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A CONTEXTUAL ASSESSMENT OF EUROPEAN UNION'S ENERGY SUPPLIES IN MID 2022

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Following the pandemic, European Union's decisions that backfire on its economy appear to be controversial. Bruxelles politicians oscillate between renewable energies and possible new hydrocarbon sources in a bid to eliminate Russian supplies. The study reveals that the EU has actually had problems with energy independence ever since the oil age began. The historical superpower approach on oil and gas adopted by USA and Russian Federation, a still relevant UK, combined with the rise of China as economic leader, leave little room for the EU to gain control over its energy supplies. The study identifies a sinuous relation between USA and the former USSR in terms of energy trade, but not only: while the two countries collaborated on different issues in recent history, their interests were both convergent and divergent and their approaches to international relations as well. Among others, the study identifies France as the single country with a company in top 10 world oil and gas companies by revenue, and the only EU country with a company in top 4 manufacturers of nuclear fuel at global level. The study concludes that unless the energy paradigm will shift significantly, EU's chances to become energy independent are minimal.

Keywords*: European Union; energy supply; geopolitics of energy resources in/around EU; energy security; global power projection through oil companies; Russian Federation; the United States.*

Introduction

While most countries around the globe, including the largest industries, agree on swift action related to curbing hydrocarbon consumption and heavy pollution

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from burning coal, the fight for domination in hydrocarbon markets has probably never been more acute. However, the European Union, a relatively scarce territory in terms of oil and gas reserves, has not introduced any articulated plan to curb energy vulnerability on short and medium term. Political leaders of countries that have been presented either as high-income, or as high ranking in terms of Human Development Index or Happiness Index, asked populations to reduce shower time in order to cope with the "energy crisis" or "dependency on Russian gas" (Paulsson and Buttler 2022) (Radio Free Europe 2022) (Newslogic.in 2022). This happens while superpowers, such as the USA (Crawford 2019), the Russian Federation and China invest in military technology whose production and operation still requires important energy amounts (especially jet fuel), export fighter jets. France (Seibt 2021) is also among the mentioned powers. Not only does this trend deepens, but aspirants to global military leadership, such as Türkiye, India, South Korea, also develop new platforms for fighter jets. In the commercial sector, emerging economies, such as India, Brazil, and Türkiye, increase their overall energy consumption significantly. Companies, including Airbus (Bryan 2021) and Boeing (Asian Aviation Staff 2021), expect significant sales of aircraft in the next two decades, especially from the Asia-Pacific region.

Does the European Union represent a case of energy mismanagement or is it caught in the fight for dominance between USA and a fading UK on one side, and Russian Federation and China on the other? Or has it aimed too high in terms of transition to clean energies and, in doing so, endangered its hard-won and already fragile security?

This study is limited to European Union due to several considerations: Europe itself encompasses a part of the Russian Federation, Norway carries out an energy and economic policy relatively independent from the EU, the UK decided for Brexit and probably aims for a sustained global push in order to compensate slower parts of its economy, the Balkans are an unpredictable area, among others.

1. Energy Consumption in Context

There are more possibilities to estimate energy consumption at international and national levels, which generally produce comparable results for similar definitions. At global level, energy consumption for 2021 was estimated to come from: 29% oil, 27% coal, 24% gas, 10% biomass, 10% electricity (includes hydro, geothermal, nuclear and wind electricity), and a very small portion from heat (Enerdata 2022). Hence, coal remains an important energy source at global level.

Figure no. 1 is based on data from 2022 BP report on world energy, and indicates total consumption of primary energy by continent/region measured in Exajoules [EJ] (BP 2022). Asia Pacific includes Australia, New Zeeland, China and India, CIS

includes the Russian Federation, while the Middle East includes Iran and Europe includes Türkiye.

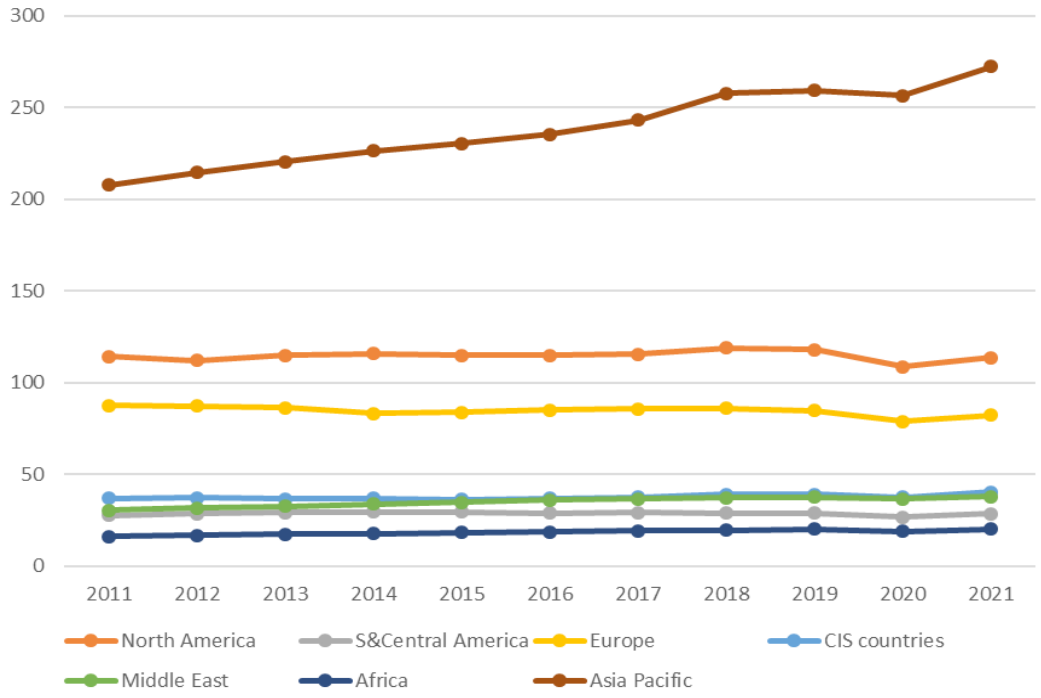


Figure no. 1: Primary energy consumption by continent/region in 2011-2021 expressed in EJ (BP 2022)

The data indicates that:

- starting with 2002, when Asia Pacific overtook other regions, its consumption has increased from 207.66 EJ to 272.45 EJ;

- Asia Pacific, Middle East and CIS regions managed to surpass pre-pandemic 2019 consumption. The fastest growing consumption was Asia Pacific with 259.51 EJ in 2019 and 272.45 EJ in 2021. All other regions registered in 2021 consumptions lower than in 2019, and Africa reached the 2019 again in 2021;

- although the population of Africa surpasses by far that of North America, Africa's primary energy consumption is at least five times less than that of North America;

- although energy consumption is driven by economic development and other factors, a faster rise in consumption in the Middle East when compared to CIS suggests that a study should be carried out in order to verify whether global warming has the potential to determine increased energy consumption for cooling building in overheated regions when compared to the energy increase necessary to heat buildings in colder regions during harsher winters;

- Europe, the main region analyzed, decreased its primary energy consumption with 5.86% from 2011 to 2021, and North America also decreased it with 0.55 % for the same period. While the pre-pandemic consumption level of North America (117.87 EJ) is higher than that from 2011 (114.33 EJ), Europe remains the only region that has actually decreased energy consumption from 2011 to 2019 or from 2011 to 2021. This occurred despite the fact that Europe began to host many refugees in 2011 and the factors driving this tendency can be multiple: increased energy efficiency, externalization of energy-intensive industries to emerging regions, such as Asia Pacific, among others;

- as of 2021, North America's primary energy consumption (USA, Mexico, Canada) was over 38% higher than that of Europe, whose population is actually larger. This determination requires a per capita primary energy consumption assessment.

Despite Croatia's accession to the European Union in 2013, EU's energy consumption decreased steadily from 63.87 EJ in 2011, to 61.77 EJ in 2019 and 60.11 EJ in 2021 (BP 2022, 8).

Figure no. 2 presents the primary energy consumption in 2021, by country. Although this graph does not reflect trends (for example, in the UK and Japan the consumption is decreasing), it indicates the largest consumer and may hint in the case of which countries can make a significant difference if energy saving is being accelerated.

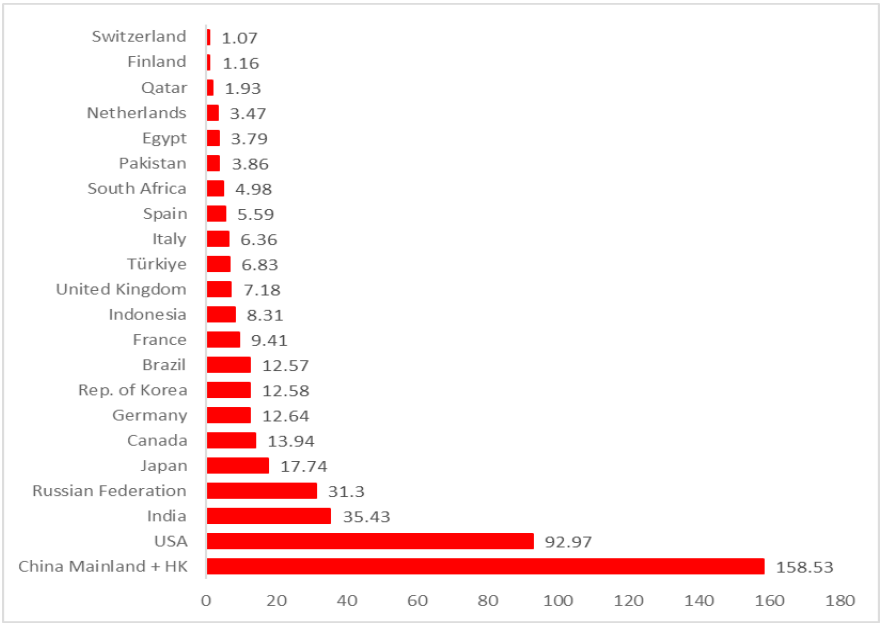


Figure no. 2: Primary energy consumption by country, in 2021, expressed in EJ (BP 2022, 8)

China's increasing energy consumption has led to a significant difference between it and second occupant in this chart, the USA.

In order to obtain an even more accurate indication of energy consumption patterns, the total primary energy consumption in 2021 has been related to the number of inhabitants per country in 2021 (The World Bank 2022). The per capita consumption will be computed in gigajoules (GJ), one billionth part of an exajoule (1 exajoule = 1'000 petajoules = 1'000'000 terajoules = 1'000'000'000 gigajoules).

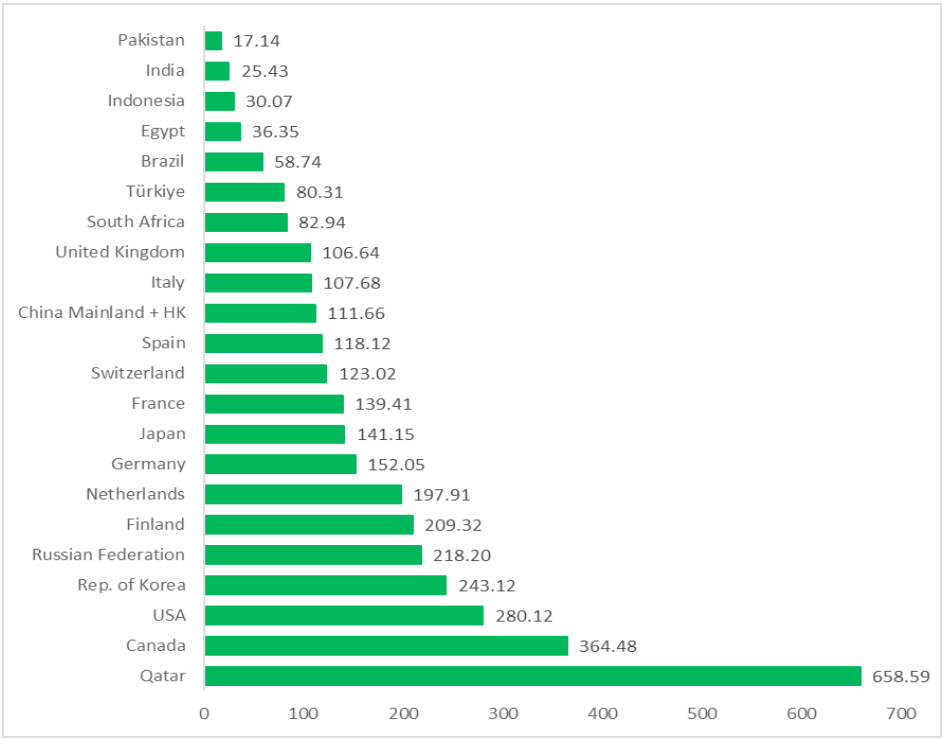


Figure no. 3: Primary energy consumption per capita, in 2021, expressed in Gigajoules (BP 2022)

According to Figure no. 3, the USA consumes 84.22% more than Germany (related to Germany's consumption), and 162.68% more than the United Kingdom (related to UK's consumption) on a per capita basis. The Republic of Korea is getting close to the level of the USA of per capita primary energy consumption, surpassing significantly traditional industrial countries, such as France, Germany and Japan.

As a partial conclusion, one can notice that Asia Pacific is becoming the center of energy consumption. While this region has employed manufacturing and industrialization in recent decades, it continues to develop energy supply systems and expand industries. With an accelerated decarbonization policy in place or not,

this region is creating an energy market that will probably become dominant and will manage to impose political directions in the future. In terms of per capita consumption of primary energy, there is a big gap between the USA and large economies in Europe, such as Germany, France, Italy and Spain. This may be determined by energy efficiency, case in which EU is generally more efficient than heavy consumers, or by the overall international system that determines quantities and prices.

Influence of large markets on the global stage should not be underestimated. For example, while the percentage of population in urban areas has increased significantly across the board in large economies, and transportation should have become less resources-intensive as a consequence, the sales of larger vehicles, such as SUVs (Carlier 2022) (and Pickup trucks), continued to thrive actually. One step ahead, this trend spread across the world and determined consumers from other countries to buy more SUVs. At the same time, average area of houses appears to decrease (Hunters Estate Agents & Letting Agents 2019), meaning that the construction industry already adjusted to smaller, lower costs buildings.

While the EU is struggling to impose its own standards in trade with the USA, or develop its neighborhood through ambitious policy directions, energy supply is clearly EU's Achilles' heal should it try to pursue a path more independent from superpowers that control energy supplies. But who controls hydrocarbon energy supplies nowadays?

2. Energy Supply – a Short History and Facts

This section will not focus on the geographical location of oil and natural, which is mentioned very often when energy supply is discussed. The reason is that neither Venezuela nor Iraq or Canada, among holders of top largest deposits, determine energy supplies across the world, but energy extraction and processing giants USA, Russian Federation and to a certain extent Saudi Arabia. However, Figure no. 4 indicates that, in terms of oil reserves, Europe is one of the poorest continents (Russian Federation excluded), and the European Union, without the reserves of the UK and Norway, even poorer.

Considering that despite advances in energy production with nuclear or renewable technologies, we are still living in an oil/gas age, historical lessons might provide insights to nowadays international developments related to energy supplies and their political significance.

While the British Empire had been utilizing large amounts of coal since the 17th/18th centuries, Germany's boom in coal extraction from the Ruhr Area at the beginning of 20th century, outpacing the UK, threatened to change the international power balance. According to literature, UK's coal trade surpassed 52 billion GBP in

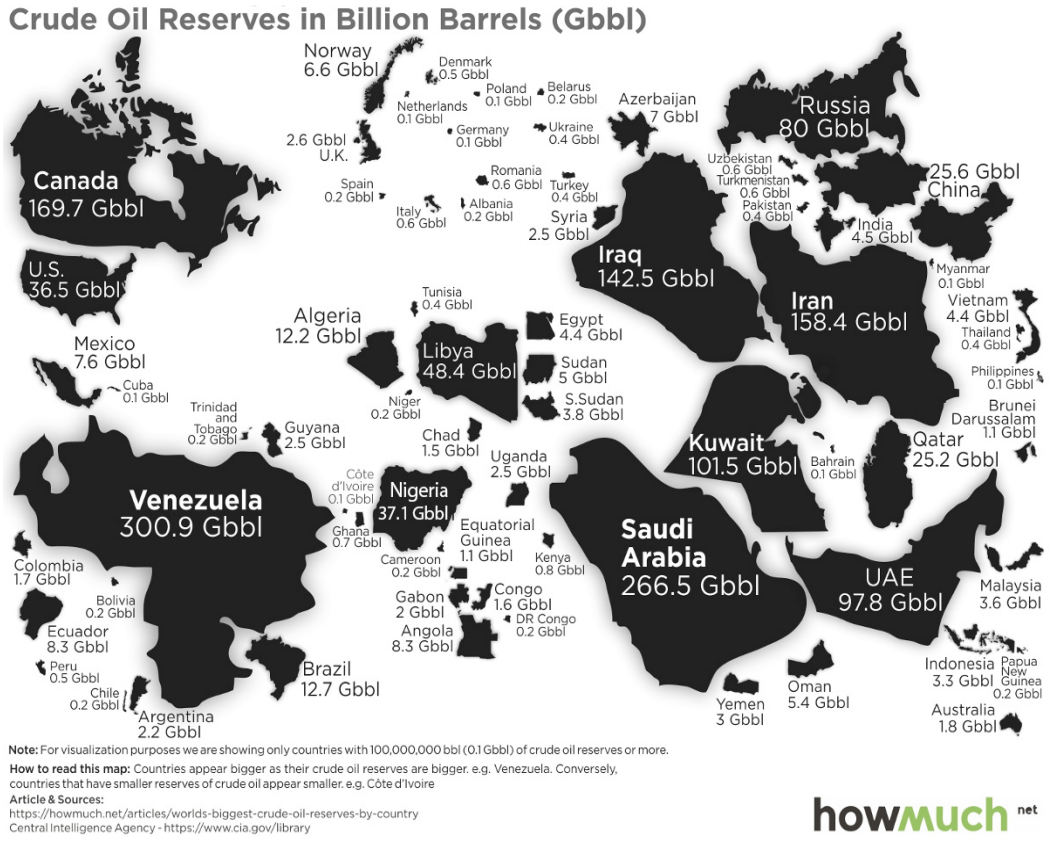


Figure no. 4: Crude oil reserves in 2019 (Desjardins 2019)

1907, while USA's petroleum exports amounted about 19 billion GBP (Johnstone and McLeish 2020). During World War I (WWI), 90% of oil employed by the UK and France came from the USA, while Italy was also depending on the same supplier.

After WWI, the British lost its leading place as the global energy exporter, and tensions arose between the USA on one hand, and the UK and France on the other, related to control of oil deposits and energy independence (Johnstone and McLeish 2020). Britain acquired 50% of known oil reserves after the war, and through the 1920 San Remo Agreement, it ceded oil reserves in the Middle East to France and succeeded in "locking out" foreign companies from controlling oil production the British Empire. The study cited mentions that also the USA enforced the Mineral Leasing Act of 1920 that prevented companies from countries excluding American players from Middle East oil projects to obtain access to the US oil fields (i.e. the British and French). Finally, the study mentions the 1928 Red Line Agreement from Achnacarry, the cartel that was to be formed by "the seven sisters": "Standard Oil Company of New Jersey (later Exxon), the Standard Oil Company of New York (Socony,

later Mobil, which eventually merged with Exxon), the Standard Oil Company of California (Socal, later renamed Chevron), the Texas Oil Company (later renamed Texaco), Gulf Oil (which later merged with Chevron), Anglo-Persian (later British Petroleum), and Royal Dutch/Shell" (Department of State, USA n.d.), and that different approaches to oil of the British and Germans resulted in "implications for WWII".

The Russian Empire allowed foreign companies to start the oil production in the second part of 19th century, and before the nationalization from 1918, the Nobel Brothers competed with the Rothschilds for dominance (Siegel 2012-2013). In order to underline the struggle for maintaining control over European oil/gas supplies, that probably remained acute to this day, following the statement issued by Standard Oil Company of New Jersey, in a 1927 article, might reveal a long-standing pattern: "Newspaper dispatches, undoubtably emanating from Russian sources, report negotiations by which a quantity of Russian oil is being purchased by the Standard Oil Company. As a result, the impression has been created, both in Europe and in this country, that the Standard Oil Company of New Jersey, in the face of the present overproduction in the United States, is buying Russian oil to displace products of American origin in the European markets supplied in part by its foreign subsidiaries. The impression that the Standard Oil of New Jersey has any trade relationship with the Soviet Government is incorrect. The Soviet Government seized all the producing oil wells and refineries and assumed full proprietary rights over the private property represented by the oil industry in Russia, without any pretense or compensation. Subsequently, the Soviet Government tried to raise capital abroad by selling oil which it had thus confiscated. Efforts were made to open a regular market for Russian oil products with various interests, including European subsidiary companies of the Standard Oil Company of New Jersey" (Darling 1927). The article is revealing many aspects that even today may be considered stunning: information, misinformation, competition and most important the struggle to dominate Europe's energy supplies. The sensible relations between private entities and state organizations, especially in international affairs, were brilliantly captured in this declaration as well.

The 1924-established Amtorg – American Trading Corporation – reinvigorated collaboration between the USSR and the USA. It was situated initially in New York and acted as a representative of Russian economic interests, especially industrialization, in the USA. Contributions from leaders such as chairman Saul Bron (1927-1930) led to the development of sectors such as automotive, tractor and tank industries (Melnikova-Raich 2011). Although some of its managers either died in suspect circumstances or were executed by Stalin under what was called "the Great Purge", this organization was instrumental in arranging transfer of goods, weapons and oil products to USSR during WWII, as part of the program "Lend-Lease".

The Russian oil industry that developed during the interwar period and afterwards was not similar in scope and dimension with that from the West. Sources mention

that oil exports amounted to 3.9 million tons in 1929, 6.1 million tons in 1932, almost disappeared during the war and then rebounded to 57 million tons in 1964, 111 million tons in 1970 and 216 million tons in 1989 (Ermolaev 2017). The cited study suggests that, unlike international players from the West, USSR did not manage to make the most out of its exports and during this period tried to continue growing exports of resource to pay for industrialization. Even in period of low prices, it continued to export as much oil and gas as it could, besides other commodities. Nowadays Gazprom, a state monopoly on natural gas, became in 1989 the successor of former Soviet Ministry of Gas Industry, Rosneft overtook assets from the former Soviet Ministry of Oil and Gas (Ford 2011). Lukoil, another state-controlled company, was founded by decree in 1991 and overtook assets of several oil exploration, refining and distribution entities. Hence, the American, British and Russian oil industries had many intersection points and all these former and/or present superpowers saw today's EU's countries rather as a (peaceful) big market, not as a competitor.

3. Q&A about EU Energy Supply

After 100 years, the questions are whether the European Union has managed to achieve a certain degree of independence in terms of energy supply, whether the competition to control oil and gas supplies is targeting only EU as a market, or whether there is a global supremacy dispute between the USA and the Russian Federation and their respective allies, and whether this is limited to oil/gas or it has additional facets as well.

Table no. 1 presents revenues of the largest oil and gas companies at global level (as of 2020), for the period 2016-2020. While 2020 is not representative due to the pandemic and its effects on economies and fuel consumption, the 2016-2019 may be considered a relatively reliable pattern.

Table no. 1: Revenue of 10 largest (as of 2020) oil and gas companies (Farmer 2022)

No	Company	2016 $ bln.	2017 $ bln.	2018 $ bln.	2019 $ bln.	2020 $ bln.
1	Sinopec [CN]	277.858	362.762	420.088	425.945	322.637
2	PetroChina [CN]	232.672	309.842	341.976	361.414	296.264
3	Saudi Aramco [KSA]	134.475	264.110	355.718	329.603	229.747
4	Shell [UK]	233.591	305.179	388.379	344.877	180.543
5	BP [UK]	183.008	240.208	298.756	278.397	180.366
6	ExxonMobil [US]	218.608	237.162	279.332	255.583	178.574
7	TotalEnergies [FR]	127.925	149.099	184.106	176.249	119.704
8	Chevron [US]	110.215	134.674	158.902	139.865	94.471
9	Gazprom [RU]	99.610	113.510	117.935	123.626	85.151
10	Marathon Oil [US]	63.339	74.733	96.504	123.949	69.779

In 2022, Royal Dutch Shell headquartered in the Netherlands, was renamed to Shell plc and moved its headquarters to London, UK. This certainly decreased EU's ability to secure its oil and gas supplies. Only Sinopec, PetroChina, Gazprom and Marathon managed to increase sales between 2018 and 2019, but all other top companies actually experienced decreasing oil and gas production one year before the general decrease in production determined by the pandemic. This includes British, American (except Marathon, which is essentially focused on the US market) and French companies from Table no. 1.

Related to the EU-based companies in top 10 largest oil and gas companies, the revenue of TotalEnergies with headquarters in Paris, the only representative in this list, represents 6.97% from the total revenue of all top 10 companies combined for the year 2018 (a good year for most companies). For the same year, the revenue of Chinese companies represents 28.85% from the total of top 10 companies, that of now British companies 26.01%, that of American companies 20.24% and that of Russian Gazprom 4.46%. Since these percentages are calculated only based on the total revenue of 10 largest companies, it is only partially indicative related to which jurisdictions register the highest revenues from oil and gas industries. Not only does France occupy the single EU position in this top, but it is also producing much of its electricity with nuclear power plants, hence less dependent on oil and gas, its company Areva is a major player in nuclear power plant building and a top manufacturer of nuclear fuel from uranium, along Global Nuclear Fuel (GNF) and Westinghouse from the USA and TVEL from the Russian Federation (World Nuclear Association 2021).

The primary answer to the first question, i.e. whether EU has managed to achieve a certain degree of independence with respect to its energy supply after WWII, is definitely: no. Traditional powers and a strong-emerging China are in another league in terms of controlling their own energy supplies, and France, the only EU member that is also represented in the Security Council, has a good grip on its own energy supplies, but might not be in the position to help very much other large EU economies, in case of need. France's use of nuclear industry is exemplary at global level.

Recent developments are also suggesting that at least on short and medium term, the EU has a low chance to gain control over its energy supplies. Internally, Germany's questionable decision to shut down nuclear power plans was either a huge miscalculation, or the result of external pressure.

Externally, Norway conducts its energy business with EU on a relatively sovereign basis and even a large increase in output does not have the potential to cope with the entire EU demand. Shell's relocation to London is also indicative with respect to control of some of its output for the EU. BP's influence in Azerbaijan, whose Baku fields were considered by Winston Churchill a diamond in oil industry, is another indication that EU is not in control. BP's recent announcement (Bagirova and Blair 2022) that it will redirect oil from Baku – Supsa (Georgia) pipeline to Baku – Tblisi (Georgia) – Ceyhan (Türkiye) pipeline is yet another

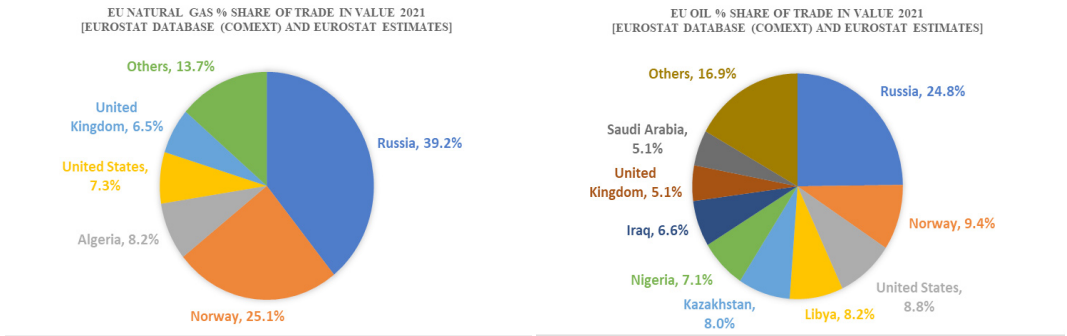
testimony that decision to oil and gas enroute to EU are taken outside EU. Furthermore, it reveals the importance of relation with Türkiye, a possible new hub of pipelines towards Europe that are not controlled by the Russian Federation.

The attempt of Ukraine to provide Chevron, ExxonMobil, Shell access to its new oil fields after 2010, ended up in political turmoil and the Russian Federation overtaking Crimea. However, if these companies really gave up plans to exploit Ukrainian hydrocarbons is not obvious. Türkiye discovered gas in its Black Sea waters and Romania's new gas fields in the Black Sea are operated by Black Sea Oil & Gas, a company controlled by the Carlyle Group LP (USA). The exploration of Romania's Neptune Block of Black Sea by OMV and ExxonMobil does not appear to progress smoothly.

While Algeria is perceiving EU only as a market, and companies such as Gazprom, Eni, TotalEnergies, Vitol (Netherlands), Equinor (Norway) are striving to strike partnerships on large oil resources from Libya (Hollands 2021) (Temizer and Gurkan Abay 2021). Furthermore, Egypt's new hydrocarbon reserves appear to be exploited in the future by Dragon Oil (Dubai), after BP sold its interests (BP Press Release 2019), Shell (Shell n.d.), Qatar Energy and ExxonMobil (Kulovic 2022) (although Exxon's stake appear to have been sold to Shell in May 2022), Chevron (Najem, et al. 2022), etc. Chevron also holds a very large stake in Israel's Leviathan gas field.

Finally, Russian companies control significant flows of oil and gas towards Europe, and is also a top supplier of uranium for fueling nuclear plants.

EU's imports of natural gas and oil by external partner are presented in Figure no. 5.



a) Natural gas **b)** Oil

Figure no. 5: EU's imports of natural gas and oil, in 2021, by external partner (Eurostat 2022)

Consequently, recent developments also suggest that large oil companies, state, listed or private, from jurisdictions outside EU continue to increase their already dominant role in hydrocarbon production and supply to EU.

Related to the second question, i.e. if competition for controlling oil and gas supplies is targeting only EU or global markets, is relatively simple. While the competition for resources and ideology between the USA and the USSR was carried out on more global fronts, their superpower approach appears to be holistic. Global might be an understatement, as the discussion for resources on the Moon and other planets is already emerging.

Related to domination of oil sources, a paradoxical behavior of classical superpowers that rely on this on winning wars, this appears to remain a priority of superpower policy. Recent attempts by the US to repair ties with Saudi Arabia, the failed attempt to approach Venezuela after it kept it under harsh sanctions for decades and floating ideas that Iran can sell oil and gas despite sanctions, clearly indicates that oil and gas are still considered central in "defence" strategies. From this perspective, the EU would need a miracle to enable it to increase control over its energy supplies. Rosneft's decision to elect former German chancellor Schroeder as chairman in 2017 (Astakhova 2017) did not represent a basis on which to build political capital needed to increase energy dependency, on the contrary: it might have raised the attention of British and American partners on the potential of EU to secure more energy supplies from competitors.

Finally, the competition for dominance over EU as a market may encompass other elements besides control of energy supply, although the latter remains a very strategic power instrument. As examples, the dominance of search engine markets, operating systems, online retail and cloud computing by US/UK companies is becoming a classical characteristic of dominance. Recently, Tesla has aimed to disrupt sales of vehicles with its electric vehicles offer in Europe, while Amazon partners to Stellantis to include its software in future Opel, Fiat and Peugeot vehicles (SASATIMES NEWS and anp / 2022) (and will allegedly supply vehicles for Amazon logistics), while Volkswagen appears to oscillate between a Google Android environment and VW.OS, apparently also based on Google Android (Jens 2022).

Conclusions

The data analyzed in this study indicates that EU's reliance on foreign gas and oil reserves, and on foreign companies to provide it with energy is relatively high, and determined by a broader competition for dominance among superpowers. Due to recent dynamics and an apparent renewed appetite for competition of traditional superpowers, and the displacement created by the rise of China, EU might experience two main scenarios with respect to energy supplies: one in which the US and the UK will continue to dominate EU supplies of energy and the Russian Federation will not be able to supply energy at same levels until now, or one in which the American/ British influence of EU's hydrocarbon resources will diminish. Should the EU try to

pursue a third path, i.e. aggressive development of renewable energy systems, the outcome is unclear as in parallel, EU is striving to secure hydrocarbon supplies from new sources such as Azerbaijan, the Persian Gulf countries, and probably Egypt and Israel.

Although Europe appears to have already started to increase its energy efficiency, historical patterns present inside or outside the EU continue to influence the speed of transition to an even more efficient energy usage. Furthermore, when distinguishing between CO2 emissions and pollution with poisoning substances and plastics, restarting to burn coal in large economies such as Germany, and continuing the same in Poland, appears a paradoxical approach to tackling pollution.

In comparison to other regions, EU states may consume relatively lower amounts of energy per unit of economic output. However, such a pattern may be influenced by a series of factors that require further analysis: predominating sectors of economy (countries such as France, Spain run an important tourism sector), the output of industrial goods (some manufacturing activities have been externalized to China and other Asian countries) and efficiency of infrastructure.

While EU countries are consuming less energy per capita than, for example, the USA, they will be compelled by the context to further reduce their energy consumption. While the environmental constraint is a good argument to motivate population to comply with restrictions, this development fits perfectly in the Cold War pattern. The USA has been striving since the 1950s to contain USSR and in 1990s it partially suceeded. However, a strengthened Russian Federation that signalized its readyness to contain the expansion of NATO eastward initially in 2014, along with various measures taken by the Russian Federation and China to isolate themselves from American influence in global affairs, place the EU in the difficult position of accepting restrictions on energy without asking its economic and security partners to do the same. The crisis is certainly not determined by EU's mismanagement of energy, but by external geopolitical and historical factors.

In all cases, the European Union has to prevail with a significant vulnerability related to its energy supplies, which are significantly controlled from outside, no matter how much more efficient it will become. This situation does not appear to have a short-term or medium-term solution, it would take a miracle for the EU to be able to assert energy independence in the next decade.

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