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## Article

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# Prospects for the Development of Transport in Poland during the Energy Crisis

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## ABSTRACT

Recent years have been times of crisis triggered by the Covid-19 pandemic and the Russian attack on Ukraine. Energy markets have seen dynamic increases in commodity prices, which have continued to this day. The prices of oil, whose rise fuels inflation are particularly important for the world economy. The paper presents an overview and per-prospects for the development of transport in Poland during the energy crisis and the Covid-19 pandemic. The analysis carried out on the example of Poland clearly shows that in the near term there is no chance to reduce fuel prices in Poland, which would result in a decrease in transport costs. It seems that the only chance for companies to reduce transport costs is to change their supply and inventory management strategies to take advantage of economies of scale and maintain high inventory levels. On the other hand, in world markets, oil prices will fall only if the war in Ukraine finishes.

**Keywords:** Energy Crisis, Oil, Transport, Covid-19, Poland

**JEL Classifications:** L9, O13, P18,Q00

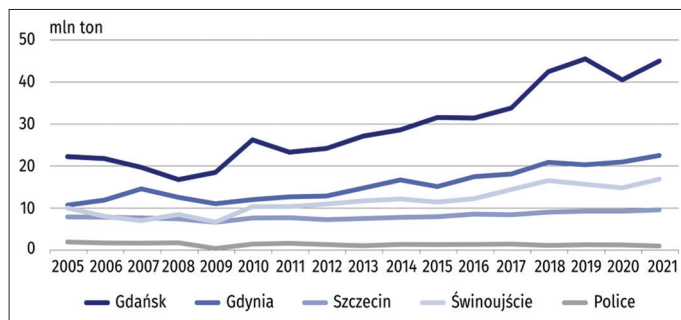
## 1. INTRODUCTION

In recent years, crisis situations such as natural disasters, economic crises, migration crises, political conflicts and terrorist attacks have had a significant impact on the price of oil. Oil prices have shown rapid fluctuations in global markets (Galini et al., 2020; Llamas and Sovacool, 2021; Silvennoinen and Thorpe, 2013; Sheng et al., 2020). Changes in oil price markets affect the environment, energy efficiency, the economy, financial markets and, above all, determine the level of inflation worldwide (Shah et al., 2020; Sun et al., 2021; Ahmadi et al., 2022; Song et al., 2022; Long and Zhang, 2022; Zulfigarov and Neuenkirch, 2020). Recent years vividly show how dynamically the increase in oil prices in the market raises the level of inflation.

The political situation in Europe and Russia's armed attack on Ukraine resulted in historic geopolitical changes in the oil market. It has changed a number of economic relations between countries

practically all over the world. There are countries such as China, Serbia, Hungary, or India that are benefiting from the fact that some countries in Europe have turned their backs on Russia and abandoned Russian oil. It can be said that these countries are filling their warehouses with cheap oil. However, this will not protect them from high levels of inflation, because the world and mainly Europe, will benefit from more expensive oil from different suppliers, which will raise transportation costs around the world. In turn, transportation costs will affect the prices of products, materials, goods or services. It seems that the countries that now benefit from cheap Russian oil will in the future bear the costs of their irreconcilable political decisions. The world will hold those who finance the genocides in Ukraine accountable.

Today, political relations have a particular impact on oil prices. Figure 1 below shows the world's largest fuel producers. When analyzing the Table 1, one can see that several countries decide and will decide the level of oil prices on the financial markets.

**Figure 1:** Cargo turnover in seaports in Poland.

Source: Central Statistical Office

**Table 1: Global oil production 2021**

Countries that produced the most oil in the world in 2021	Data in millions of barrels per day
USA	11.6
Russia	10.5
Saudi Arabia	10.2
Canada	4.6
Iraq	4.3
China	4.0
United Arab Emirates	3.0
Iran	2.5

Source: Energy information administration

Table 1 confirms that the role of Russia and its relations with other countries, have a huge impact on future oil prices in this market. Such relations between producers and their powerful influence on oil prices and have already been analyzed in many studies (Ansari, 2017; Behar and Ritz, 2017; Bradshaw et al., 2019; Parnes, 2019; Plante, 2019).

Unfortunately, the BRISC summit in the last days of June 2022 shows that Europe may have big problems with curbing inflation. A new economic coalition of Russia, China and Brazil is emerging. Unfortunately, the Arab countries are also better off working with Russia. To this day, it remains unclear whether it will be possible to supply oil from Iran to Europe. In recent days, post-appearance of information about arms deliveries from Iran to Russia may lead to a blockade of this direction of oil supplies to Europe. OPEC-affiliated countries, on the other hand, are not interested in lowering oil prices, despite US suggestions. An alternative for Europe and the World could be oil from Venezuela. Slowly one can see how the world is beginning to see "races" between countries in the search for suppliers of cheap oil. Certainly also not good for oil prices will be the recent statement of the CEO of JP Morgan who warned investors that the war in Ukraine will continue to put pressure on global commodity markets and that the conflict could raise oil prices to \$150 or \$175 per barrel.<sup>1</sup>

If we additionally take into account the information that in China the economy is beginning to recover from the lockdowns after the Covid-19 pandemic, it is reasonable to assume that the price of this raw material will grow dynamically (Song et al., 2022; Long and Zhang, 2022; Zulfigarov and Neuenkirch, 2020; Lorde et al., 2009). Although in the case of China, the alliance between Russia

and China provides them with a low oil price, which, however, should not negatively affect the price of oil in European markets. However, this will mean big problems for the world and a massive increase in inflation rates.

So it seems a necessity to look for an alternative to oil. When analyzing the current situation in the world, it is clear how the increase in oil prices directly affects the growth in inflation rates. And oil prices are bound to rise which will increase transportation costs, and consequently the prices of all products and services.

In the literature one can find a number of studies that clearly show the dependence of inflation on oil prices or the Covid-19 pandemic (Hamilton, 1983; Nusair and Olson, 2019; Apergis and Apergis, 2020; Gil-Alana and Monge, 2020; Li et al., 2022; Kollias et al., 2013; Kaymak and Kaymak, 2022; Bach Pchan et al., 2021; Soava and Mehedintu, 2023). Specifically, studies by Kamber and Wong (2020) and Zhang (2022) show that energy commodity prices had a powerful impact on inflation. (Zhnag, 2022; Kilian, 2010; Kamber and Wong 2020; Aastviet, 2015; Baumeister and Kilian, 2016). While Hamilton (1983) first revealed a close correlation between oil price shocks and macroeconomic performance, numerous studies showed that international oil price fluctuations affected macroeconomic variables to varying degrees (Song et al., 2022; Long and Zhang, 2022; Zulfigarov and Neuenkirch, 2020; Lorde et al., 2009; Katircioglu et al., 2015; Amiri et al. 2021). Nusair and Olson (2019) suggest that oil price shocks have asymmetric effects on the returns of several Asian countries, but do not consider China.

The literature even states that oil should be treated as the "blood" of any country's economy (Long and Zhong, 2022).

Therefore, it is necessary to slowly look for new solutions based on renewable energy, which will allow stopping or reducing the impact of oil price increases on inflation. Whoever succeeds in doing so will achieve high profitability and gain a competitive advantage.

The price of oil is a key building block for transportation costs. In turn, transport costs have an impact on inflation. An opportunity to reduce the cost of transportation based on high fuel consumption, which "drives" the increase in inflation, seems to be sea and rail transportation. To date, the studies conducted have not covered and analyzed the period of armed conflict, and at the same time the pandemic period in Central and Eastern Europe, and the analysis of the correlation between the price of oil, inflation (the impact of crises on the level of rail and sea transport).

There are studies in the literature mainly on terrorism and their impact on the operation of oil producers and maritime transport (Kollias et al., 2013; Amihud and Wohl, 2004; Drakos, 2010; Frey and Kucher, 2000; Frey and Kucher 2001; Behar and Ritz, 2017; Abadie and Gardeazabal, 2003; Bird et al., 2008; Crain and Crain, 2006).

Soava and Mehedintu (2023), on the other hand, writes that the war in Ukraine has a major impact on the energy markets of neighboring countries, such as Romania.

<sup>1</sup> <https://www.ft.com/content/07108e32-aff1-4d8c-8950-7f7c4e5a5f28>

There are also studies that indicate that Somali pirate attacks have a negative impact on prices and inflation (Belasen et al., 2017). There is an increase in delivery times due to attempts to bypass bodies of water that pose a threat (Belasen et al., 2017; Gambardella, 2011; Leeson, 2009; Leeson, 2010).

There are papers that describe the "trade war" between the U.S. and China or earlier Saudi Arabia and Russia as another factor strongly affecting fuel prices (Ma et al., 2021; Carlomagno and Albagli, 2022).

Thus, the review carried out represents, in a sense, a research gap and presents new insights into the relationship between the price of oil, inflation and the impact of these phenomena on the choice of maritime transport as the primary form of transportation during the armed conflict in Europe.

## 2. TRANSPORTATION IN POLAND

Maritime transport is one of the cheapest means of transportation. When analyzing data on the dynamics of maritime transport in Poland, one can observe an increase in 2020-2021. Cargo turnover at seaports in 2021 amounted to 96.7 million tons, 9.2% more than in 2020. Figure 1 below shows the dynamics of turnover in Polish seaports in the years 2005-2021.

So you can see the powerful growth of this form of transportation. The years 2020 and 2021 are difficult to assess after the Covid-19 pandemic significantly depressed road transportation. Maritime transport has certainly benefited. Table 1 shows the share of the total structure of individual ports in nationwide turnover in 2021.

Figure 1 shows the dynamics of the various cargo groups that were transported by sea. When analyzing information from Central Statistical Office, it can be seen that a definite increase in 2020-2021 was recorded in the area of liquid bulk cargoes of about 31%, container cargoes of about 8%, and a decrease in dry bulk cargoes. In 2021, domestic maritime traffic amounted to 4.1 million tons (47.1% more than in the previous year) (CSO). In 2021, cargo carried by ships in relation to ports of Europe accounted for 68.0% of the international cargo turnover of Polish ports, Africa - 11.8%, Asia - 11.4%, Central and South America and North America each - 3.5%, and Australia and Oceania - 1.8%. (CSO). Central Statistical Office (2021) presents detailed information with which countries Polish ports have cooperated. Unfortunately, relations with Russia account for a large share of the structure. Already from 2022, a decrease is to be expected in the case of transactions with Russia. In the case of transit cargo turnover, an increase of about 14.4 million tons was recorded from 2021 to 2020. Compared to the previous year, an increase in transit cargo turnover was recorded in both exports (by 22.8%) and imports (by 8.4%). Based on the data presented in Central Statistical Office (2021), it can be seen that an increase in cargo turnover in Polish ports was recorded in the Covid-19 period of 2020-2021. This increase concerned domestic as well as international transport. At a time when fuel prices will be on the rise, it seems necessary to increase turnover in maritime transport. Unfortunately, the tragic war for Ukraine creates an opportunity for Poland to increase transportation by sea even of Ukrainian products. Such actions will certainly help to reduce the level of inflation in Europe in the future.

The balance of seaborne traffic at Polish ports is therefore expected to grow dynamically from 2022 onward. The problem for sea/water transportation may be the level of rivers in Poland. It can be said that another crisis, this time the climatic one, has lowered water levels throughout Europe, which has a negative impact on inland shipping in Poland as well as in countries such as Germany and France where this form of transport is very well developed. If river levels continue to fall in the next few months. Below (Tables 2-4) there are various data from the Central Statistical Office.

**Table 2: Share of individual ports in nationwide turnover 2021**

Port	Share in nationwide turnover (%)
Gdańsk	46.6
Gdynia	23.5
Świnoujście	17.8
Szczecin	10.2
Police	1.4
Other ports	0.5

Source: Own study based on the central statistical office

**Table 3: Cargo shipments by mode of transport (In tonnes- thous.)**

Mode of transport	2020	2021	2020/201 dynamics %
Total	2 201 252	2 253 377	103.6
Rail transport	218 381	237 915	108.9
Road transport	1 919 193*	1 952 465	101.7
Pipeline transport	51 489	49 854	95.2
Sea transport	8 135	9 587	109.9
Inland water transport	3 991	3 465	74.0

Source: Own study based on the central statistical office

**Table 4: Cargo shipments by mode of transport (In millions tone kilometers)**

Mode of transport	2020	2021	2020/201 dynamics %
Total	474 557*	491 427	102.4
Rail transport	51 096	54 387	106.4
Road transport	395 625*	410 224	103.7
Pipeline transport	20 435	18 428	90.2
Sea transports	6 658	7 554	113.5
Inland water transport	516	493	95.5

Source: Own study based on the central statistical office

**Table 5: Structure of cargo transportation by cargo groups in 2021 and changes compared to the previous year**

Structure	%
Metal ores and other mining and quarrying products; peat; uranium and thorium	23.1
Other non-metallic mineral products	10.8
Food products, beverages and tobacco	10.6
Coal and lignite; crude oil and natural gas	6.9
Products of agriculture, hunting and forestry; fish and other fishing and fishery products	6.6
Secondary raw materials; municipal and other wastes	6.0
Primary metals; fabricated metal products, excluding machinery and equipment	5.4
Wood and products of wood and cork (except furniture)	5.6
Chemicals, chemical intermediates, artificial fibers	5.3
Other	19.0

Source: Own study based on the central statistical office



In 2021, cargoes from the group of metal ores and other mining and quarrying products; peat; uranium and thorium accounted for the largest share in the structure of shipments (23.1%). Details in Table 5.

In maritime transport, the majority (61.0%) was cargo from the group of self-propelled rolling units.

### 3. CONCLUSION

At the moment it is clear that the global energy crisis will have a powerful impact on increasing transport costs. The growth in prices for transportation services will in turn further fuel inflation. We should expect an increase in the level of oil prices in quarters III and IV of 2022. It seems that a powerful stimulus that would cause a drop in world oil prices would be the end of the war caused by Russia. This would certainly lead to drops in oil prices in the market. However, it should be borne in mind that in the following years there could be further terrorist attacks organized by the Russian state against Ukraine and other European countries. Therefore, all European countries should continue building their energy policy without considering gas and oil from Russia. Such a policy will allow building a secure, probably in the coming years expensive, energy security policy in Europe. Poland has already taken such measures.

Turning away from the supply of oil, gas and energy from Russia will raise energy prices in Europe, but most importantly will weaken Russia for years to come. In the future it may also come to a situation where oil from Russia will be the cheapest in the world, which will allow European countries to take advantage of cheap raw materials. At the moment, however, this is not possible, because sanctions have been imposed, which weaken the terrorist Russia, showing which countries are building their potential on cooperation with Russia, such as Hungary in Europe. However, in the future if the majority of the world's governments turn their backs on Russia's terrorist state, the country will be forced to sell raw materials at ever lower prices to its few customers.

When analyzing the current situation in the world and the transport possibilities in Poland, it must be said that the situation and the transport possibilities are narrowing. This is, of course, a result of the energy crisis, which is slowly hitting Poland as well as other countries throughout Europe. Unfortunately, the price of oil is the most important component shaping the prices of transport services. When considering the situation and the transport capacity of Poland during the crises, it must be said that unfortunately road transport is the most important branch of transport. The cost of this transport will increase. This transport is considered one of the fastest, but the situation on Poland's eastern borders may lead to long delays. For instance, the conflict with Belarus over migrants halted road transport for several days this year. Border protests over cargo shipments to Russia have also caused delays. It seems that there may be problems here in the coming months, and transport companies will be looking for alternative road routes.

A safer solution is rail transport. Today, rail transport seems to be a very good solution. In the case of Poland, a big problem may be

relations with its eastern neighbors, i.e. Russia and Belarus, which can severely limit transport or cause severe blockades. However, such risks are lower compared to road transport. Importantly, rail transport is much cheaper than road transport.

Air freight transport in Poland is developing if we look at the dynamics, there was a 17% increase compared to 2020. However, the tonnage of this form of transport is small, at only 91 tons. Certainly, the unit cost for this form of transport and high fuel prices is very high. For special cases where cost is not important and delivery time is important, this is a very good form of transportation. Despite the fact that the war in Ukraine has closed the border and often lengthened the flight routes, it seems that this form of transportation is the best form of transportation.

In Poland in recent years, there has been a marked increase in transport services by sea and inland waterway. This is the cheapest source of transport, but it mainly concerns heavy goods. Unfortunately, in the case of inland shipping, weather conditions have a major impact. Poland has this transport network underdeveloped and the drought this year has severely lowered the water level, which in many places has made it impossible for inland transport to function. This year, however, the problem also affected the much more developed countries of Western Europe. What is different is sea transport, here investment in the expansion of seaports provides new opportunities. It seems to be the best and cheapest form of transportation. However, one has to reckon with extended delivery times compared to air, rail or truck transport. However, if there are companies that can use this form of transport, they should switch their supply system to this type of delivery so that the new delivery system does not lead to stock shortages. Admittedly, this will involve an increase in the cost of storing goods, raw materials because these deliveries will be in larger quantities, but there will be economies of scale. However, an attractive price will give one an advantage over competitors.

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