

THE IMPACT OF THE COVID-19 PANDEMIC ON THE FINANCIAL PERFORMANCE AND PRICE OF THE SHARES OF THE ENERGY AND FUEL COMPANIES LISTED ON THE MAIN SEGMENT OF THE BUCHAREST STOCK EXCHANGE

Ștefăniță ȘUȘU

“Ștefan cel Mare” University of Suceava, Romania

stefanita.susu@usm.ro

Received 17 September 2021; Accepted 26 November 2021

Abstract:

It is known that many factors influence the stock prices and the value of energy and fuel companies. Among them we can mention the economic, social, environmental, political factors, and recently the Covid-19 pandemic. The aim of the study is to examine the probability and intensity of the deterioration of the financial situation and the decrease in the share prices of energy and fuel companies listed on the main segment of the Bucharest Stock Exchange (Romania) during the pandemics. The study has used mixed benchmarking methods, in time and space, and highlighted the impact of the Covid-19 pandemic on the financial performance and share prices of three energy and fuel companies listed on the main segment of the stock market. The risk of declining the financial performance and the share price of energy and fuel companies has increased significantly. This issue has been associated both to a temporary reduction in energy and fuel demand, to the pandemic restrictions introduced in most countries as well as to the behavior of the market investors.

Key words: energy sector, fuel sector, Covid-19 pandemic, financial performance, share price

JEL classification: D22, D53

INTRODUCTION

The access to energy represents a key element for the economic and social development, thus contributing to the improvement of the population's standard of living. The energy sector is considered to be a key factor in a country's economic development. Energy as a sustainable force for the sustainable development – being economically viable, needs-oriented, autonomous and ecological - is becoming more and more important (Kurian, 2012).

Thus, the energy and fuel sector are constantly changing and they need to be adjusted to the ever-changing economic conditions. On the other hand, the changes taking place in the energy sector affect the lives of people who are concerned about and carry out activities in agriculture, industry, transport, communication, economy, urbanization, quality of life, politics and environment (Smil, 2017). Avtar and colleagues (Avtar et al., 2019) have recalled about energy expansion, energy security, increasing energy generation capacity and the relationships manifesting in terms of the energy industry, urbanization and society.

The specialty literature emphasizes that increasing energy needs are correlated with issues such as the economic sustainability, the social development, the environmental sustainability (Omer, 2009 and Colombo et al., 2013), as well as the population's health problems (Manisalidis et al., 2020).

The global economic developments over the past 20 years, the technological advances as well as the economic, geopolitical, and environmental events have led to a significant increase in the energy commodity price volatility (Halkos and Tsirivis, 2018). One such event is the manifestation of the SARS-CoV-2 virus. On March 11, 2020, the World Health Organization (WHO) declared the Covid-19 outbreak a global pandemic. This pandemic soon hit the globalized economies and the energy markets with a tremendous force thus causing huge losses. The impact of the effects of the pandemic was visible on the oil future market. (US Oil Prices Turn Negative as

Demand Dries Up. Retrieved from BBS News, 2020). In April 2020, the price of U.S. crude oil for the first time in history, the West Texas Intermediate (WTI) type of crude oil, the benchmark for crude oil, traded negative at -40.32 USD / barrel, compared to 18.27 USD / barrel a few days earlier.

Constrained by declining demand for petroleum products caused by the medical crisis as well as by the unavailability or speculative trends related to storage space, producers and traders preferred to sell at a loss or even pay buyers to collect their products due to the fact that stopping crude oil production lasts and sometimes cannot be achieved without taking the risk of further declining productivity. Moreover, a stopped probe presents the risk that the restart will not produce the same (<https://www2.deloitte.com/ro/en/pages/business-continuity/articles/pretul-istoric-negativ-al-petrolului-implicatii-pentru-romania.html>).

The risk of loss associated with trade in goods may depend on the economic, political and market conditions. Commodity prices are inherently volatile based on the fact that they react quickly to a number of unpredictable factors, including labour strikes, weather conditions, exchange rates, speculation, inflation and now the pandemic situation (Ezeaku et al., 2021).

It is important to understand and analyze the impact of the Covid-19 pandemic on the worldwide economies. Such an analysis can help investors better cope with the increase in systemic financial risk as well as it can provide some basic ideas for managing similar events in the future, too. Blockage, social restrictions, travel bans, unemployment and work at home or telework have forced most people to stay at home thus affecting the normal functioning of businesses and reducing the demand for energy and fuel. Particularly, the pandemic could threaten labor markets, the global supply chains could affect the consumer behavior. They all have an impact on the global economy as such. The stock market represents one of the most important elements (Ahmar and del Val, 2020; Al-Awadhi et al., 2020). Given the slower growth rates and lack of capital flows, the emerging markets, including Romania, have relatively limited resources in order to cope with the impact of the pandemic and are therefore they are expected to suffer the most.

The present study is focused on examining the probability and intensity of the deterioration of the financial situation and the decline of the stock prices of energy of the fuel companies listed on the main segment of the Bucharest Stock Exchange (Romania) during the Covid-19 pandemic. The significance of the research is shown in the analysis of the reaction of the energy and fuels market to the crisis situation. The Covid-19 pandemic is an exceptional situation, resulting from a threat to health, but which, in its turn, significantly affects the economic situation of the companies as well as the worldwide economies. In order to reproduce as accurately as possible the impact of the pandemic on the energy and fuel companies, we have taken into account three companies listed on the main segment of the Bucharest Stock Exchange. In order to obtain eloquent results, we have used the comparative method of mixed analysis, in time (analysis period being 2018-2020) and space (i.e. the financial reports of ROMGAZ Ltd., NUCLEARELECTRICA Ltd. and of OMV PETROM Ltd.).

LITERATURE REVIEW

So far, the pandemic is the most important challenge facing countries around the world. The first wave had a major impact on the world economy in such a way that it has accentuated the poverty (Laborde et al., 2020), has changed the behaviour of the food consumers (Gutiérrez-Villar et al., 2021), has led to higher food prices and lower food prices sales of goods and services (by Vet et al., 2021).

The supply of electricity during such a difficult period represents an essential service and, of course, the discontinuations are not acceptable (Zhong et al., 2020). Some authors in their studies have addressed the impact of the pandemic on the energy consumption patterns (Ghiani et al., 2020; Santiago et al., 2021) as well as the changes in the energy mix (Hosseini, 2020; Akrofi and Antwi, 2020).

Navon and colleagues (Navon et al., 2021) have stated that the Covid-19 pandemic is not only a global health crisis, but also an indication of a new era of economic activity whose potential consequences cannot be understood nowadays.

Rajput and colleagues (Rajput et al., 2020) have provided an analysis of the current and likely impact of the COVID-19 pandemic. The sudden outbreak of the COVID-19 pandemic has caused global declines in the goods process. This situation has mainly affected the demand as well as the supply of goods. The oil market has been severely affected by the collapse in demand, mainly due to travel restrictions which have also led to a sharp drop in the oil prices. Fuel demand has fallen to unprecedented levels especially in terms of the aircraft fuel demand (Chiaramonti and Maniatis, 2020).

The researchers have pointed out that the impact of the pandemic has varied when it comes to regions and countries. This aspect is related to the different degree the spread of the pandemic, but also to the different role of the analyzed areas on the energy market. Nyga-Łukaszewska and Aruga (Nyga-Łukaszewska and Aruga, 2020) have studied the impact of the pandemic on oil and gas prices in the United States and Japan. If in the US the pandemic of COVID-19 has had a significant negative effect on the price of oil and a positive effect on the price of gas, in Japan, this negative impact is visible only on the oil market.

Other global and local factors have also influenced the demand for and supply of energy products and the health of energy and fuel companies. The pandemic is not responsible for all changes which have taken place in the energy market. As Cohen (Cohen, 2020) has pointed out, the "oil price war" taking between Saudi Arabia and Russia has also contributed to the fall and destabilization of oil prices in the first half of 2020 (Hasan et al., 2021).

Drabecki and Kulak's study (Drabecki and Kulak, 2021) which has been conducted in four European countries which have reacted differently to the spread of the epidemic at government level (e.g. Italy, the United Kingdom, Poland and Sweden) has showed that the global pandemics can have a major impact on the electricity demand as well as on the share prices of the electricity companies.

The outbreak of the COVID-19 pandemic has led to serious global socio-economic disruptions that affected all the economic sectors including the tourism industry, the tertiary sector the operational sector as well as the opening of public offices, the closure of schools and the organization of families. The aim of Ghiani and his collaborators' study is to show the impact of the restrictions and stoppage of the activities in Italy as well as to discuss the effects of the COVID-19 outbreak on the entire electricity sector (Ghiani et al., 2020).

In their study, Bieszk-Stolorz and Markowicz (2021) have stated that in Poland, like in other countries, too, the decline in terms of the energy demand during the pandemic has led to a decline in the turnover of energy companies and fuels. The consumption reduction has been a consequence of the restrictions which have been set in place by governments in order to prevent the spreading of the virus. This has caused uncertainty in terms of the economic development and has increased the corporate profit which is reason of the falling stock prices. Thus, the long-term share prices have been affected by the unfavorable financial results of the companies. On a short-term basis, the fall in stock prices has been caused by the investors' fears related to the development of the pandemic, the following news from around the world of an increase in the number of cases of the disease. The governments of the countries affected by the pandemic first introduced restrictions that resulted in a reduced energy demand. The government measures, such as the restriction of the road and air transportation, the restrictions in terms of the teaching activities in schools, the restrictions imposed on the manufacturing companies, shops and offices, have led to a significant reduction of the global energy and fuel demand. All these facts have led to a decrease in the share prices of the companies in this sector, the intensity of their decline being more than double compared to other companies in other sectors.

RESULTS AND DISCUSSIONS

In order to develop the present study, the documentation has been done based on the financial information of three energy and fuel companies listed on the main segment of the Bucharest Stock Exchange (i.e. ROMGAZ Ltd., NUCLEARELECTRICA Ltd. and OMV PETROM Ltd.), for 2018-2020. Our endeavor was meant to highlight the impact that the COVID-19 pandemic on the financial results, on the one hand, and on the evolution of the share price of the three studied companies on the other hand. The financial information was retrieved, processed and transposed into tables by using Microsoft Editor for Word & Excel.

In 2020, the global economy faced a deep and rare crisis which was triggered by the COVID-19 pandemic. It impacted both the health of the population and the economies of the worldwide countries. As a result of the exceptional measures taken by governments around the world to counter the pandemic, the global economy contracted sharply by 3.5% thus suffering the worst recession since the Great Depression (1929-1933). The world trade volume fell by 9.6% as a result of the significant slowdown in the economic activity during the first half of 2020. The political decision-makers and central banks have reacted rapidly and have implemented a series of unprecedented support schemes in order to support households, the enterprises and the financial markets (according to the OMV PETROM Annual Report, 2020).

In the same year, the euro area economy was also affected by the extraordinary and the severe shock generated by the coronavirus pandemic (COVID-19). The economic activity contracted sharply during the first half of the year as a result of the containment measures and the increased risk aversion. The strong and coordinated response from the monetary and the fiscal policies, as well as the positive news on vaccines, have helped to stabilize economic activity during the second half of the year. Generally speaking, the euro area of the GDP contracted by 6.6% in 2020. The total annual inflation dropped by 0.3% from 1.2% in 2019 largely due to decline of the energy prices even if this development was related to the pandemic. For example, the sectors which were hit the hardest by the crisis, such as the transportation and the hospitality sectors, contributed to a lower inflation during the second half of 2020 (according to the ECB Annual Report, 2020).

As far as the situation of ROMGAZ Ltd. is concerned, we have selected the following economic and financial indicators as shown in Table no. 1:

Table no. 1. Economic and financial indicators for ROMGAZ Ltd.

Company	Indicators	Reporting period			Evolution (%)	
		1.01-31.12.2018	1.01-31.12.2019	1.01-31.12.2020	2019/2018	2020/2019
ROMGAZ Ltd.	Net turnover (RON)	4,964,733,263	4,924,879,529	3,926,033,569	-0.80	-20.28
	Net income (RON)	1,360,546,709	1,046,406,623	1,278,884,673	-23.09	+22.22
	Net margin rate (%)	27.40	21.25	32.57	-22.47	+53.31
	EBITDA (RON)	2,346,686,886	2,669,630,961	1,948,616,546	+13.76	-27.01
	Market capitalization (RON)*	10,714,742,720	14,299,171,040	10,830,369,440	+33.45	-24.26

Source: Author's personal contribution based on the company's financial statements

* The recorded values are on December 30th of each year.

The data provided by the table shows that the turnover decreased during the entire analyzed period. The company's net result, after a decrease of 23.09% in 2019, increased by 22.22% during the following year. The net margin rate also showed oscillating evolutions which were influenced by the superior dynamics of the net result compared to the one of the turnover. EBITDA also showed an oscillating evolution decreasing by 27% in the last year of the analysis. The market value of the company, following an increase of 33.45% in 2019, decreased by 24.26% in the following year (the market capitalization on March 23rd, 2020 was of 9,943,897,920 RON).

The effects of the COVID-19 pandemic on the Romanian economy were reflected on the production of natural gas, which decreased by approximately 14% in 2020 compared to the

previous year and implicitly on sales prices, decreasing them (adapted after the Annual Report of the company ROMGAZ Ltd., 2020).

In 2020, the trading prices of shares and GDRs were negatively influenced, on the one hand, by the evolution of the COVID-19 pandemic and the decrease in the price of oil (a trend observable especially at the end of the first quarter of 2020) and, on the other hand, the declining financial results for the first half and the third quarter of 2020 compared to previous periods. Thus, in the first two months of 2020, the trading price of ROMGAZ shares followed a slightly oscillating trend, increasing in January, up to a maximum of 37.70 RON / share reached on January 17th, 2020 (which is and the maximum of the year). Starting with March 2020, as a result of the declaration of the COVID-19 pandemic worldwide by the World Health Organization, as well as the decrease of the oil price, the ROMGAZ share registered considerable decreases up to a minimum of 25.80 RON / share on March 23rd, 2020 (Annual report of ROMGAZ Ltd., 2020).



Chart no. 1. The evolution of the SNG share price during 2018-2020

Source: Adapted based on <https://bvb.ro/FinancialInstruments/Details/FinancialInstrumentsDetails.aspx?s=SNG>

In terms of the situation of NUCLEARELECTRICA Ltd., we have selected the following economic and financial indicators shown in Table no. 2:

Table no. 2. Economic and financial indicators for NUCLEARELECTRICA Ltd.

Company	Indicators	Reporting period			Evolution (%)	
		1.01-31.12.2018	1.01-31.12.2019	1.01-31.12.2020	2019/2018	2020/2019
NUCLEARELECTRICA Ltd.	Net turnover (RON)	2,129,744,920	2,379,424,484	2,448,712,083	+11.72	+2.91
	Net income (RON)	410,611,215	535,667,264	699,322,229	+30.46	+30.55
	Net margin rate (%)	19.28	22.51	28.56	+16.77	+26.86
	EBITDA (RON)	1,228,360,636	1,314,841,225	1,409,774,210	+7.04	+7.22
	Market capitalization (RON)*	2,460,353,024	4,299,587,515	5,387,359,947	+74.75	+25.30

Source: Author's own contribution according to the company's financial statements.

* The values recorded are on December 30th of each year.

From the data provided in the table above it is observed that both the turnover and the net result and EBITDA increased over the entire analysis period. Against the background of the superior dynamics of the net result compared to the turnover, it was possible to observe an increase of the net margin rate by 16.77%, respectively 26.86%. Also, the market value of the company

increased over the entire analysis period, reaching the value of 5,387,359,947 RON at the end of 2020 (the market capitalization on March 16th, 2020 was of 3,310,622,084 RON).

Globally, interest in nuclear power increased during 2020 with the Covid-19 pandemic. About 10% of the world's electricity is generated by about 440 nuclear reactors, so nuclear reactors have played a key role in maintaining electricity supply (Processed after the Annual Report of NUCLEARELECTRICA Ltd., 2020).

Although the year 2020 was a challenging and difficult one due to the pandemic context, the company achieved very good financial results, complied with and fulfilled its investment programs, the nuclear beam manufacturing and delivery program, the electricity and heat production program and obtained an operating profit (EBITDA) higher by approximately 7.22% compared to the same period of the previous year. The company's operating expenses registered a decreasing trend compared to the previous year of approximately 4%, the pandemic context causing increases only in terms of expenses such as protective equipment, sanitation services, expenses with isolated personnel, and the cost reductions due to travel restrictions imposed by state authorities (i.e. less travel costs, training courses and seminars) (adapted after the Annual Report of NUCLEARELECTRICA Ltd., 2020).



Chart no. 2. The evolution of the SNN share price during 2018-2020

Source: Adapted based on <https://bvb.ro/FinancialInstruments/Details/FinancialInstrumentsDetails.aspx?s=SNN>

Regarding the situation of OMV PETROM Ltd., we selected the following economic-financial indicators which have been shown in Table no. 3:

Table no. 3. Economic and financial indicators of OMV PETROM Ltd.

Company	Indicators	Reporting period			Evolution (%)	
		1.01-31.12.2018	1.01-31.12.2019	1.01-31.12.2020	2019/2018	2020/2019
OMV PETROM Ltd.	Net turnover (RON)	17,817,366,024	19,793,585,306	14,795,525,494	11.09	-25.25
	Net income (RON)	3,879,650,048	3,563,589,092	1,381,578,837	-8.15	-61.23
	Net margin rate (%)	21.77	18.00	9.34	-17.32	-48.13
	EBITDA (RON)	7,550,326,492	7,648,097,421	6,228,800,307	1.29	-18.56
	Market capitalization (RON)*	16,936,588,392	25,319,916,426	20,590,133,380	+49.50	-18.68

Source: Author's own contribution according to the company's financial statements.

* The recorded values are on December 30th of each year.

The data presented in the above table show that all the indicators decreased during 2020 in comparison to the previous year. The market value of the company was affected, too, since it decreased by 18.68% in 2020 and reached the value of 20,590,133,380 RON at the end of the year (i.e. the market capitalization on March 16th, 2020, was of 15,803,706,225 RON). The alteration of the economic and financial indicators was caused both the Covid-19 pandemic and the accelerated increase of the supply determined by the existing tensions in terms of the oil exporting countries.

During 2020, the evolution of OMV Petrom's share prices was significantly influenced by the evolution of the Covid-19 pandemic, which also caused stock market crashes, both locally and internationally, especially during February-April 2020. (according to the Annual report of OMV PETROM Ltd., 2020).

The year 2020 started on a positive note, and the maximum trading price of 0.4500 RON / share was reached shortly on January 7th and the 9th. However, by the end of January 2020, markets had already begun to decline after the World Health Organization declared the Covid-19 epidemic.

The correction of the capital market deepened in March, having as catalyst the turbulences on the crude oil market. During this period, the crude oil and gas sector suffered twin shocks: the destruction of the demand under the impact of the pandemic and the accelerated supply growth caused by OPEC+ tensions. The tensions culminated with Saudi Arabia's increase in crude oil production and its sale at a low price, thus leading to a free fall in crude oil prices in the international markets. On March 9th and the 12th, the international stock markets experienced one of the largest daily declines in recent years as the Covid-19 disease was declared a pandemic (on March 11th) when the quarantine measures were widely imposed on globe. In this context, on March the 9th, the company's share recorded the largest daily price decrease in 2020 of 13.9% (according to the Annual Report of OMV PETROM Ltd., 2020).



Chart no. 2. The evolution of the SNP share price during 2018-2020

Source: adapted after <https://bvb.ro/FinancialInstruments/Details/FinancialInstrumentsDetails.aspx?s=SNP>

In 2020, the Romanian economic environment was marked by a high degree of uncertainty, largely caused by the coronavirus pandemic (Covid-19). Despite of the high market volatility and the low demand, OMV Petrom's achievements at the end of 2020 are outstanding. They have proved once again the value of the integrated business model, the flexibility in adjusting the plans

and the resilience of the company's results (based on the Annual report of OMV PETROM Ltd, 2020).

CONCLUSIONS

The conclusion is that the situation of the fuel and energy sector has deteriorated significantly during the analyzed crisis period which has been generated by the Covid-19 pandemic. The findings of the present study have important implications for both the investors and the financial managers and can contribute to the design of the low-risk portfolios based on the energy market's specific conditions (e.g. health crisis). The present study expands the existing literature on the impact of a pandemic in general (the Covid-19 pandemic in particular) on the Romanian capital market. Many studies have been conducted and published on the impact of Covid-19 on the energy and fuel companies in different countries. Therefore, the contribution of the present study will be an extension to the global literature on the impact of the Covid-19 pandemic on the economies of the countries, in general, and on the energy and fuel companies listed on the regulated market of the Bucharest Stock Exchange (Romania) in particular. Future research plans will include an analysis of the situation of the European energy and fuel companies, the way the Covid-19 pandemic has altered the financial results of companies and has changed the lives of the world's population.

BIBLIOGRAPHY

1. Ahmar, A.S.; del Val, E.B., *SutteARIMA: Short-term Forecasting Method, A Case: Covid-19 and Stock Market in Spain*, Science of the Total Environment, 2020, vol. 729, <https://doi.org/10.1016/j.scitotenv.2020.138883>
2. Akrofi, M.M.; Antwi, S.H., *COVID-19 Energy Sector Responses in Africa: A Review of Preliminary Government Interventions*, Energy Research and Social Science, 2020, vol. 68, <https://doi.org/10.1016/j.erss.2020.101681>
3. Al-Awadhi, A.M.; Alsaifi, K.; Al-Awadhi, A.; Alhammadi, S., *Death and Contagious Infectious Diseases: Impact of the COVID-19 Virus on Stock Market Returns*, Journal of Behavioural and Experimental Finance, 2020, vol. 27, <https://doi.org/10.1016/j.jbef.2020.100326>
4. Avtar, R.; Tripathi, S.; Aggarwal, A.K.; Kumar, P., *Population-Urbanization-Energy Nexus: A Review*, Resources, 2019, 8(3), 136, <https://doi.org/10.3390/resources8030136>
5. Bieszk-Stolorz, B.; Markowicz, I., *Decline in Share Prices of Energy and Fuel Companies on the Warsaw Stock Exchange as a Reaction to the COVID-19 Pandemic*, Energies 2021, 14(17), pp. 13, 14, <https://doi.org/10.3390/en14175412>
6. Chiaramonti, D.; Maniatis, K., *Security of Supply, Strategic Storage and Covid19: Which Lessons Learnt for Renewable and Recycled Carbon Fuels and Their Future Role in Decarbonizing Transport?* Applied Energy 2020, vol. 271, <https://doi.org/10.1016/j.apenergy.2020.115216>
7. Cohen, A., *Too Little too Late? Russia and Saudi Arabia Reach Truce in Oil Price War*, Retrieved from Forbes, 2020, available online: <https://bit.ly/2W9STZC>
8. Colombo, E., Bologna, S., Maserà, D., *Energy and Sustainable Economic Development, Renewable Energy for Unleashing Sustainable Development*, Springer: Cham, Switzerland, 2013, pp. 181-193
9. de Vet, J.M.; Nigohosyan, D.; Núñez Ferrer, J.; Gross, A.K.; Kuehl, S.; Flickenschild, M., *Impacts of the COVID-19 Pandemic on EU Industries. Publication for the Committee on Industry, Research and Energy, Policy Department for Economic, Scientific and Quality of Life Policies*, European Parliament, Luxembourg. 2021, available online: <http://www.europarl.europa.eu/supportinganalyses>

10. Drabecki, M.P.; Kulak, K.B., *Global Pandemics on European Electrical Energy Markets: Lessons Learned From the COVID-19 Outbreak*, International Journal of Energy Optimization and Engineering, vol. 10, issue 3, 2021, <https://www.igi-global.com/viewtitlesample.aspx?id=280133&ptid=254344&t=global%20pandemics%20on%20european%20electrical%20energy%20markets>
11. Ezeaku, H.C.; Asongu, S.A.; Nnanna, J., *Volatility of International Commodity Prices in Times of COVID-19: Effects of Oil Supply and Global Demand Shocks*, The Extractive Industries and Society, 2021, vol. 8, issue 1, 257-270, <https://doi.org/10.1016/j.exis.2020.12.013>
12. Ghiani, E., Galici, M., Mureddu, M., Pilo, F., *Impact on Electricity Consumption and Market Pricing of Energy and Ancillary Services during Pandemic of COVID-19 in Italy*, Energies 2020, 13(13), 3357; <https://doi.org/10.3390/en13133357>
13. Gutiérrez-Villar, B.; Melero-Bolaños, R.; Carbonero-Ruz, M., *COVID-19's First Wave: Examination of Impact on Food Purchasing, Behavior in the Eurozone*, Foods 2021, 10(6), 1179, <https://doi.org/10.3390/foods10061179>
14. Halkos, G.E.; Tsirivis, A.S., *Effective Energy Commodities' Risk Management: Econometric Modelling of Price Volatility*, 2018, vol. 63, pp. 234-250, <https://doi.org/10.1016/j.eap.2019.06.001>
15. Hasan, B.; Mahi, M.; Sarker, T.; Amin, R., *Spillovers of the COVID-19 Pandemic: Impact on Global Economic Activity, the Stock Market, and the Energy Sector*, Journal of Risk and Financial Management, 2021, 14(5), <https://doi.org/10.3390/jrfm14050200>
16. Hosseini, S.E., *An Outlook on the Global Development of Renewable and Sustainable Energy During of COVID-19*, Energy Research and Social Science, 2020, vol. 68, <https://doi.org/10.1016/j.erss.2020.101633>
17. Kurian, A.L., *Sustainable Development in The Energy Sector*, The Indian Journal of Political Science, 2012, vol. 73, no. 4, pp. 673-682
18. Laborde, D.; Martin, W.; Swinnen, J.; Vos, R., *COVID-19 Risks to Global Food Security*, Science 2020, vol. 369, issue 6503, pp. 500-502, DOI: 10.1126/science.abc4765
19. Manisalidis, I.; Stavropoulou, E.; Stavropoulos, A.; Bezirtzoglou, E., *Environmental and Health Impacts of Air Pollution: A Review*, Frontiers and Public Health, 2020, vol. 8, no. 14, <https://doi.org/10.3389/fpubh.2020.00014>
20. Navon, A.; Machlev, R.; Carmon, D.; Onile, A.; Belikov, J.; Levron, Y., *Effects of the COVID-19 Pandemic on Energy Systems and Electric Power Grids - A Review of the Challenges Ahead*, Energies 2021, 14(4), <https://doi.org/10.3390/en14041056>
21. Nyga-Łukaszewska, H.; Aruga, K., *Energy Prices and COVID-Immunity: The Case of Crude Oil and Natural Gas Prices in the US and Japan*, Energies 2020, 13(23), <https://doi.org/10.3390/en13236300>
22. Omer, A.M. *Energy Use and Environmental Impacts: A General Review*, Journal of Renewable and Sustainable Energy, 2009, <https://doi.org/10.1063/1.3220701>
23. Rajput, H.; Changotra, R.; Rajput, P.; Gautam, S.; Gollakota, A.R.K.; Arora, A.S., *A Shock Like No Other: Coronavirus Rattles Commodity Markets*, Environment, Development and Sustainability, 2020, 23, 6564-6575, <https://link.springer.com/article/10.1007/s10668-020-00934-4>
24. Santiago, I.; Moreno-Munoz, A.; Quintero-Jiménez, P.; Garcia-Torres, F.; Gonzalez-Redondo, M., *Electricity Demand During Pandemic Times: The Case of the COVID-19 in Spain*, Energy Policy, 2021, vol. 148, 111964, <https://doi.org/10.1016/j.enpol.2020.111964>
25. Smil, V., *Energy and Civilization: A History*, MIT Press, London, UK, 2017
26. Zhong, H.; Tan, Z.; He, Y.; Xie, L.; Kang, C., *Implications of COVID-19 for the Electricity Industry: A Comprehensive Review*, CSEE Journal of Power and Energy Systems, 2020, vol. 6, issue 3, 489-495

27. <https://www2.deloitte.com/ro/en/pages/business-continuity/articles/prețul-istoric-negativ-al-petrolului-implicatii-pentru-romania.html>, [accessed on 20.09.2021]
28. The annual report of OMV PETROM Ltd., 2020, https://bvb.ro/infocont/infocont21/SNP_20210427162254_Rapoarte-anuale-situatii-financiare-si-plati-catre-guverne.pdf, p. 25, [accessed on 27.09.2021]
29. The annual report of ROMGAZ Ltd., 2020, https://bvb.ro/infocont/infocont21/SNG_20210427163510_Raportul-anual-2020.pdf, p. 26, [accessed on 27.09.2021]
30. The annual report of NUCLEARELECTRICA Ltd., 2020, https://bvb.ro/infocont/infocont21/SNN_20210426131045_Raport-anual-2020-RO.pdf, p. 7, [accessed on 27.09.2021]
31. Annual Report of the European Central Bank, 2020, <https://www.ecb.europa.eu/pub/annual/html/ar2020~4960fb81ae.ro.html>, [accessed on 8.10.2021].
32. *US Oil Prices Turn Negative as Demand Dries Up*. Retrieved from BBS News, 2020, available online: <https://www.bbc.com/news/business-52350082>, [accessed on 1.09.2021].