Agreement (UN, 2015). The revised directive defined a new mandatory target of a share of renewable energy of at least 32% in gross final energy consumption in the EU by 2030. In December 2019, the European Commission released the Communication on the European Green Deal (European Commission, 2019), which presented the guidelines and activities necessary for achieving a green transformation, i.e., a climate-neutral Europe, by 2050. In order to achieve this goal, Member States have committed to reducing greenhouse gas emissions by 2030 by at least 55% compared to 1990 levels.

Energy companies that produce electricity from fossil fuel plants are one of the biggest polluters. Namely, according to the European Green Deal data (European Commission, 2019), three quarters of all greenhouse gas emissions in the EU are generated due to energy generation and consumption,

which is the reason why the EU strongly supports investments in renewable energy sources. The changed regulatory and market conditions have affected the position and operation of energy companies. Therefore, this paper investigates the impact of EU adaptation to the requirements for reducing greenhouse gas emissions on the operation of three EU energy companies. The financial statements and financial performance of the companies falling within the scope of this paper will be considered. In this way, we will try to determine how a generation mix of these companies, with an emphasis on renewable energy sources, affects their profitability and stability of their operation.

The paper is divided into several sections. After the introduction there follows Section 2 that deals with the theoretical basis for the analysis of financial reports with special emphasis placed on energy companies. Section 3 presents research results of the impact of efforts to reduce greenhouse gas emissions on business and financial performance of energy companies, while the last section concludes the paper.

## **Theoretical basis**

According to International Accounting Standards 1 (IAS 1, point 9), "the objective of general purpose financial statements is to provide information about the financial position, financial performance, and cash flows of an entity that is useful to a wide range of users in making economic decisions." At the same time, Jooste (2005) states that ratio analysis includes the processing of financial information in order to generate new information, while the causes and consequences of the results obtained within the framework of the analysis will be determined by interpretation. Ratio analysis can be used for decision-making in the company – in the broader sense of the word (Vareško, 2021; Tintor, 2020; Vukoja, 2018; Učkar, Grbin, 2014; Čižmešija, Kurnoga Živadinović, 2012), budget accounting (Hladika, 2014), detecting fraudulent financial reporting (Palac, 2020), predicting business financial problems (Gabrić, 2018; Ježovita, 2015; Zenzerović, 2009), and auditing financial statements (Mijić, Jakšić, 2019; Kontuš, Šarlija, 2019).

Recently, there has been widespread and loud criticism of the impossibility of adapting the analysis to specific needs, partly due to the initial

assumption that financial reports faithfully and objectively depict the financial position, and partly due to the problem of adapting certain ratios to the observed activity. The above is particularly pronounced in the case of energy companies, whose role is particularly emphasised in the transition towards a climate-neutral European Union. These are companies that are extremely capital intensive and require significant investments, be it investments in infrastructure or equipment. In relation to labour-intensive activities, capital-intensive ones usually have a more significant share of fixed costs in total costs and a proportional relationship (an increase) of revenue and profit. Wahlen, Baginski and Bradshaw (2011) state that companies with high operating leverage have higher variability of return on total assets compared to companies with low operating leverage. Therefore, the values of the calculated ratios will be conditioned by the fact whether these are labour- or capital-intensive activities, but the type of activity itself will also affect the values of the ratios.

For energy companies, which are a classic example of capital-intensive companies, by means of ratio analysis of 28 EU energy companies in the period 2005-2015, Borozan, Pekanov Starčević and Radman Funarić (2020) determined the mean value of the current ratio of 1.45 and the quick ratio of 1.19, and assessed liquidity as satisfactory. At the same time, the mean value of the leverage ratio was 0.51, while return on assets and return on capital were 3% and 7%, respectively. Similar research on Italian energy companies was conducted in 2014 by Iovino and Migliaccio (2019). Large energy companies recorded mean values of the quick ratio and the debt-to-equity ratio of 1.16 and 1.22, respectively. As for profitability ratios, the mean value of return on assets was 5.97%. Interesting discoveries were made by Tomczak (2019) in his research on the differences in the financial position between plants that produce electricity from fossil fuels (i.e., coal) and those that produce electricity from renewable sources. His sample included energy companies from the Baltic countries and Central Europe during the period 2008-2017, and the results showed that in most cases there is no statistically significant difference between the financial position of companies that use renewable (“green”) energy sources and those that use only fossil fuels (“red”). More precisely, the mean values of return on assets were 5% for “green” companies and 3% for “red” companies, while the mean values of the current ratio were 1.62 for “green” and 1.28 for “red” companies. Furthermore, the leverage ratio

was 0.50 for “green” and 0.49 for “red” companies. Therefore, he referred to a review of the justification of investment in renewable energy sources from the point of view of private investors.

## Research methodology

Three energy companies from the EU were analysed with an emphasis placed on business and financial performance in the three-year period (2017-2019). The main goal of the paper is to determine how the EU requirements for reducing greenhouse gas emissions are reflected within the framework of the European Green Deal on business and financial performance of companies from the former Socialist Bloc, which have always relied on conventional electricity generation.

Hrvatska elektroprivreda d.d. (the HEP Group) was selected as the first company since it is the largest electric power company in Croatia. When selecting other companies, the following characteristics were taken into account: the company is wholly or partially owned by the state, it is the largest electricity company in the country, the value of its consolidated revenue is at the level of approximately EUR 2 million, and it belongs to the former Socialist Bloc due to similar heritage and easier comparability. Holding Slovenske elektrarne (the HSE Group) from Slovenia met all requirements and was thus selected for analysis. Of other companies that were analysed, the company most suitable for analysis was Slovenské elektrárne (the SE Group) from Slovakia, and hence it was selected as the third company for analysis.

The consolidated financial statements of the companies were taken from the annual reports for 2017, 2018 and 2019, and the annual reports were taken from the websites of the companies that were analysed. All financial statements and financial data are presented in EUR (the reporting currency of the HSE Group and the SE Group), while the financial statements of the HEP Group have been converted into EUR at the exchange rate of 7.50.

## Research results

### *Hrvatska elektroprivreda d.d. (the HEP Group)*

Hrvatska elektroprivreda d.d. (hereinafter referred to as “the HEP Group”) is a company owned by the Republic of Croatia, which represents the parent company of the HEP Group. The HEP Group is the largest electric power company in Croatia with an installed capacity of 4,060.25 MW, and the main activities of the group are electricity generation, distribution, transmission, supply and trading. Companies engaged in regulated activities (distribution and transmission) are strictly separated within the HEP Group from those engaged in unregulated activities (supply and generation). A generation mix of the HEP Group includes hydroelectric power plants (51%), thermal power plants (31%), and Krško Nuclear Power Plant (17%), while the share of other sources is negligible. Such generation mix contributes to the reduction of CO<sub>2</sub> emissions within the HEP Group.

The HEP Group derives most of its sales revenue from the sale of electricity (over 80% of sales revenue in all years under observation). During the observation period from 2017 to 2019, HEP was a wholesale gas supplier. In 2019, gas revenue fell by 30% because in 2018 gas was supplied to a national industrial customer (which HEP did not supply gas to in 2019 and 2017). In addition, warmer weather in part of the heating season had an impact on lower consumption and a drop in revenue from the sale of thermal energy in both 2019 and 2018. Consequently, profit was made in the electricity sector, while loss was made in all other sectors. The group achieved net profit of EUR 187 million, which is an increase of EUR 5 million (2.8%) compared to the previous year (i.e., 2018), when it amounted to EUR 182 million, while in 2017 the profit amounted to EUR 173 million.

Property, plant and equipment make up the most significant part of the total assets of the HEP Group and in the entire observation period they amounted to 95% of the total assets. In the period 2017-2019, the HEP Group was one of the most significant investors in Croatia, and investments in 2019, 2018 and 2017 amounted to EUR 451.5 million, EUR 316.8 million, and EUR 324.3 million, respectively. Investments mostly

related to the modernisation and renovation of electric power system facilities and generation facilities, as well as facilities for the construction of new and retrofitting of existing electric power system facilities and network infrastructure facilities in the fields of transmission and distribution. Investments were mostly supported through equity financing thanks to good liquidity and good business results.

### *Holding Slovenske elektrarne (the HSE Group)*

Holding Slovenske elektrarne d.o.o. (hereinafter referred to as “the HSE Group”) is the parent company of the HSE Group headquartered in Ljubljana, and it is entirely owned by the Republic of Slovenia. The basic activities of the HSE Group are the sales and trade in electricity and thermal energy, CO<sub>2</sub> emission allowances, certificates of origin and other renewable energy certificates, the optimisation of the HSE Group production, the provision of ancillary services needed for the functioning of the electric power system, and the implementation and management of energy projects. The HSE Group is the largest electricity producer and trader from domestic sources on the wholesale market in Slovenia and the largest Slovenian electricity producer from renewable sources with a total installed capacity of 1,915.47 MW. In terms of its generation mix, the HSE Group produces electricity in thermal power plants (52%) and hydroelectric power plants (48%). Although the share of electricity production from hydroelectric power plants is 48%, thermal power plants use coal as fuel, which is a significant source of greenhouse gas emissions.

Electricity generation in the members of the HSE Group dropped by 2% in 2019 compared to the previous year. Regardless of the amount of electricity generated, by increasing its sales activities, especially abroad, the HSE Group achieved 16% higher revenue from the sale of electricity compared to the previous year and made a profit in 2019. The Šoštanj Thermal Power Plant d.o.o. achieved 12% higher revenue from the sale of thermal energy due to higher sales prices as a result of higher prices of CO<sub>2</sub> emission allowances. The HSE Group compensates for electricity needs by additional purchases on foreign markets. Due to a sharp increase in average electricity prices since May 2018, purchases were unfavourable, which had a negative impact on the HSE Group’s result related to electricity sales. As

a result of the above, sales revenue fell by 7% compared to 2017. At the end of 2018, the HSE Group recorded a loss totalling EUR 11.8 million.

On 31 December 2019, the assets of the HSE Group were 3% lower compared to the situation recorded on 31 December 2018. On 31 December 2018, the assets of the HSE Group were at the level of the previous year (i.e., 2017). Property, plant and equipment decreased in 2018 by 3% compared to 2017. In 2019, the HSE Group made investments amounting to almost EUR 41 million (compared to EUR 57 million in 2018, and EUR 49 million in 2017). Most of these funds were intended to increase safety and reliability in electricity generation systems.

### *Slovenské elektrárne a.s. Group (the SE Group)*

The main activity of the Slovenské elektrárne a.s. Group (hereinafter referred to as “the SE Group”) is electricity generation and sales. The company is the largest electricity producer in Slovakia and one of the largest in Central Europe. The SE Group also generates and sells thermal energy and provides auxiliary services for the electric power grid. There were two owners of the parent company Slovenské elektrárne a.s. as at 31 December 2019. The majority shareholder is Slovak Power Holding BV,<sup>44</sup> with a 66% share in the registered capital. The minority shareholder, which holds 34% of the share capital, is the Slovak Republic. A generation mix of the SE group, with the total installed capacity of 4,080.92 MW, includes nuclear power plants (48% of installed capacity), hydroelectric power plants (40% of installed capacity) and thermal power plants (12% of installed capacity), while the share of other capacities is negligible (two solar power plants). Given that it generates most of its electricity from nuclear power plants and hydroelectric power plants, the SE Group records low levels of CO<sub>2</sub> emissions.

Taking into consideration a revenue structure of the SE Group, it can be seen that in all years throughout the whole period under study, revenue from the sale of electricity accounts for approximately 80% of revenue

<sup>44</sup> A 50% shareholder of Slovak Power Holding BV is Energetický a průmyslový holding a.s., Czech Republic (EPH), a leading energy group in Central Europe with more than 25,000 employees, and the other 50% of the company is owned by ENEL Produzione S.p.A., Italy, a multinational company in the energy sector with more than 62,000 employees and the world's leading integrated electricity and gas operator.



generated on the national market. In 2019, the group generated 14% less revenue from the sale of electricity on the national market compared to the previous year, while in 2018, it recorded a 7% increase in sales revenue compared to 2017. At the same time, revenue from the sale of thermal energy makes up only about 2% of revenue on the national market. Net profit for 2019 was EUR 22.6 million, compared to EUR 19.6 million in 2018 and EUR 62.9 million in 2017.

On 31 December 2019, the assets of the SE Group were 8% higher compared to 31 December 2018, and the assets on 31 December 2018 were 6% higher compared to 31 December 2017. Property, plant and equipment increased by 12% due to significant investments in units 3 and 4 of the Mochovce Nuclear Power Plant. The group is fully committed to maintaining its investment plan in the period 2020-2024. Total investments in 2019 amounted to EUR 420 million (not including capitalised interest), while in 2018 and in 2017, they amounted to EUR 431 million and EUR 448 million, respectively. Given that the SE Group is currently in a multi-year investment cycle, there are significant liabilities owed to financial institutions.

### **Comparison of business indicators for the HEP Group, the HSE Group and the SE Group for the period 2017-2019**

Below is a table of business indicators for the HEP Group, the HSE Group and the SE Group for the period from 2017 to 2019.

Table 1. Ratio comparison for the period from 2017 to 2019

Name		Calculation	Unit of measurement 2019	HEP Group			HSE Group			SE Group		
				2018	2017	2019	2018	2017	2019	2018	2017	
Liquidity ratios	Current ratio	short-term assets / short-term liabilities		1.75	1.92	1.76	1.07	1.12	1.09	0.93	0.94	0.77
	Quick ratio	(short-term assets – inventory) / short-term liabilities		1.37	1.52	1.41	0.95	1.01	1.00	0.51	0.61	0.44
	Financial stability ratio	fixed assets / (capital + long-term liabilities)		0.91	0.90	0.92	0.99	0.98	0.99	1.01	1.01	1.03
	Net working capital	short-term assets – short-term liabilities	In thousand EUR	464,082	467,637	364,245	19,007	32,323	23,264	-55,592	-57,388	-225,116
Leverage ratios	Leverage ratio	total liabilities / total assets	%	40	40	33	49	49	51	61	63	60
	Equity-to-assets ratio	capital / total assets	%	60	60	67	51	51	49	39	37	40
	Debt-to-equity ratio	total debt (liabilities) / capital		0.66	0.66	0.49	0.95	0.96	1.06	1.54	1.69	1.47
	Equity ratio I	(equity x 100) / fixed assets	%	74.44	73.75	79.89	59.42	59.86	55.73	42.08	40.95	43.85
	Equity ratio II	((equity + long-term liabilities) x 100) / fixed assets	%	110.12	110.61	108.40	101.06	101.77	101.25	99.48	99.40	97.55
Profitability ratios	Revenue-to-cost ratio	total revenue / total cost		1.12	1.12	1.12	1.01	0.99	1.00	1.01	1.01	1.04
	Net profit margin	net profit / total revenue		0.09	0.09	0.09	0.02	-0.01	0.01	0.01	0.01	0.03
	ROA – return on assets	net income / total assets		0.004	0.004	0.005	0.01	-0.01	0.004	0.002	0.002	0.006
	ROE – return on equity	net income / total equity		0.01	0.01	0.01	0.03	-0.01	0.04	0.01	0.005	0.02

Source: Authors

### *Liquidity ratios*

Ratio analysis led us to conclude that the liquidity of the HEP Group was stable during the observation period and that the HEP Group was able to meet its short-term liabilities from short-term assets without difficulty. The current ratio is slightly below the desirable value of 2; however, the quick ratio and the financial stability ratio are satisfactory. Net working capital, which is essential to maintaining liquidity and financial stability, is also favourable. Liquidity ratios of the HSE Group are also satisfactory, although the current ratio is below the desirable value of 2; other liquidity ratios are satisfactory. Liquidity ratios of the SE Group are slightly worse than the ones of the previous two groups. The current ratio and the quick ratio are below 1, which may indicate possible difficulties in meeting current liabilities. Likewise, net working capital is negative, which may indicate difficulties in meeting short-term liabilities. As for the financial stability ratio, the lower the value of this ratio, the greater the financial stability and liquidity, i.e., working capital increases. In all three companies, it has similar values, but it is the worst in the SE Group.

### *Leverage ratios*

Leverage ratios reflect the structure of liabilities and tell us how much of the assets is financed by a company's own capital (equity) and how much of the assets is financed by other people's capital (liabilities). The leverage ratio of the HEP Group shows that in the observation period, 40% (2019 and 2018) and 33% (2017) of the total assets were financed by other people's capital, while the remaining 60% (2019 and 2018) and 67 % (2017) were financed by their equity. On the other hand, the leverage ratio in the HSE Group is slightly worse and is 49% (2019 and 2018) and 51% (2017), while the equity-to-assets ratio is 51% (2019 and 2018) and 49% (2017). The SE Group has the worst leverage and equity-to-assets ratios, i.e., 61% (2019), 63% (2018) and 60% (2017) of total assets were financed by other people's capital.

A desirable value of the equity-to-assets ratio is above 50%, from which it can be concluded that the leverage ratios of the HEP Group, the HSE Group and the SE Group are satisfactory, marginal, and below the desired value, respectively. Such results were expected because the SE Group is currently making a major investment in the process of constructing units

3 and 4 of the Mochovce Nuclear Power Plant, which represents one of the most significant investments in Slovakia, and which made the SE Group take on additional debt.

The debt-to-equity ratio is also satisfactory in the HEP Group and the HSE Group, while it is somewhat worse in the SE Group, although it is still below the upper limit (the upper limit is 2), while in the SE Group, the values are 1.54 (2019), 1.69 (2018) and 1.47 (2017). Equity ratios I and II are favourable for the HEP Group and the HSE Group, while they are marginal for the SE Group.

### *Profitability ratios*

The net profit margin shows how much net profit was made from the total work done on the market, which the company can freely dispose of. The company can pay that part of revenue, i.e., profit after tax, to the shareholders, or leave part of it on the balance sheet as retained earnings. A higher value is preferred here. By comparing the three groups, it can be seen that the HEP Group has the highest net profit margin (0.09 in all three periods), while the net profit margin of the HSE Group and the SE Group ranges from 0.01 to 0.03 (it was negative only in 2018 in the SE Group when the company operated at a loss).

ROA stands for return on assets; it is a profitability ratio that shows how much profit a company generates from its assets. In the observation period, the highest value is recorded in the HSE Group, namely in 2019, when it is 0.01. It is smaller in the HEP Group and the SE Group, and the reason for this is that the total assets of the HEP Group and the SE Group are significantly higher than the assets of the HSE Group. ROE stands for return on equity; it is a profitability ratio that shows how much profit a company generates from its investments or invested capital. It is the same, i.e., 0.01, in all three observation periods in the HEP Group, whereas in the HSE Group it is the highest in 2019 (0.03). In the SE Group, it is the highest in 2017 (0.02), and the lowest in 2018 (0.005).

### *Revenue-to-cost ratio*

The revenue-to-cost ratio shows the relationship between total revenue and total cost, and a value that is as high as possible, or at least 1, is desirable

because it implies that revenue and cost are equal. In the observation period, it is above 1 in all groups (it is the highest in the HEP Group, i.e., 1.12 in all three observation periods), except for the HSE Group in 2018, when it generated a loss.

## Conclusion

Financial statement analysis of the HEP Group for the period 2017-2019 showed that this group made a profit in all three observation periods, had no problems with liquidity and was financially stable. The HEP Group has no significant financial liabilities, and the liabilities are met in a timely manner. Comparison of the profit margin of all three groups, for which the highest possible value is desirable, revealed that the HEP Group achieved the highest value in all three periods. In the observation period, the HEP Group was operationally profitable, and profit growth was recorded every year. Given the business results and financial stability, as well as the fact that the existing investments are mostly supported through equity financing, and that the EU-level fund has been announced from which investments in renewable energy sources would be financed, there are no barriers to new significant projects in the field of renewable energy sources.

Operational analysis of the HSE Group in the period from 2017 to 2019 shows that the group made an operating profit in all periods except for 2018, when it made a loss. In the observation period, the group had no problems with liquidity, and its leverage ratios were at acceptable levels. As for the generation mix, the group equally relies on the process of generating electricity from both hydroelectric and thermal power plants. During the observation period, investments that prevailed in the HSE Group aimed at ensuring organisational safety and security, i.e., investments and retrofitting procedures related to generation reliability. The HSE Group started with restructuring measures, the goal of which is long-term decarbonisation of electricity generation and the gradual coal phase-out without a negative impact on the reliability of electricity supply to consumers. It is planned to replace coal with renewable and other low-carbon energy sources. For this reason, the HSE Group is proactive in the field of creating a regulatory framework that will support and enable realisation

of sustainability-oriented development projects and provide the foundations for ensuring an appropriate share of public funds necessary for their implementation.

In the period from 2017 to 2019, the SE Group made an operating profit; however, its business and financial indicators are worse compared to the previous two groups, mostly because it is currently in a multi-year investment cycle and there are significant liabilities owed to financial institutions. Most of the investments relate to the construction of units 3 and 4 of the Mochovce Nuclear Power Plant, whose construction is planned to enable the SE Group to achieve energy independence, meet the energy needs of Slovakia entirely, and focus even more on electricity export. Given that the SE Group generates most of its electricity in nuclear power plants and hydroelectric power plants, it also has low levels of emissions in relation to total electricity generated.

Operational analysis of three EU electricity companies revealed that they approach changes in business models differently with regard to the specifics of the business environment and the development of energy infrastructure, which consequently affects success and stability of their operations through the adjustment of the generation mix. Analysis results show that companies with a higher share of renewables in electricity generation are not necessarily more profitable, which indicates the need to review the profitability of investments in renewable energy sources and to instruct decision makers to encourage such investments through various measures. Given that these are companies that are predominantly owned by the state, political will is required for making such decisions, and therefore it is recommended to make an extra effort in order to make company management recognise the need to invest in significant renewable energy projects as one of the national strategic goals that would ensure greater energy independence of the state.

Research limitations refer to a small sample of energy companies under study and a relatively short period of time of observing their business operations and adapting to EU requirements in terms of greenhouse gas emissions reduction. Therefore, in future research studies, it would be advisable to extend the research time horizon and take into account additional energy companies in order to gain a deeper insight into the state of the EU energy industry.

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