A BRIEF ANALYSIS OF THE EU ENERGY DEPENDENCY IN TERMS OF CONVENTIONAL RESOURCES

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TOPLICEANU Stefan-Catalin
Faculty of Economics and Business Administration, „Alexandru Ioan Cuza" University of Iasi, Romania
stefan.topliceanu@uaic.ro

POSTOLACHI Andrei-Teofil
Faculty of Economics and Business Administration, „Alexandru Ioan Cuza" University of Iasi, Romania

Abstract: Energy has been an important and priority subject for the European Union, while the Ukrainian war have intensified the member countries' uncertainties about the energy security. This paper aims to highlight the EU countries energy dependency on conventional resources. In this regard, this study presents a brief analysis regarding the 27 EU member states' domestic production, trade and consumption of conventional energy resources, especially oil products, natural gas and solid fossil fuels, for the period 2014-2022. The results show that there are differences between EU countries in terms of domestic production, internal consumption and trade. Although the situation for solid fossil fuels is optimistic, most EU countries need to rely on imports of petroleum products and natural gas from Russia in order to cover their consumption needs
Keywords: the Ukrainian war, oil dependency, Russian energetic resources, EU energetic imports.

Introduction

The European Union is recognised as one of the world's economic powers of the 21st century. Although the European Union is capable of competing with others global powers, it faces a number of weaknesses and shortcomings that have an impact on its economic development. Among these, the greatest challenge remains the EU's dependence on Russia's energy resources. Access to energy resources is one of the important elements of the welfare and sustainable development of economies. The security of energy supply is a priority topic on the agenda of EU Member States, taking into account the increasing demand and dependence on imports, the sensitivity of energy supply to geopolitical tensions (Chalvatzis & Ioannidis, 2017), such as the war between Russia and Ukraine, and the need to adapt to structural changes in international markets. The EU's energy relations are framed in terms of excessive dependence on Russia, which poses a threat to European security, especially with the emergence of geopolitical tensions (the Russia-Ukraine war) and energy crises. Considering these aspects, the aim of this paper is to present an analysis of the energy dependence on conventional resources for the EU countries, in general and on Russia, in the context of the war in Ukraine. In particular, the analysis is for the period 2014-2022 in order to capture the annexation of the Crimean peninsula by Russia and the beginning of the war between Russia and Ukraine.

Literature review

When it comes to the existence of an EU dependency, most studies in the literature treat the relationship between the EU and Russia in terms of the supply of energy resources. From this perspective, the literature is rich (Belyi, 2003; Finon & Locatelli, 2008; Casier, 2011; Belyi, 2012; Dyson & Konstadinides, 2016; DeBardeleben, 2020; Boute, 2022; Cebotari, 2022; Crowley-Vigneau *et al.,* 2023). Paillard (2010) suggests that economic and political interdependence between the European Union and Russia is valid for long term, despite the Russian reactions in the short term. On the other hand, Krickovic (2015) notes that the interdependence between the EU and Russia is not a complex one and, therefore, their relation evolves in such direction that one side is becoming more dependent on the other. In this case, the less dependent side can use this dependence for its own purposes. Braun *et al.* (2023) confirm that the EU countries are dependent on energy resources coming from Russia. As regarding the financial and military support to Ukraine, the EU countries provide different levels of support according to their dependency on Russian energy imports.

Data and methods

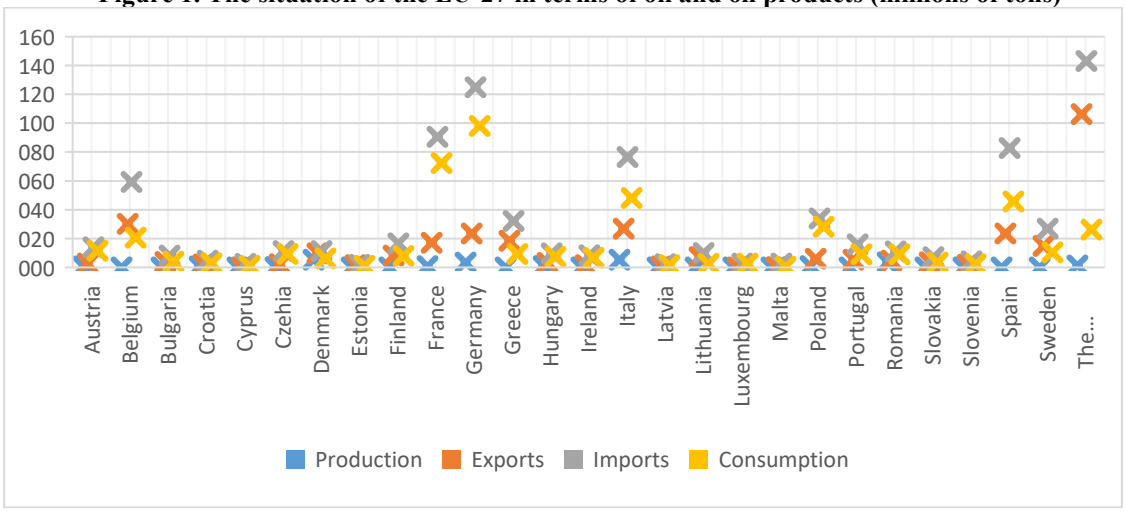
Methodology implies a systematic analysis of several dimensions related to the energy supply of EU countries. The analysis covers the 27 EU member countries for the period 2014-2022. The year 2014 is the first point of reference because in that year Russia annexed the Crimean Peninsula from Ukraine. The year 2022 is the second reference point, when war started between Russia and Ukraine because of the Russian invasion of Ukrainian territory. The study captures the analysis of European countries from the perspective of energy supply in two phases. The first stage comprises the analysis of EU countries' domestic production, imports, exports and consumption of oil and oil products, natural gas and solid fossil fuels. The second stage deals with EU countries' imports of oil and oil products, natural gas and solid fossil fuels from Russia. Statistical data are extracted from Eurostat (2024) and are graphically presented and interpreted by the authors.

Findings

The situation of EU countries in terms of conventional energy resources

All EU member countries had, on average for the period 2014-2022, a higher consumption of oil and oil products than their own production, having to rely on imports to meet their consumption needs. At the same time, the average values of imports of oil and oil products were higher, relative to both exports and consumption. Figure 1 shows that the Netherlands, Germany and France have the highest average import values over the period 2014-2022, exceeding 100 million tons for the first two. Of these three countries, only the Netherlands is among the countries with the highest average export values, being first with 106 million tons, followed by Belgium and Italy. On the other hand, in terms of consumption, Germany and France occupy the top two places with over 70 million tons each, followed by Italy, Spain and Poland. Compared to these, the average oil production is insignificant, with the richest productions being for Denmark and Italy, each with over 5 million tons. As a result, EU countries need to rely on imports to sustain their consumption of oil and petroleum products, with their own production almost negligible.

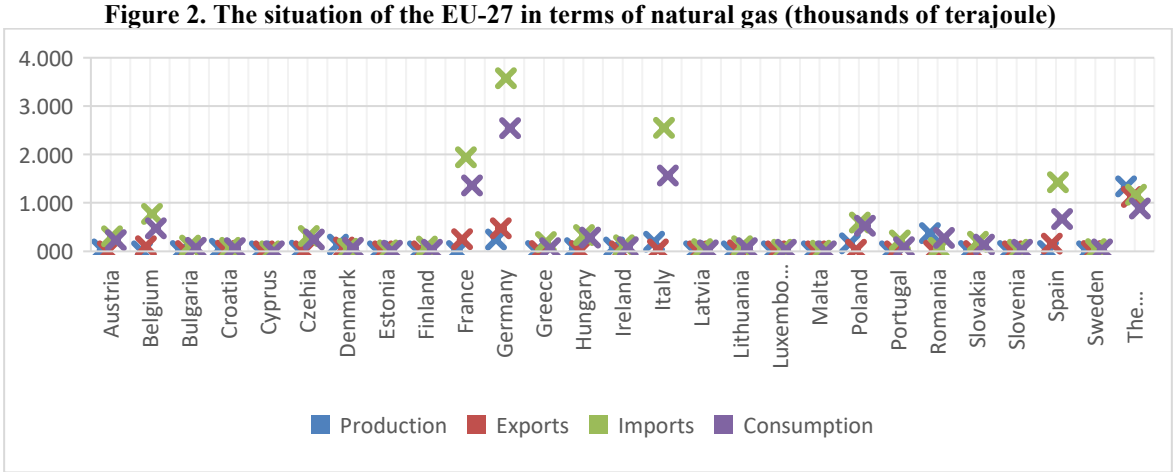
Figure 1. The situation of the EU-27 in terms of oil and oil products (millions of tons)



Source: own representation based on Eurostat

Worryingly, many EU countries are showing a downward trend in their production of oil and oil products, particularly after 2014. Following a downward trend, Austria and the Netherlands have almost halved their oil production in 2022 compared to 2012. Similarly, the Czech Republic has reduced its production in 2022 to a quarter of the capacity it had in 2012, and Denmark to a third. Lithuania, Slovakia and Spain's production has become almost non-existent over time, while for Germany, France and Romania production levels have decreased slightly. With regard to natural gas, the Netherlands, Romania and Denmark stand out, with natural gas production exceeding consumption between 2014 and 2022. On average, the surplus of production over consumption was close to 461,000 terajoule for the Netherlands, 98,000 terajoule for Romania and 67,500 terajoule for Denmark, as can be seen in Figure 2. At the same time, the Netherlands and Romania were the countries with the highest natural gas production at European level. The other EU Member States had a level of natural gas consumption that exceeded the production volume for the period 2014-2022. This demonstrates the need for member countries to cover their consumption needs through imports.

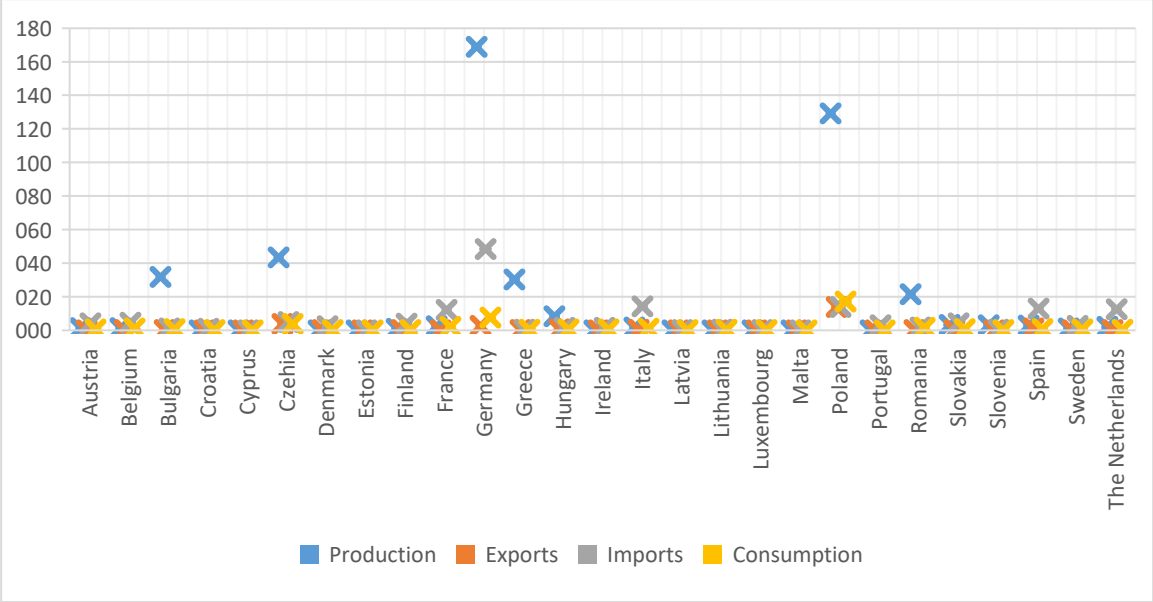
Figure 2. The situation of the EU-27 in terms of natural gas (thousands of terajoule)



Source: own representation based on Eurostat

The link between consumption needs and reliance on imports is evident in countries such as Germany, Italy, France, Spain, Belgium and Poland, which are among the countries with the highest average gas consumption and imports. A special case is the Netherlands, which has the largest production of natural gas in the EU but is also one of the largest consumers and importers (in the top 5), although the Netherlands is also the largest exporter of natural gas among EU countries. In general, the trend in the EU is to cover consumption needs through own production, accompanied by imports, with the surplus resulting from imports being exported. In terms of solid fossil fuels, the situation in EU countries is much better. Only in countries such as Cyprus, Croatia, Denmark, Denmark, Ireland, Luxembourg, the Baltic States and Portugal has the consumption of solid fossil fuels exceeded their own production capacity, as can be seen in Figure 3.

Figure 3. The situation of the EU-27 in terms of solid fossil fuels (millions of tons)



Source: own representation based on Eurostat

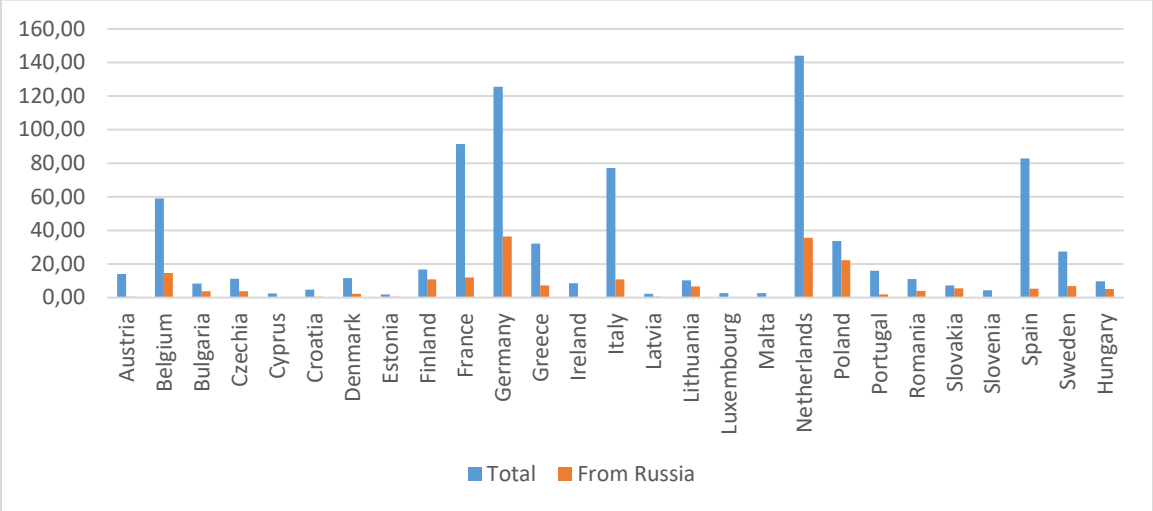
However, the differences over the period 2014-2022 between the average consumption and own production levels do not exceed 0.5 million tons for any of the countries mentioned, with the largest shortfall in this respect being in the case of Ireland (0.42 million tons). For all these countries, additional consumption needs have been covered by imports, while the highest average import values are recorded by Portugal. On the other hand, the other EU countries ensured their consumption of solid fossil fuels through their own production. Here, Germany and Poland stand out, with average own production values of over 125 million tons in the period 2014-2022, being the largest producers in the EU. At the same time, the level of consumption did not exceed 18 million tons for each of them, Poland and Germany being at the same time the largest consumers of solid fossil fuels in the EU. These two countries rank in the top three EU countries for exports of solid fossil fuels (together with the Czech Republic) and for imports (together with Italy). Together with these two countries, Bulgaria, the Czech Republic, Greece, Hungary, Greece, Romania, Slovenia and Romania stand out as the average production level of each of them exceeds both the

average import level for the period 2014-2022 and the consumption and export levels of each.

How energy dependent are EU countries on Russia?

From the point of view of the supply of oil and oil products through imports, the geographical and economic size of countries plays an important role. Thus, countries with small land areas, considered as having smaller economies, have low levels of imports of oil and oil products. According to Figure 4, for countries such as Estonia, Latvia, Cyprus, Luxembourg and Malta, the average values of imports of oil and petroleum products do not exceed 3 million tons for each country over the period 2014-2022. Large European economies such as the Netherlands, Germany, France, Italy, Spain and France are at the opposite pole. For the first two, the average value of imports of oil and petroleum products exceeds 125 million tons over the period 2014-2022 for each of them. At the same time, France, Spain and Italy each imported more than 75 million tons of oil.

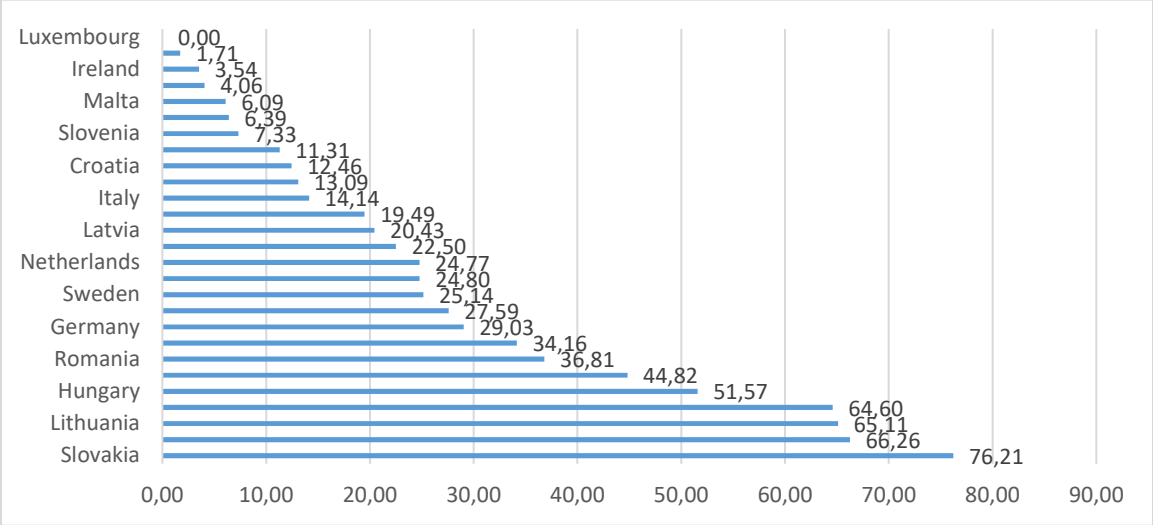
Figure 4. The EU-27 imports of oil and oil products (millions of tons)



Source: own representation based on Eurostat

Germany and the Netherlands are among the EU countries with the highest imports of oil and petroleum products from Russia, with over 35 million tons each. On the other hand, there is a group of nine EU countries whose Russian imports of oil and petroleum products do not exceed 0.6 million tons per country. This group includes island states like Malta and Cyprus as well as more developed economies like Austria, Croatia and Ireland. Also in this group are Estonia and Latvia, which although they have low values of total and Russian imports of oil and oil products, the share of Russian imports in total imports is over 20% each, making them exceptional cases of this group. However, for the period 2014-2022, there are also cases where the shares of Russian imports in total imports are higher. Figure 5 shows that at the top of the ranking is Slovakia, with an average of 76%, followed by a group consisting of Poland, Lithuania and Finland. At the same time, half of Hungary's total imports of oil and petroleum products come from Russia, while for Sweden, Belgium and the Netherlands they account for a quarter of total imports.

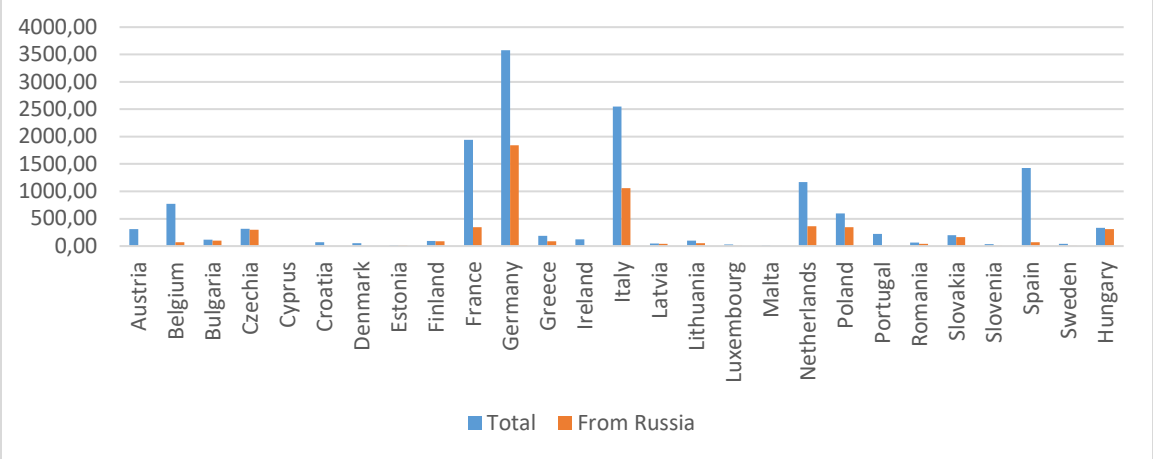
Figure 5. Share of Russian imports of oil and oil products in total imports (percentage)



Source: own representation based on Eurostat

Cases that are more fortunate may be Spain or Austria, which, while securing a relatively high level of oil and oil products through imports, the share of imports from Russia is below 7%. In terms of gas supply through imports, there are significant differences between EU countries for the period 2014-2022. According to Figure 6, Germany, Italy, France, Italy, Spain and the Netherlands have the highest average values of natural gas imports, above 1 million terajoule each, reaching up to 3.5 million terajoule for Germany. At the other end of the scale are the islands of Cyprus and Malta, as well as smaller countries like Estonia and Luxembourg.

Figure 6. The EU-27 imports of natural gas (thousands of terajoule)

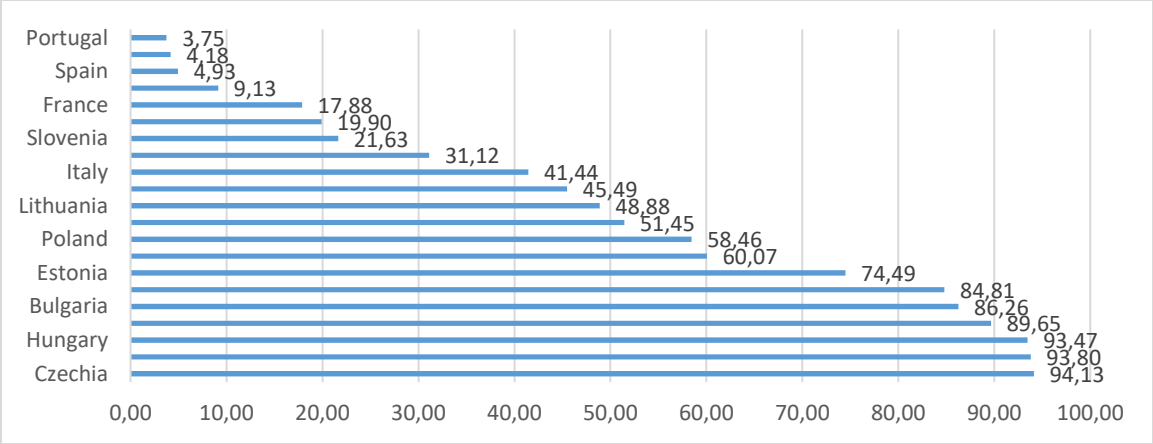


Source: own representation based on Eurostat

In terms of gas imports from Russia, countries such as Germany, Italy, the Netherlands and France are among the top five importers at EU level, along with Poland. The average values of Russian gas imports for the period 2014-2022 exceed 1 million terajoule for Germany and Italy. At the other end of the scale are countries that import natural gas in general but do not rely on imports from Russia, including Austria, Ireland, Croatia, Denmark and

Malta. Looking at the percentages, Figure 7 shows the existence of several country groupings for the period 2014-2022. One of them consists of six EU member countries, whose imports of natural gas from Russia exceed 80% of the total imports reported for each country. Another group can be considered as countries with percentages varying between 40% and 60%, of which Romania stands out with about 60% of gas imports from Russia in total imports. Between these two groups is Estonia with 75% for the period 2014-2022.

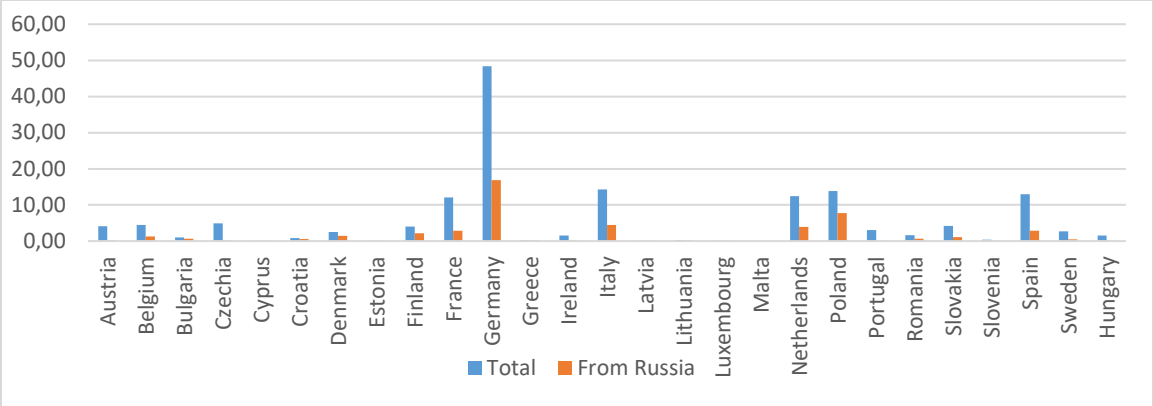
Figure 7. Share of Russian imports of natural gas in total imports (percentage)



Source: own representation based on Eurostat

At the other end of the spectrum, apart from the countries that do not rely on Russian gas imports at all, there are two other groups, this time with a smaller number of countries. One of these groups consists France, Luxembourg and Slovenia, with shares of Russian natural gas imports in total imports ranging from around 18% to 22%. In the second group are Portugal, Sweden, Spain and Belgium, whose imports of Russian natural gas are less than 10% of total imports for each country. From the perspective of imports of solid fossil fuels, Germany stands out as having the highest average values over the period 2014-2022, in terms of both total imports and imports from Russia. According to Figure 8, Germany's total imports are close to 50 million tons, the highest in the EU, but only 35% of them come from Russia (equivalent to 17 million tons). In contrast to Germany, the group of countries consisting of Italy, Poland, Spain, the Netherlands and France imported somewhere between 12 and 14 million tons each, but the share of Russian imports is close to that of Germany (for Italy and the Netherlands), or even higher in the case of Poland (around 56%).

Figure 8. The EU-27 imports of solid fossil fuels (millions of tons)

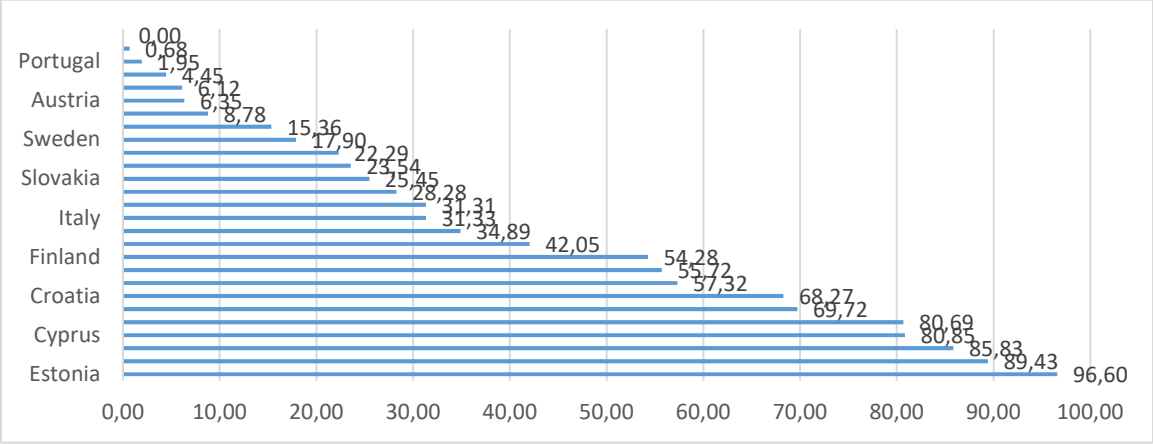


Source: own representation based on Eurostat

In fact, the highest average values of Russian imports of solid fossil fuels in the period 2014-2022 are recorded for Germany and Poland, while for the rest of the EU countries these imports do not exceed 5 million tons on a country-by-country basis. In addition, more than half of the EU countries did not import, on average, more than 1 million tons of solid fossil fuels from Russia in the period 2014-2022.

For Greece, Luxembourg, the Baltic countries, Cyprus, Malta and the Baltic States, the average values of imports of solid fossil fuels are insignificant (below 300,000 tons), but more than 80% of these imports come from Russia. The exceptions are Luxembourg and Malta, as shown in Figure 9. In a similar situation are Bulgaria and Croatia, which, although they imported on average no more than 1 million tons of solid fossil fuels in the period 2014-2022, about 70% are of Russian origin.

Figure 9. Share of Russian imports of solid fossil fuels in total imports (percentage)



Source: own representation based on Eurostat

For Denmark, Poland and Finland, about half of the imports of solid fossil fuels in the period 2014-2022 came from Russia, while for Slovakia and France they accounted for a quarter of total imports. Very low, insignificant, shares were recorded by Portugal and Slovenia, while Malta did not rely on imports of solid fossil fuels during the period under review.

Conclusions

The analysis of statistical data from 2014-2022 on the level of own production, consumption, imports and exports of oil, natural gas and solid fossil fuels reveals several trends. The EU countries need to rely on imports to sustain their consumption of oil and petroleum products, with own production almost negligible. At the same time, only the Netherlands, Romania and Denmark have natural gas production above the level of consumption, while for the rest of the EU countries there is a high need to cover their consumption through imports. The situation for solid fossil fuels is more optimistic, with many EU countries managing to meet their consumption needs through their own production. However, most EU countries continue to rely on imports of energy resources from Russia. In some cases, the share of these imports in total imports exceeds 60% for oil and oil products or 80% for natural gas and solid fossil fuels. The differences between EU countries in terms of production, consumption and supply of conventional energy resources demonstrate that the EU's energy security objective should focus on renewable energy sources. In this way, energy measures are necessary to avoid possible future energy crises.

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