
Serbian Natural Gas Sector in a Gap Between East and West: ChatGPT Decision Support

Dejan Brkić

Faculty of Electronic Engineering, University of Niš, 18000 Niš, Serbia, <https://orcid.org/0000-0002-2502-0601>
Correspondence: dejan.brkic@elfak.ni.ac.rs and dejanbrkic0611@gmail.com

Abstract: This article should examine ideas of how a chatbot can support decision making processes by collecting general opinion about the certain topics. The ChatGPT is tested in this article in respect of natural gas security of supply of the Republic of Serbia in the context of the current political situation in the world. The author first describes its own stance on the topic and then the ChatGPT is asked for its opinion (which most probably collects and compiles phrases from English speaking sources to build a text in a smart way). The topic is ort only about security of gas supply of Serbia but also political and highly sensitive, so it is examined if the ChatGPT can be useful tool to reach a balance between less on more favorable options in the process of policy making.

Keywords: ChatGPT; artificial intelligence; chatbots; Serbia; natural gas; EU acquis

1. Introduction

This article should show how a chatbot [1-7], an artificial intelligence (AI) based program, such as ChatGPT can reevaluate and make more balanced positions on some sensitive topics providing support in the process of making decisions related to certain policies [8,9]. ChatGPT means Chat Generative Pre-trained Transformer. It is a large language model based on artificial intelligence which can serve as gateways to interact with the accumulated body of human knowledge in a smart way [10-16]. The ChatGPT is a chatbot launched in November 2022 by OpenAI, San Francisco-based private company and for the moment is free of charge and public can access it through web portal [17]. It can provide a senseful text using machine learning techniques and has the ability to learn. The ChatGPT can also write computer codes, design experiments and even write a scientific papers through supervision of experienced researchers (however, ChatGPT can sometimes easily make errors even in simple computation -see Appendix A). Independently without a supervision of humans, in a number of cases it can provide a text that is convincing but wrong, full of misinterpretations and should be understood only as an internet search engine capable to reproduce the found information in a more elaborated and in a smarter way (and very often in a misleading way). It should be used in a clever way especially for writing of review articles to avoid compilation of poorly interpreted data [18,19]. Misuse of this tool can lead to the advanced level of plagiarism and cheating without adding anything new to the body of science. The ChatGPT can be useful in collecting data (for example searching for references and citations which also need to be double-checked by humans [20]).

This article deals in particular with the safety of supply of natural gas of the Republic of Serbia. It updates also a previous more than one-decade old overview of Serbian gas sector by the same author [21]. Accuracy of data and alternative options are tested with ChatGPT. Also, points where ChatGPT and the author of this article have different opinions have been reevaluated and double checked. This issue is not only about energy policy

but also has deep political consequences related to the accession of Serbia to the European Union (EU) and related acquis. The main political obstacles are:

1. Serbia recognizes territory of Kosovo* as its autonomous province and not as an independent state [22] (here and in further text * (the text provided by ChatGPT and references are the only exception) means that the status of the territory is defined in accordance of the United Nations Security Council (UNSC) Resolution 1244/1999) [23], and
2. Serbia does not comply with ongoing sanctions against Russia posed by western countries [24-26].

Chinese investments in Serbia has been seen also as a disturbing factor in the process of joining to the EU [27].

The author of this article has been trying to conduct analysis about the topic without prejudices and from the independent point of view based on scientific facts. The opinion by the author is reexamined by using ChatGPT in order to reach more balanced options to support decision processes on policy making level. After providing a piece of the text of the author, particular stance is reexamined through a set of questions posed to the ChatGPT.

The author wrote Section 2 completely while ChatGPT gives input for parts of Section 3 of this text. Section 4 gives additional discussion and concluding remarks. Section 2 provides a brief viewpoint of the author on the Serbian political position in Europe and in the current World in the context of energy supply, then gives short overview of the Serbian energy sector with a focus on natural gas. However, with the help of the ChatGPT, Section 3 reexamines stances by the author.

2. Interpretation by the Author

Top priority of Serbia is to become full member of the European Union (EU) [28] and to preserve its territorial integrity by keeping its Autonomous Province of Kosovo* and Metohija which is at the moment controlled by the United Nation (UN) de jure and de facto by the North Atlantic Treaty Organization (NATO). The main political obstacles are somehow overlapped: 1. Issue of Kosovo* and 2. Relationship with Russia:

1. Issue of Kosovo*;

Kosovo* is recognized as an independent state by the most western countries (in the first place by majority of members of the European Union (EU) and the European Economic Area (EEA), then majority of members of the North Atlantic Treaty Organization (NATO) military alliance, in addition with Australia, New Zealand, Japan, South Korea and Switzerland) but not by Serbia (de jure part of Serbia as the Autonomous Province of Kosovo* and Metohija), Russia, China and by more than 100 countries across the globe including even few full-member states of the European Union (EU) (namely: Slovakia, Spain, Greece, Romania, and Cyprus) [29-31];

2. Relationship with Russia.

Partnership with Russia is important because for the moment, Serbia imports natural gas exclusively from Russia with very favorable price (domestic production is minor). Russia also, together with China, preserves territorial integrity of Serbia (good relations with China are also seen as obstacle).

Russia is an important partner for Serbia from the aspect of energy because:

1. In the past, Serbia had a deal with Russia for the construction of South Stream pipeline which one branch was planned to transport Russian gas through the Black Sea, Bulgaria, Serbia and further to the European market [32], but the project has been canceled in 2014 (the competitive American and European Nabucco project which was planned to transport gas from the middle East through Bulgaria and Romania bypassing Serbia has been also canceled) [33-36]. However, the South Stream project has replaced with the Turkish Stream and now the Russian gas arrives to Serbia via

Bulgaria (before the main direction of supply was quite opposite, via Ukraine and Hungary).

2. Russian gas arrives to Serbia with a special discounted price.
3. Main Serbian national company for exploitation of oil and gas - NIS (in Serbian: Naftna Industrija Srbije) is in ownership of Russian Gazprom since 2008 with share of 51%.

Serbia is an energy deficient country especially in terms of oil and gas, but also in coals of high quality. Contribution of renewable energy sources in total energy consumption contemporary amounts to less than 1% (excluding hydropower). The oil and gas import bill is a serious strain on the economy of the country, so discounted price offered from the Russian side is welcomed.

To fulfill obligations to join the European Union (EU) Serbia should diversify sources of supply [37-40] and to increase share of renewable energy sources. The European Union (EU) is the main trade partner for Serbia. Serbia also has access to some pre-accession funds.

Further text gives some political aspects of security of supply of Serbia and also some technical details not connected to political issues. It also describes some details about accession to the European Union (EU) including Acquis Chapter 15 "Energy" a part of the Cluster 4 "Green agenda and sustainable connectivity", all with respect on the current situation about security of natural gas supply of the Republic of Serbia.

2.1. Political Aspects

To the best knowledge of the author, unsolved problem of the status of Kosovo* is the main political issue in the process of accession of Serbia to the European Union (EU), although it is stated many times that Serbia does not need to recognize Kosovo* as an independent state, but only needs to normalize relationship [41].

Serbian autonomous province of Kosovo* and Metohija in the South-West part of the country is out of Serbian control since 1999 after the NATO intervention and the territory is under the United Nation (UN) jurisdiction since then, according to the United Nations Security Council (UNSC) Resolution 1244/1999 [23]. The self-proclaimed administration of local Albanian population declared independent state in 2008. This venture has opposed by Serbia and by majority of the countries with exception of the western countries which supports this endeavor through military presence on that territory and by other political means, through financial aid, etc. The Resolution 1244/1999 [23] gives guarantees about the territorial integrity of Serbia and also allows presence of Serbian army and police (hundreds of military personnel) but for the moment this has not been allowed yet.

Serbian stance related to Kosovo* is as follows:

- NATO intervention against the joint state of Serbia and Montenegro (at that time FR Yugoslavia) in 1999 from was illegal (the NATO intervention is practically post-factum partially legalized through the United Nations Security Council (UNSC) Resolution 1244/1999 but at the time it was simply expression of illegal brutal force) [42,43].
- The disputed Kosovo* cannot be treated as an independent state:
 1. from the point of view of the international law because the United Nations (UN) has not reached a favorable decisions following very strict prescribed procedures through the United Nations Security Council (UNSC); (the International Court of Justice (ICJ) set up advisory opinion in 2010 that "the declaration of independence of Kosovo* adopted on 17 February 2008 did not violate international law" [44], but anyway the declaration of independence still remained nullified by Serbia as unconstitutional and has remained unrecognized by the UNSC).

2. from the point of view of the European Union (EU) because the prescribed obligatory unanimous decision favorable to support independence of the disputed Kosovo* among the member countries is missing (for the international law such decision is not relevant, but for Serbia it has huge consequences because of the process of negotiation of full membership status to the EU) [45].

Serbian viewpoint regarding the ongoing Russian military intervention is:

- Serbia recognizes territorial integrity of Ukraine (Serbia expects that its territorial integrity should be treated in an equal way; i.e. that the territory of Kosovo* is treated as integral part of the Republic of Serbia).
- Ongoing Russian military intervention in Ukraine is illegal in the same meaning as was illegal the NATO intervention against the joint state of Serbia and Montenegro (at that time FR Yugoslavia) in 1999 [46,47].

Serbia as a sovereign state has right to sustain from introducing political, economic or any other types of sanction toward Russia (or any other country), especially if they are unilateral dictated by other countries or group of countries organized in any way except if the sanctions are introduced by the United Nations Security Council (UNSC). The joint state of Serbia and Montenegro (at that time FR Yugoslavia) was during 1990s under the legal, but still illegitimate United Nations (UN) sanctions introduced by the United Nations Security Council (UNSC) Resolution 757/1992 [48]. In the view of Serbia, sanctions of any kind are counterproductive and mostly hits innocent people and vulnerable groups and they are expensive [49].

Additional pragmatic reasons are:

- The Russian Federation as a permanent member of the United Nations Security Council (UNSC) with a power of veto, supports full Serbian territorial integrity (China also).
- Security of gas supply (Favorable natural gas deal with Russia).

Additionally, Serbia has free trade agreements with Russia (since 2000), Belarus (since 2009) and Kazakhstan (since 2010), now repacked as a free trade deal with the Eurasian Economic Union (signed in 2019 and in force since 2021). The deal also secures free trade with Armenia and Kyrgyzstan (Eurasian Union is an economic union of Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan). Knowing that Serbia has a similar deal with the European Union (EU), it makes it the unique country with a free trade deal with both blocks for the goods entirely produced in Serbia (reexport is forbidden). These deals do not work as a custom union among member states of the European Union (EU), but they are much more complex especially for the ordinary people. China and Serbia started also the negotiations for a free trade agreement in April, 2023.

2.1.1. Accession of Serbia to the European Union (EU)

Serbia is on the path toward membership in the European Union (EU) since 2009 when the formal application toward membership was submitted, the full status of candidate has been reached in 2012, while the first negotiation chapters has been opened in 2015.

Two main issues are noted as obstacles and both are related to Kosovo*:

1. Among others, Serbia has to solve "Item 1: Normalisation of relations between Serbia and Kosovo*" (* here means that "This designation is without prejudice to positions on status and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo* declaration of independence") under acquis Chapter 35 "other issues" in order to join the European Union (EU). To date, it has been a unique case that a candidate country has to deal with Chapter 35. The main peculiarity is that even the all members of the European Union (EU) do not recognize the disputed Kosovo* as a sovereign state (the members states has not reached unanimous decision).

2. The countries that are in the process of joining are obliged not only to harmonize the legal system with the European Union (EU), but also to follow the line of the current foreign policy of the Union. Serbia recognizes full territorial integrity of Ukraine, but additional request by the European Union (EU) is to introduce economic and political sanctions against Russia due to the ongoing Russia-Ukraine war. However, Serbian territorial integrity depends on Russia and China (their vote against is equal to veto in the United Nations Security Council (UNSC)); (also Russia is important for gas supply and China for investment).

For the case of Serbia some minor issues should be also noted and be examined for fully understanding of the ongoing situation:

- The new methodology with clusters instead of single acquis Chapters [50] has been in force since 2021 which applies to Serbia although the prescribed methodology should remain unchanged for all already started and ongoing negotiations. Although it has been always underlined that the speed of negotiation depends only and solely on the preparedness of the ascension country, Serbia did not open any new acquis Chapter (nor cluster following new methodology) during 2020, caused with the period needed to develop the new methodology within the European Union (EU); the Chapter 4, Free Movement of Capital has been opened since 9–Dec–2019 while the first cluster (Chapters 14, Transport Policy, 15, Energy, 21, Trans-European Networks and 27, Environment and Climate Change) since 14–Dec–2021.
- During the period of the joint state of Serbia and Montenegro, the EU encouraged two separate negotiation processes for Serbia and for Montenegro due to unknown reasons. Also, Montenegro was allowed to use Euro as replacement of dinar which was the legal tender in the union state of Serbia and Montenegro (although Montenegro has been never accepted in the Eurozone officially).
- Although some of the acquis Chapters do not have anything with certain political issues, they remain unopen even if they are ready from the technical point of view. For example, issue with fisheries can be frozen or remain unopen due to some completely unrelated other issues (such as compliance with visa policy of the European Union (EU) or due to not alignment with sanctions of the EU toward third countries).
- Residents of Kosovo* who are Serbian citizens cannot use Serbian passports through visa-free regime to visit Schengen area as tourists although this possibility is available for all other Serbian citizens who reside outside Kosovo* (with residence in any other part of Serbia or abroad).
- In the process of ratification of certain agreements between Serbia and the European Union (EU) all member states need to ratify such documents which is complex and time-consuming process. On the other hand simplify procedure applies for Kosovo*, after the entry into force of the Lisbon treaty [51], which conferred a legal personality to the European Union (EU) making the direct relation of Kosovo* and the European Union (EU) where the member states are not parties independently. This change allows Kosovo* to start the process of accession (which would not be possible before because some member countries does not recognize it as independent state and only such states can join the Union).

Some precedents and illogicalities related to the European Union (EU) in general which are needed to be examined to understand the process are noted:

- Cyprus has been accepted as a full member state although it does not control its full territory.

- Some territories can be part of the member country, but to remain outside of the European Union (EU). An example is Greenland which is an island, part of Denmark (Denmark is a full member state).
- Territory of the former East Germany (GDR) has been accepted simply by its absorption by the West Germany (BRD) without going in details about local legislation and without reviewing of implementation of the new imposed federal laws of the absorbing country in practice. Also technical standards in industry was not compatible with requirements posed by the predecessor of the European Union (EU), at that time the European Economic Community (EEC).
- A possible decision in favor of independence in Scotland and Catalonia was discouraged by imposing automatic loss of their full-member status although they obviously fulfill all technical requirements prescribed by the European Union (EU) *acquis* to remain under the same conditions but as independent countries.
- The special status for Norway, Iceland and Lichtenstein are available through the European Economic Area (EEA) in absence of their full EU membership (similar rules apply for Switzerland) [52]. However, it is underlined that such status cannot be offered to the UK after the Brexit (withdrawal of the United Kingdom (UK) from the European Union (EU)); questionable is if the UK would agree to remain in the EEA.

The European Union (EU) obviously lost enthusiasm to accept new members, and even a candidate such as Montenegro which is full-member state of NATO and does not have similar obstacles as Serbia has been experiencing never-ending negotiation accession process [53,54].

2.1.2. *Acquis* Chapter 15 “Energy”

Acquis Chapter 15 “Energy” is a part of the Cluster 4 “Green agenda and sustainable connectivity” of the process of accession of Serbia to the European Union (EU); the candidate countries must accept and implement the *acquis* before they join the Union [55,56]. It has been opened for Serbia in December 2021 as a part of the negotiation process. It has been in the status “Moderately prepared” since 2015 according to the annual European Commission Reports (previously it had been in the status “Further efforts needed” between 2010 and 2015).

The challenges in energy facing Serbia on the road to enlargement [57] are related to improving in the security of supply through the achievement of two key goals – improving energy efficiency and increasing the use of renewable energy sources by 20% (with the obligations undertaken by signing the Agreement on the Establishment of the Energy Community, the Republic of Serbia is obliged to implement Directives in the field of renewable energy sources).

In respect to natural gas, Serbia separates the competencies and property rights of the transport, distribution and natural gas storage systems which means that practically Serbia harmonized its energy regulations with the energy “*acquis*”. However, certain shortcomings are noticeable in the application of these provisions in practice. Namely, the regulatory framework still needs to be improved in the field of strengthening existing institutional and administrative capacities, in better communication between institutions at the local and state level, etc.

The European Union (EU) sees a special problem in Serbian energy policy in excessive dependence on the Russian gas. Exploitation of oil and gas in Serbia is a business with a 51% share of Gazprom since 2008. Russian Gazprom bought this share during negotiations for construction the South Stream gas pipeline through Serbia (Turkish Stream has been built instead this pipeline but gas still arrives from Russia).

2.2. Overall Situation in the Energy Sector of Serbia

Energy sector represents a key industrial branch in Serbia [58]. Annual consumption of all types of energy is greater than domestic production, but Serbia potentially could be self-sufficient with domestically produced energy especially in terms of electricity (oil and gas are deficient). Serbia possesses the great proven deposits of lignite which is mostly surface-mined and used for electricity generation. The indigenous reserves of oil and natural gas are limited, so the country is heavily dependent on the import of crude oil and natural gas.

Here is additionally and briefly discussed situation with coal, crude oil and with special attention on natural gas as the most important fuels for energy situation in Serbia.

Serbian government has been conducting social policy for decades through relatively low energy prices for all (not only for energy jeopardized customers), and especially through the price of the electricity [59,60].

2.2.1. Coal and Electricity

Serbian lignite reserves are among the largest in Europe while reserves of coals of higher quality are not discovered (reserves on the territory of Kosovo* are even larger [61]); Figure 1.

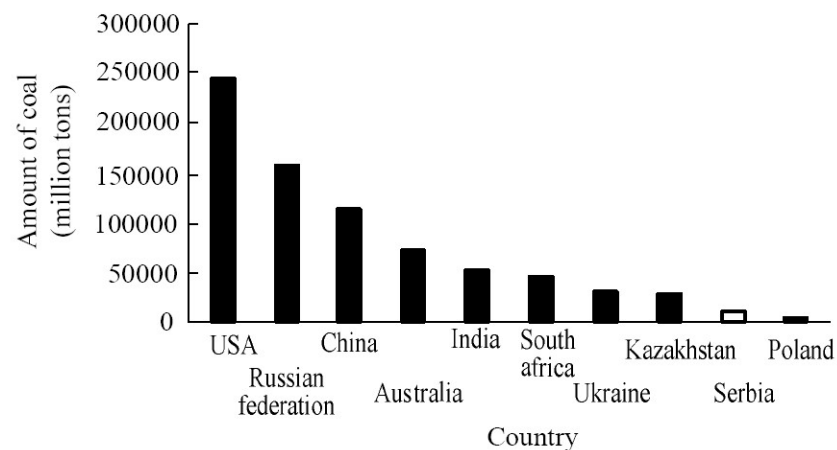


Figure 1. Proven coal reserves.

Heating values of Serbian lignite are from 6 to 12.5 MJ/kg [62]. Large open pit lignite mines are near Belgrade in Kolubara and Kostolac [62,63]. Lignite production in Serbia is used dominantly for electricity generation (installed capacity in lignite-fired thermal power plant is 4.43 GW, while the total electrical power capacity installed in Serbia is around 8.28 GW [64]. Lack of coal quality is the permanent problem resulting by great amounts of coal reserves to be used in a way non-friendly for the environment [65,66], but still CO₂ emission per capita is around the same value as in Switzerland or half of in Finland [67-70] (however oil exploitation releases huge amount of CO₂ and methane [71]). Thermal power capacities provide 53.5%, while hydroelectric power makes up almost 35.5% of total electric power capacity [63]. Serbia generates around 36.5 TWh of electricity per year (in 2016, [72]) and the main producer of electricity in Serbia is state-owned company Elektroprivreda Srbije.

In regular conditions Serbia can cover its demands for electricity from domestic sources. Almost 100% of population has access to electricity.

Serbia experienced problems with production of electricity during 2022 due long-term drought and historically bad hydrological conditions with river inflows and due to extremely bad quality of coal dug out at the time (damp, muddy and sticky coal was dug out partly due to poor management) which caused severe technical problems in the

process of production of electricity due to delays in overburden removal [73] (Figure 2). Most facilities for production of electrical energy will demand reconstruction in near future [74].

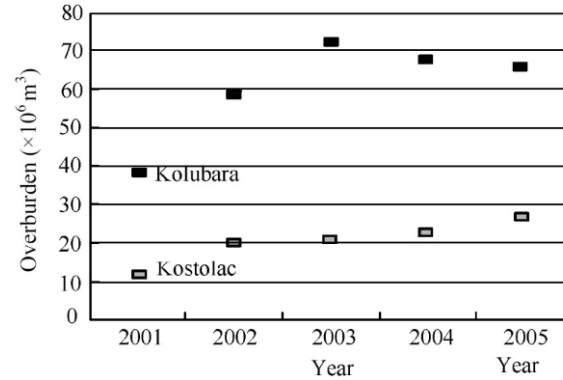


Figure 2. Overburden removal in Kolubara and Kostolac [73].

2.2.2. Crude Oil

Production of crude oil from Serbia oil fields is about 23.15 thousand barrels per day while the consumption is more than 74 thousand barrels per day (data from 2016 [75]). This is only about 50% of consumption in 1990 because of substitution of liquid fuel with natural gas for satisfying of heating demands for households.

Russian Gazprom controls 51% of the government founded petroleum industry – NIS (in Serbian: Naftna Industrija Srbije) since 2008 (this includes all oil refineries in the country which are now completely renewed) [76,77].

Almost all Serbian oil and gas production is situated north of Danube [73] (Figure 3).

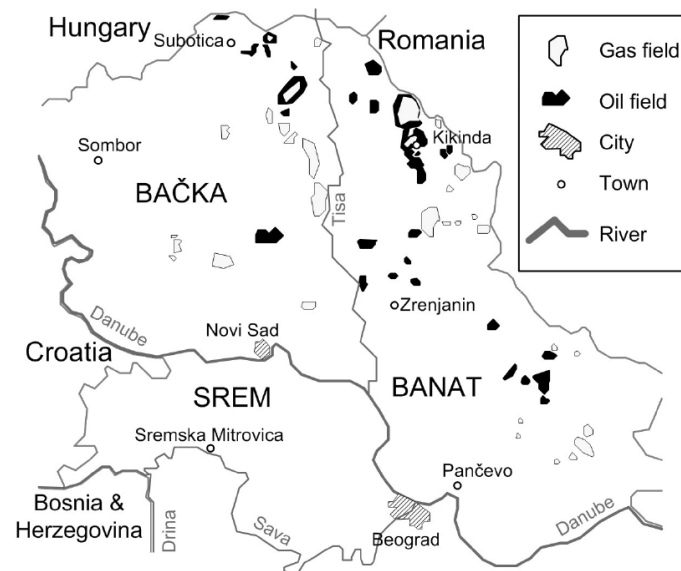


Figure 3. Oil and gas fields in Serbia [73].

2.2.3. Natural Gas

Natural gas is the fastest growing primary energy source in Serbia. Serbia has produced natural gas domestically since 1952, but the intensive development of consumption and the gas pipeline system in Serbia started by the import of natural gas from former USSR in 1978. Gas consumption in Serbia showed tendency for continuous growth until 1989 with amount of 2.87 bcm (billion cubic meters) when the greatest consumption was

reached, and since then it was declining [78,79]. Hubert peak for gas production was in 1993 with 0.801 bcm during United Nations (UN) sanctions according to the United Nations Security Council (UNSC) Resolution 757/1992 [49]. Industry plays dominant role in Serbian gas consumption. For example, the consumer area of Belgrade is being supplied with thermal energy by district heating system consisting of 15 heating plants, which use gas [80-83]. This consumption is comparable to the annual production of natural gas in Serbia. Nowadays, individual use of gas through natural distribution network is also available in many towns in Serbia.

Serbia is a net importer of gas (import is at least about 2 bcm, while domestic production is less than 0.5 bcm while total needs are around 2.7 bcm annually or more). At the same time, Serbia, together with Bosnia and Herzegovina and North Macedonia, is one of the Balkan countries that are most dependent on Russian gas. Natural gas that is imported into Serbia enters through Hungary (near Horgoš) and this was the only import supply route until the recent opening of the Turkish Stream pipeline, when an interconnector from the direction of Bulgaria was built. The import pipeline through Hungary has capacity around 6.1 bcm on annual basis [21]. Main line of new Turkish Stream from Russia to Bulgaria is projected to carry around 30 bcm of Russian-delivered gas annually, but branch through Serbia will carry 10–18 bcm annually and potentially will be doubled [84]. The first deliveries to Serbia started in January 2021, with an estimated supply volume of 12.7 bcm of gas per year. The only export pipeline is still on the border with Bosnia and Herzegovina. Physical security of gas pipelines in Serbia are put in advanced level after recent sabotages on the Nord Stream 1 and 2 from 2022 [85,86] (gas pipelines for transport of natural gas from Russia to Germany through Baltic Sea).

Serbia has one underground gas storage facility is the Banatski Dvor depleted gas reservoir according to a January 2019 agreement, Gazprom and Srbijagas planned to increase the capacity of the country's only storage facility, Banatski Dvor from 0.45 bcm to 0.75 bcm. Withdrawal daily capacity from Banatski Dvor is up to 10 mcm, while Serbia consumes around 10-11 mcm daily with peaks up to 17 mcm daily. Serbia also recently reached an agreement with Hungary to store 0.5 bcm of gas in its storage facilities in addition to the domestic Serbian capacity in Banatski Dvor. Serbia can withdraw a daily amount of 3 mcm (million cubic meters) from Hungarian storage in October 2022 and March 2023, while from November 2022 and February 2023 can withdraw a daily amount of 6 mcm.

State monopoly in this sector in Serbia still exists, while Srbijagas is government owned enterprise for natural gas transport. On the other hand, many companies exist in natural gas distribution business. Before 2008, the sector of oil and gas was dominated by state-owned monopoly NIS with central office in Novi Sad. From 2005, old NIS was split into two major sectors: oil (new NIS and Transnafta) and gas (Srbijagas). Gas sector was previously a part of NIS. New gas company is responsible for transport, storing, distribution and trading of natural gas. Previously, this issue was covered by two firms; NIS Energogas with central office in Beograd and NIS Gas with central office in Novi Sad. Srbijagas is still in 100% ownership of the Republic of Serbia.

Serbia had until recently a contract with Russian Federation with 270 US\$ per 1,000 cubic meters [87]. After expired, a new deal which will be valid for three years was settled and agreed that the price of gas will be calculated according to the 100% oil formula, which means that Serbia when oil is the most expensive, will pay for gas from Russia at a price of 310 to 408 US\$ per thousand cubic meters. It was feared the new formula would depend 70% of the gas price from the international market with 30% based on crude oil price, while the most optimistic scenario envisioned was 80% based on crude oil price and 20% on the gas price from the international market. Finally, the 100% oil-linked formula means that Serbia will pay among the lowest price in Europe (around 10-12 times less than the others in Europe will pay) [88]. According to the new deal Russia will export to Serbia 2.2 bcm of gas over the next three years while it is expected that Serbia will need additionally 0.8 bcm which will be bought on free market.

Price for natural gas used in households has been expressed in kWh since 2022 while before it was in cubic meters.

Diversification of routes and suppliers through interconnectors with neighboring countries and their gas pipeline systems would enable the supply of natural gas from the Caspian Sea region, the Mediterranean as well as liquefied petroleum gas (LNG) to the Serbian market through terminals in Croatia and Greece (LNG is more expensive option) [89].

3. Interpretation by ChatGPT through Set of Questions

This section reexamines stances of the author from the previous text by posing a set of questions to the ChatGPT [17]. The sets are divided into political issues connected to the energy situation in Serbia, while the second part is strictly related to the issues of energy in more narrow sense.

3.1. Political Aspects Treated by ChatGPT

Political issues related to natural gas supply of Serbia are treated by ChatGPT through the questions related to the status of Kosovo*, and through Serbia's connections with the European Union (EU), the Eurasian Economic Union (EAEU), and the Russian federation including aspects of the NATO Intervention against FR Yugoslavia in 1999.

3.1.1. Status of Kosovo*

Question 1: Give me in few sentences overview of the disputed status of Kosovo* from the Serbian point of view.

Answer by ChatGPT: *"From the Serbian point of view, Kosovo is an integral part of Serbia and its declaration of independence in 2008 is considered illegal and illegitimate. Serbia sees Kosovo as the cradle of its cultural and historical heritage, as well as a strategic territory with significant natural resources. The loss of Kosovo is viewed as a national tragedy and a threat to the country's territorial integrity. Serbia continues to reject Kosovo's independence and maintains that it should be resolved through dialogue and negotiations within the framework of international law."*

Question 1a: Give me in few sentences overview of the disputed status of Kosovo* from the point of view of the European Union (EU).

Answer by ChatGPT: *"Kosovo declared independence from Serbia in 2008, but its status as an independent state is disputed. While some countries, including the United States and most EU member states, recognize Kosovo as an independent state, others, including Serbia and Russia, do not. The EU is divided on the issue, with five member states not recognizing Kosovo's independence. The EU has facilitated talks between Serbia and Kosovo to improve relations, but a final resolution to the status of Kosovo remains elusive."*

Question 1b: Does European Union treat Kosovo* as independent state?

Answer by ChatGPT: *"Yes, the European Union (EU) treats Kosovo as an independent state, although not all EU member states recognize its independence. As of 2021, 23 of the 27 EU member states recognize Kosovo as an independent country, while 4 do not: Spain, Greece, Cyprus, and Slovakia. The EU's position on Kosovo is based on the fact that it has been recognized as an independent state by a large number of countries and has established functioning institutions of government. The EU supports the development of Kosovo as a stable, democratic, and multi-ethnic state, and has provided significant financial and technical assistance to support its economic and political development. Kosovo has been recognized as a potential candidate for EU membership since 2008, and the EU has been actively engaged in supporting Kosovo's efforts to implement the necessary reforms and meet the conditions for accession. However, progress towards EU membership has been slow, due in part to the ongoing disputes over Kosovo's status and the challenges facing the country in terms of corruption, organized crime, and economic development."*

Question 1c: What does it mean * in "Kosovo*"?

Answer by ChatGPT: *"The * symbol in Kosovo* is often used as a disclaimer to indicate that there is a dispute or controversy surrounding the status of Kosovo as an independent state. The symbol is used to acknowledge that while Kosovo has declared independence from Serbia, not all*

countries or organizations recognize it as an independent state. The use of the * symbol is a way to reflect the complexity of the situation and avoid taking a position on the disputed status of Kosovo.”

Question 1d: Cite me the main documents in favor of independent Kosovo* and against.

Answer by ChatGPT:

“The main documents in favor of the independence of Kosovo are:

- *The Kosovo Declaration of Independence - a document adopted by the Assembly of Kosovo on February 17, 2008, which declared Kosovo an independent and sovereign state. The declaration was based on the claim that Kosovo’s unique history and circumstances justified its independence, and that it was a necessary step to secure peace, stability, and democracy in the region.*
- *The Advisory Opinion of the International Court of Justice (ICJ) - a document issued by the ICJ on July 22, 2010, in response to a request by the UN General Assembly to provide an opinion on the legality of Kosovo’s declaration of independence. The ICJ concluded that the declaration of independence did not violate international law, as there was no general prohibition on unilateral declarations of independence.*

The main documents against the independence of Kosovo are:

- *The UN Security Council Resolution 1244 - a document adopted by the UN Security Council on June 10, 1999, which authorized the deployment of a UN peacekeeping mission in Kosovo and affirmed the territorial integrity and sovereignty of the FRY. The resolution called for a political solution to the Kosovo crisis within the framework of the FRY’s territorial integrity.*
- *The Serbian Constitution - the supreme law of the Republic of Serbia, which defines Kosovo as an integral part of its territory. The Serbian government and many Serbs consider the independence of Kosovo to be illegal and a violation of their country’s sovereignty and territorial integrity.”*

Comments by the author: ChatGPT provided general but accurate and balanced point of view related to Questions 1 and 1a not citing any document (it is not asked explicitly). However, the ChatGPT decided to say explicitly “Yes” for 1b based on the unknown rationale (in further explanation says that consensus among member countries has not been reached). Also it point out that 4 states do not recognize the disputed Kosovo*, while the correct number is 5 and Romania is omitted. It should be noted that Questions 1a and 1b are almost with the same meaning, but the ChatGPT gave different opinions. Answer to Question 1c provided by the ChatGPT is based on facts and it is accurate. Related to Question 1d ChatGPT provided good answer (however it did not add anything new what was not provided by the human author in Section 2 of this article).

Question 1e: Can Serbian citizens who are residents in Kosovo* travel with Serbian passport in Schengen zone without visa?

Answer by ChatGPT: “No, Serbian citizens who are residents in Kosovo cannot travel with a Serbian passport in the Schengen zone without a visa.

Kosovo is not recognized as an independent country by all EU member states, and the status of Kosovo is a subject of international dispute. As a result, there are special rules that apply to Serbian citizens who are residents of Kosovo when it comes to travel within the Schengen zone.

Serbian citizens who are residents of Kosovo must obtain a Schengen visa in order to travel to countries in the Schengen zone. This is because Serbia is not yet a member of the EU, and therefore its citizens do not have the right to visa-free travel in the Schengen zone. Additionally, because of the special status of Kosovo, its residents are subject to additional travel restrictions.

However, there are some exceptions to these rules. For example, if a Serbian citizen who is a resident of Kosovo also holds a passport from an EU member state, they may be able to travel without a visa in the Schengen zone. Additionally, there may be other circumstances in which a Serbian citizen who is a resident of Kosovo can travel without a visa, but these would depend on the individual’s specific situation and the countries they wish to visit.”

Comments by the author: ChatGPT provided dubious and vague answer related to Question 9e. One point is extremely doubtful “This is because Serbia is not yet a member of

the EU, and therefore its citizens do not have the right to visa-free travel”, because although Serbia is not yet a member of the EU, its citizens who are residents outside Kosovo can travel to the Schengen zone as tourists without visa. Also, there are many countries outside the EU whose citizen can travel without visa as tourists to the Schengen zone which includes their citizens who resides in Kosovo* including those who have dual-citizenship including Serbian if they do not use Serbian passport.*

3.1.2. Eurasian Economic Union

Question 2: Which countries has trade deals both with the Eurasian Economic Union and with the European Union?

Answer by ChatGPT: *“There are currently no countries that have trade deals with both the Eurasian Economic Union (EAEU) and the European Union (EU). The two economic blocs have different trade policies and regulations, and it is difficult for countries to simultaneously align with both systems. However, some countries, such as Kazakhstan, Armenia, and Kyrgyzstan, have deepened economic ties with both the EAEU and the EU by signing various agreements and partnerships, although they do not have comprehensive free trade agreements with both blocs simultaneously.”*

Question 2a: Does Serbia has a trade deal with the Eurasian Economic Union?

Answer by ChatGPT: *“Yes, Serbia has a trade deal with the Eurasian Economic Union (EAEU). In October 2019, Serbia signed a free trade agreement with the EAEU, which includes Russia, Belarus, Kazakhstan, Armenia, and Kyrgyzstan. The agreement came into force in October 2020, and it grants Serbia preferential access to the EAEU’s market of over 180 million consumers. In exchange, Serbia has agreed to reduce or eliminate tariffs on a range of goods imported from the EAEU countries. This agreement has been seen as a step towards stronger economic ties between Serbia and the EAEU, and it has sparked debates in Serbia about the country’s geopolitical orientation and its relationship with the European Union.”*

Question 2b: Does Serbia has a trade deal with the European Union?

Answer by ChatGPT:

“Yes, Serbia has a trade deal with the European Union (EU). Serbia is part of the Central European Free Trade Agreement (CEFTA), which is a trade agreement between countries in Central and Southeast Europe, including Serbia, Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Moldova. CEFTA provides for the gradual reduction and elimination of tariffs on goods traded between the member countries, and it also includes provisions for cooperation in areas such as investment, services, and intellectual property.*

In addition to CEFTA, Serbia is also a candidate country for EU membership, and it has been engaged in the process of accession negotiations with the EU since 2014. As part of the accession process, Serbia is required to align its laws and regulations with those of the EU and to implement various reforms in areas such as the rule of law, human rights, and the economy. The EU is Serbia’s largest trading partner, and a significant portion of Serbia’s exports go to EU countries.”

Question 2c: Tell me about relationship between Serbia and the Eurasian Economic Union.

Answer by ChatGPT: *“Serbia has been building economic ties with the Eurasian Economic Union (EAEU) in recent years, but its relationship with the bloc is not as significant as its relationship with the European Union (EU).*

In October 2019, Serbia signed a free trade agreement with the EAEU, which includes Russia, Kazakhstan, Belarus, Armenia, and Kyrgyzstan. The agreement provides for the elimination of tariffs on a range of goods and services, and is aimed at boosting trade and economic cooperation between Serbia and the EAEU member states.

The agreement has been controversial within Serbia, with some critics arguing that it could harm Serbia’s relationship with the EU and undermine its efforts to join the bloc. Others argue that the agreement could provide economic benefits to Serbia and help diversify its trade relationships.

Despite the free trade agreement, Serbia’s trade with the EAEU remains relatively small. According to data from the Serbian Ministry of Trade, the total value of Serbia’s exports to the EAEU

in 2020 was around \$550 million, while the value of its imports was around \$2 billion. In contrast, Serbia's trade with the EU is much larger, accounting for around two-thirds of its total trade.

Overall, while Serbia has sought to build economic ties with the EAEU as part of its efforts to diversify its trade relationships, its relationship with the bloc is not seen as a major threat to its efforts to join the EU."

Comments by the author: ChatGPT provided good answers for Questions 2a and 2b, but it was not capable to compile these two facts and to provide satisfactory answer for Question 2. For the part 2c, the answer by the ChatGPT is satisfactory given.

3.1.3. NATO Intervention against FR Yugoslavia

Question 3: Was the NATO intervention against FR Yugoslavia in 1999 legal from the point of view of international law?

Answer by ChatGPT:

"The legality of the NATO intervention against the Federal Republic of Yugoslavia (FRY) in 1999 remains a subject of debate and controversy in international law. NATO's justification for the intervention was based on the claim that it was necessary to prevent the humanitarian catastrophe and the ongoing violation of human rights in Kosovo. The intervention was conducted without the approval of the UN Security Council, as Russia and China, two permanent members of the Security Council, were likely to veto such a resolution. From the point of view of NATO and its supporters, the intervention was justified under the doctrine of humanitarian intervention and the responsibility to protect. They argued that the FRY was engaged in ethnic cleansing and crimes against humanity in Kosovo, and that NATO's intervention was necessary to prevent further atrocities. However, from the point of view of Serbia and its allies, the NATO intervention was illegal and violated the principles of the UN Charter, which prohibits the use of force against the territorial integrity or political independence of any state without the approval of the Security Council, except in cases of self-defense. In the absence of a clear legal consensus, the NATO intervention against the FRY remains a controversial case and an ongoing subject of debate in international law."

Comments by the author: ChatGPT provides satisfactory answer but without capability to support negative or positive opinion related to the issue. Question 3a will be posed for the purpose of comparison.

Question 3a: Is ongoing Russian military intervention in Ukraine legal from the point of view of international law?

Answer by ChatGPT:

"No, the ongoing Russian military intervention in Ukraine is not legal from the point of view of international law.

In 2014, Russian forces annexed Crimea, a Ukrainian territory, which was condemned by the international community as a violation of Ukraine's sovereignty and territorial integrity. Since then, Russian-backed separatists have been fighting against the Ukrainian government in the eastern part of the country.

Under international law, the principle of sovereignty requires that states respect the territorial integrity of other states and refrain from using force to change international borders. This principle is enshrined in the United Nations Charter and is widely recognized as a fundamental principle of international law.

The Russian military intervention in Ukraine is a clear violation of Ukraine's territorial integrity and sovereignty. The United Nations General Assembly has passed several resolutions condemning Russia's actions in Ukraine, and the International Court of Justice has issued a ruling calling on Russia to respect Ukraine's sovereignty.

Furthermore, the United Nations Security Council has adopted several resolutions calling for an end to the conflict in eastern Ukraine and for the full implementation of the Minsk agreements, which call for a ceasefire and the withdrawal of Russian troops from Ukrainian territory.

In summary, the ongoing Russian military intervention in Ukraine is widely considered to be illegal from the point of view of international law."

Comments by the author: The similar answer of the ChatGPT as in case for Question 3 were expected (or vice versa: The similar answer of the ChatGPT as in case for Question 3a were expected in case of the question 3).

3.1.4. Accession of Serbia to the European Union (EU)

Question 4: What were the milestones in accession of Serbia to the European Union?

Answer by ChatGPT:

“Serbia has been a candidate for EU membership since 2012, and has made progress towards accession through a series of milestones and negotiations. Here are some of the key milestones in Serbia’s accession to the EU:

1. *Stabilization and Association Agreement (SAA) - signed in 2008, the SAA is a key framework for Serbia’s integration with the EU, providing a roadmap for economic and political reform.*
2. *Candidate status - in March 2012, Serbia was granted official candidate status for EU membership.*
3. *Opening of accession negotiations - in January 2014, the EU opened accession negotiations with Serbia, covering a range of topics including political reforms, rule of law, and economic development.*
4. *Normalization of relations with Kosovo - in April 2013, Serbia and Kosovo reached a historic agreement to normalize their relations, which was seen as a key step towards Serbia’s EU accession.*
5. *Implementation of reforms - Serbia has implemented a range of reforms aimed at strengthening its democratic institutions, improving the rule of law, and tackling corruption.*
6. *Accession screening process - starting in 2018, the EU began a comprehensive screening process to assess Serbia’s readiness to adopt and implement EU laws and policies.*
7. *Negotiation of accession chapters - Serbia has been negotiating the various “chapters” of EU law and policy, which cover everything from environmental standards to labor laws to intellectual property rights.*
8. *Progress reports - the EU issues regular progress reports on Serbia’s progress towards accession, assessing the country’s performance in key areas and highlighting areas for improvement.*

As of 2021, Serbia continues to work towards meeting the conditions for EU membership, with progress being made in some areas while challenges remain in others.”

Comments by the author: ChatGPT provided misleading answer. For example normalization between Kosovo* and Serbia haven reached to date making point 4 misleading (ChatGPT probably refers to the Brussels Agreement from 2013 which is far away from normalization; Also main issue is that even one decade after Community of Serb Municipalities prescribed by this Agreement has not been established). Also the statement in point 6 is wrong; Accession screening process did not finished in 2018 but earlier knowing that the first chapter was opened in 2015. The point-by-point text by the ChatGPT is confusing, mixing milestones with general descriptions (for example points 5, 7 and 8 are not milestones).

Question 4a: Explain me *acquis* Chapter 35 “other issues” in accession evaluation toward membership in the EU.

Answer by ChatGPT:

“Chapter 35, “Other issues,” is a unique chapter in the accession process of the Western Balkan countries, which includes Serbia. It is focused on issues related to the normalization of relations between Serbia and Kosovo, and the implementation of the agreements reached between the two countries.

The chapter was opened for negotiation in December 2015, and it is the only chapter that is not subject to a traditional screening process. Instead, the EU is monitoring Serbia’s progress in implementing the agreements reached between Serbia and Kosovo. This is because the normalization of relations between Serbia and Kosovo is considered a critical component of Serbia’s progress towards EU membership.

The key issues addressed in Chapter 35 include:

1. *Implementation of the Brussels Agreement - the EU expects Serbia to fully implement the agreements reached between Serbia and Kosovo, including the agreement on the normalization of relations, the establishment of the Association of Serb Municipalities, and the implementation of the justice agreement.*
2. *Dialogue facilitation - Serbia is expected to actively participate in the EU-facilitated dialogue between Serbia and Kosovo, and to contribute to the resolution of outstanding issues.*
3. *Regional cooperation - Serbia is expected to actively participate in regional cooperation initiatives in the Western Balkans, including initiatives aimed at promoting economic development, social cohesion, and environmental protection.*
4. *Good neighborly relations - Serbia is expected to maintain good relations with its neighbors and to work towards resolving outstanding disputes and issues.*

Overall, Chapter 35 is an important component of Serbia's accession process, as it demonstrates the EU's commitment to supporting the normalization of relations between Serbia and Kosovo, and to promoting peace, stability, and prosperity in the Western Balkans region."

Comments by the author: In its answer to Question 4a, ChatGPT treats Kosovo* as independent country which is questionable approach. Chapter 35 is unique for Serbia but not for all Western Balkan countries. Hardly that Serbia can establish the Association of Serb Municipalities as ChatGPT suggests because it should be formed on the territory which is not under de-facto Serbian control. The provided information is imprecise and dubious.

Question 4b: Explain me in few sentences new methodology with clusters instead of single acquis Chapters in the process of joining the EU.

Answer by ChatGPT: *"The European Union (EU) has introduced a new methodology for accession negotiations with potential member states, which uses clusters instead of single acquis chapters. The clusters group together related chapters and provide a more integrated approach to the negotiation process.*

Under the new methodology, the clusters are based on six broad areas:

1. *Fundamentals - this includes the rule of law, human rights, and democratic institutions*
2. *Internal market - this covers economic governance, competition policy, and other issues related to the functioning of the internal market*
3. *Sustainable development - this includes environmental and climate policies, as well as social policies and employment*
4. *Connectivity - this covers issues related to transport, energy, and digitalization*
5. *Security and defense - this includes issues related to security, defense, and foreign policy*
6. *Institutions and governance - this covers issues related to public administration, financial management, and public procurement*

The clusters are designed to provide a more comprehensive approach to accession negotiations, and to encourage greater progress and momentum in the process. They also provide a greater emphasis on the rule of law, which has become a more significant issue in recent years.

The new methodology has been adopted by the EU in its negotiations with North Macedonia and Albania, and is expected to be used in future negotiations with other candidate countries as well."

Comments by the author: ChatGPT provided good overview in its answer to Question 4b but failed with some facts. The new methodology has been already adopted for Serbia and one chapter has been opened on 14-Dec-2021 as already explained in 2.1.1.

Question 4c: What was the idea with negotiations for joining the EU on two tracks for Serbia and Montenegro?

Answer by ChatGPT: *"The idea behind negotiations for Serbia and Montenegro to join the European Union (EU) on two tracks was to acknowledge their shared history and close ties, while also recognizing their distinct paths towards EU accession.*

In 2006, Serbia and Montenegro were part of a loose union known as Serbia and Montenegro. When that union dissolved, both countries became independent states. In the years that followed, both countries expressed interest in joining the EU.

The EU recognized the shared history and close ties between Serbia and Montenegro, as well as their mutual desire to join the EU. At the same time, the EU recognized that each country had its own unique political and economic circumstances that would affect its progress towards EU accession.

To address these realities, the EU decided to negotiate accession separately with each country. The idea was that each country would be assessed on its own merits and progress, while also acknowledging the shared history and close ties between the two countries.

This approach was referred to as the “two-track” approach, with each track representing a separate negotiation process for each country. In the end, both Serbia and Montenegro are still in the process of negotiating their accession to the EU, with Serbia being further along in the process than Montenegro.”

Question 4d: Why Montenegro uses Euro?

Answer by ChatGPT: “Montenegro uses the Euro as its official currency because it has unilaterally adopted the Euro without being a member of the European Union (EU). Montenegro does not have the authority to issue Euro banknotes or coins, but it can use the Euro as legal tender for all transactions within its borders.

Montenegro began using the Euro in 2002, shortly after the currency was introduced. At that time, the country was part of a loose union with Serbia, which was still using the dinar as its official currency. Montenegro’s decision to adopt the Euro was motivated by a desire to promote economic stability, attract foreign investment, and facilitate trade with its European neighbors.

In 2006, Montenegro became an independent country and continued to use the Euro as its official currency. Although it is not yet a member of the EU, Montenegro has expressed a strong desire to join the bloc, and adopting the Euro is seen as a step towards achieving that goal.

It is worth noting that Montenegro’s use of the Euro without being an EU member state is not technically allowed under EU rules. However, the European Central Bank has allowed Montenegro to continue using the Euro as long as the country adheres to certain monetary and fiscal policies, and works towards meeting the criteria for EU membership.”

Comments by the author: Related to the answer for Question 4c, the author is unsure about reasons for the “two-track” approach in this particular case so he will sustain from deeper commenting. It is unknown how dissolution of the union of Serbia and Montenegro could be predicted in advance. It was unsure how the process started at all with two entities which were not sovereign countries at that time (only sovereign country can apply for membership in the EU). Related to Question 4d, the author does not have sufficient information on the topic to provide comments.

Question 4e: Is Greenland part of the EU?

Answer by ChatGPT: “No, Greenland is not part of the European Union (EU).

Greenland is an autonomous territory of Denmark, and it has a unique relationship with the EU. Although it is not a member of the EU, Greenland is associated with the EU through the Overseas Countries and Territories (OCT) Association. This association allows Greenland to participate in certain EU programs and initiatives, and to receive EU funding.

However, Greenland has chosen to opt out of some aspects of the EU’s legal framework, including the Common Fisheries Policy and the Common Agricultural Policy. This means that Greenland has its own policies and regulations in these areas, rather than being subject to EU rules.

In 1985, Greenland held a referendum on whether to remain part of the European Economic Community (EEC), which was the precursor to the EU. At that time, Greenland chose to leave the EEC, as it was concerned about the impact that EU membership would have on its fishing industry. Since then, Greenland has maintained a separate relationship with the EU, based on its own interests and priorities.”

Comments by the author: ChatGPT provides satisfied answer for Question 4e, but Question 4f will be posed for clarification.

Question 4f: Do members of native population of Greenland have passports of Denmark? Are they EU citizens?

Answer by ChatGPT: *“Yes, members of the native population of Greenland are Danish citizens, and they are eligible to obtain Danish passports. However, they are not automatically considered EU citizens.*

Greenland is an autonomous territory within the Kingdom of Denmark, and Greenlanders are Danish citizens. As such, they are entitled to Danish passports and can travel to and live in any country that recognizes Danish citizenship.

However, as Greenland is not part of the EU, Greenlanders are not automatically EU citizens. This means that they do not have the right to live and work in other EU member states without going through the same process as citizens of other non-EU countries. However, they are eligible to participate in certain EU programs and initiatives, and to receive EU funding, through Greenland’s association with the EU under the Overseas Countries and Territories (OCT) Association.

It’s worth noting that the situation with Greenlanders and EU citizenship is somewhat complex, as it is still the subject of ongoing discussions between the Danish and Greenlandic governments. While Greenland is not currently an EU member, there has been some discussion of whether it might eventually become a member or have some other type of relationship with the EU.”

Comments by the author: ChatGPT provided satisfied answer for Question 4f.

3.2. Energy Sector of Serbia

This Section reexamines opinion of the ChatGPT related to Acquis Chapter 15 “Energy” in negotiation of Serbia for joining the European Union (EU), followed with general overview of the situation in the sector of energy in Serbia with details of coal and electricity, crude oil and natural gas.

3.2.1. Acquis Chapter 15 “Energy”

Acquis Chapter 15 “Energy” of the accession of Serbia to the full membership of European Union (EU) can be treated also as a political issue.

Question 5: Can you give a short overview relate Acquis Chapter 15 “Energy” for Serbia?

Answer by ChatGPT: *“Chapter 15 of the EU’s acquis communautaire covers the topic of energy, and it is one of the chapters that Serbia needs to align with in order to progress in its accession negotiations with the EU.*

The Energy Chapter requires Serbia to implement a range of EU laws and regulations related to the energy sector, including rules on energy market liberalization, security of energy supply, energy efficiency, renewable energy, and environmental protection. Serbia is also required to establish an independent energy regulator that is in line with EU standards.

Serbia has made some progress in aligning with the Energy Chapter, but there are still a number of outstanding issues that need to be addressed. For example, Serbia needs to further liberalize its energy market, which is currently dominated by state-owned enterprises, and to improve the transparency and independence of its energy regulator. Serbia also needs to adopt a comprehensive energy strategy that is in line with EU standards, and to improve its energy efficiency and increase the share of renewable energy in its energy mix.”

Comments by the author: ChatGPT provided satisfied answer.

3.2.2. Overall Situation in the Energy Sector of Serbia

Question 6: Can you give me a very short overview of overall situation in the energy sector of Serbia?

Answer by ChatGPT: *“Serbia’s energy sector is largely dominated by state-owned enterprises, and the country is heavily dependent on fossil fuels, particularly coal. Serbia has made some progress in recent years in developing renewable energy sources, but the share of renewables in the energy mix remains relatively low.*

Serbia faces significant challenges in the energy sector, including a lack of investment in infrastructure, an aging energy generation capacity, and high levels of energy consumption. There are also concerns about the environmental impact of Serbia’s heavy reliance on coal, which is a major source of air pollution in the country.

In order to align with EU standards and progress in its accession negotiations, Serbia needs to implement a range of reforms in the energy sector, including liberalizing the energy market, improving the transparency and independence of the energy regulator, and increasing the share of renewable energy in the energy mix."

Comments by the author: The answer is correct but very general.

3.2.3. Coal and Electricity

Question 7: Can you give me a very short overview about coal with relation of electricity production in Serbia?

Answer by ChatGPT: *"Yes, certainly. Coal is the primary source of electricity production in Serbia, accounting for about 70% of the country's electricity generation. Serbia has significant coal reserves, and the majority of its coal-fired power plants are located in the Kolubara and Kostolac coal basins. The use of coal for electricity production has been a major contributor to Serbia's economy, but it has also raised concerns about air pollution and greenhouse gas emissions. In recent years, there have been efforts to diversify Serbia's energy mix and increase the use of renewable energy sources."*

Comments by the author: ChatGPT provided very general but accurate information.

3.2.4. Crude oil

Question 8: How many barrels of oils Serbia produce and consume daily?

Answer by ChatGPT: *"Serbia is not a major producer of crude oil, and its domestic production is relatively low. As of my knowledge cutoff date of September 2021, Serbia's daily crude oil production was around 20,000 barrels per day (b/d).*

In terms of oil consumption, Serbia consumes more oil than it produces, and as of my knowledge cutoff date of September 2021, its daily oil consumption was around 87,000 b/d. This means that Serbia imports most of the oil it consumes to meet its energy needs."

Comments by the author: ChatGPT provided accurate facts, but estimates higher production and consumption of oil than provided by the author in Section 2.2.2. (maybe takes different years for reference).

3.2.5. Natural gas

Question 9: What is the current price that Serbia pays for imported Russian natural gas for 1000 cubic meters?

Answer by ChatGPT: *"As an AI language model, I do not have access to real-time data and pricing information. However, according to the latest available information from 2021, Serbia reportedly paid around \$155 per 1000 cubic meters of Russian natural gas. It is worth noting that natural gas prices can be influenced by various factors, including changes in global energy markets, supply and demand dynamics, geopolitical events, and weather patterns, among other things. Therefore, the actual price that Serbia pays for imported Russian natural gas may vary over time."*

Comments by the author: ChatGPT has limited capability to estimate the real price of natural gas in certain time frame.

4. Conclusions

Chatbots such as ChatGPT can be used for reexamination of the certain issues but only in the form of brainstorming. In details, after reexamining issues related to the energy supply of Serbia and especially in terms of natural gas in current political situation, it can be concluded that the ChatGPT can be misled in various way and even in a trivial way such as simple mathematical calculation – See Appendix A of this article. Additionally, opinions expressed by the ChatGPT can be substantially different only if the different wording is used for posing a question. The ChatGPT can very often make even factual errors (for example it can say that something depends on certain number of parameters and then to elaborate point by point different number of factors which are not correlated in terms of declared quantity but also in quality where the minor issues are treated as equal with the most important points), and can be in contradiction with its own previously expressed stances (for example it says: *"There are three federal cities in the Russian Federation:*

Moscow, Saint Petersburg, and Sevastopol.”, which is not correlated with its previous claim that: *“Crimean peninsula is a region in Ukraine, and it is not a part of Russia”*, where geographical fact is that Sevastopol is located in the Crimean peninsula). However, the ChatGPT has ability to learn and knowing that it is recently developed tool, it is expected that it and similar future tools will be improved (through self-improvement and by intervention of its developers).

In the near future, Serbia should diversify its sources of natural gas supply mostly to include import of LNG (Liquified Natural Gas) which will fulfil obligation for diversification of supply which is demanded by the European Union (EU) in the process of accession of Serbia as a full member. For the moment, Serbia heavily depends on natural gas from Russia, which can come through the old route through Ukraine and Hungary (due to ongoing war in Ukraine it is unsafe route) and through Turkish Stream via Black Sea and further through Bulgaria, which assure safety of supply at relatively high level with very favorable price due to special agreement reached with the Russian Federation.

Funding: This research was funded by the Ministry of Science, Technological Development and Innovations of the Republic of Serbia through the institutional financing of the author 451-03-47/2023-01/200102 from 03-Feb-2023.

Data Availability Statement: In addition to the cited references, the data is provided through the ChatGPT, available through <https://chat.openai.com/chat>

Conflicts of Interest: The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article. The views from this article are solely by the author.

Appendix A

Question: How many kilograms we have in 2200 liters of hydrogen stored at 200 bars?

Answer by ChatGPT: *“To answer this question, we can use the ideal gas law to calculate the amount of hydrogen in moles, and then convert it to kilograms using the molar mass of hydrogen.*

The ideal gas law is given by:

$$PV = nRT$$

where P is the pressure, V is the volume, n is the amount of gas (in moles), R is the gas constant, and T is the temperature (in Kelvin).

We can rearrange this equation to solve for n:

$$n = PV / RT$$

where P is the pressure in Pascals, V is the volume in cubic meters, R is the gas constant (8.3145 J/mol·K), and T is the temperature in Kelvin.

First, we need to convert the volume of hydrogen from liters to cubic meters:

$$V = 2200 \text{ liters} = 2.2 \text{ cubic meters}$$

Next, we need to convert the pressure from bars to Pascals:

$$P = 200 \text{ bars} = 20,000,000 \text{ pascals}$$

Assuming the temperature is 298.15 K (25°C or 77°F), we can now calculate the amount of hydrogen in moles:

$$n = PV / RT = (20,000,000 \text{ Pa}) \times (2.2 \text{ m}^3) / (8.3145 \text{ J/mol}\cdot\text{K} \times 298.15 \text{ K}) \approx 176.7 \text{ moles}$$

Finally, we can convert the amount of hydrogen from moles to kilograms using the molar mass of hydrogen, which is approximately 1.008 g/mol:

$$\text{mass} = n \times \text{molar mass} = 176.7 \text{ moles} \times 1.008 \text{ g/mol} = 178.0 \text{ grams}$$

Therefore, we have approximately 178.0 grams (or 0.178 kilograms) of hydrogen in 2200 liters of hydrogen stored at 200 bars.”

Additional Question: Calculate this: $(20,000,000 \text{ Pa}) \times (2.2 \text{ m}^3) / (8.3145 \text{ J/mol}\cdot\text{K} \times 298.15 \text{ K})$

Answer by ChatGPT: $(20,000,000 \text{ Pa}) \times (2.2 \text{ m}^3) / (8.3145 \text{ J/mol}\cdot\text{K} \times 298.15 \text{ K})$ is approximately equal to 176.7 moles of hydrogen.

To break down the calculation:

$(20,000,000 \text{ Pa})$ is the pressure of the hydrogen in pascals

(2.2 m^3) is the volume of the hydrogen in cubic meters

$8.3145 \text{ J/mol}\cdot\text{K}$ is the gas constant

298.15 K is the temperature in Kelvin

When these values are plugged into the formula $n = PV / RT$, we get:

$n = (20,000,000 \text{ Pa}) \times (2.2 \text{ m}^3) / (8.3145 \text{ J/mol}\cdot\text{K} \times 298.15 \text{ K}) \approx 176.7 \text{ moles}$

Therefore, there are approximately 176.7 moles of hydrogen in the given conditions."

Comments by the author: $20,000,000 \times 2.2 / (8.3145 \times 298.15) = 17,749.3202$ which is not the same as provided by the ChatGPT.

Also, from $PV = nRT$, ChatGPT gives $n = PV / RT$ in the meaning $n = PV / (RT)$.

References

- Prieto, S.A.; Mengiste, E.T.; García de Soto, B. Investigating the Use of ChatGPT for the Scheduling of Construction Projects. *Buildings* **2023**, *13*, 857. <https://doi.org/10.3390/buildings13040857>
- Abid, H.; Javaid, M.; Singh, R.P. An Era of ChatGPT as a Significant Futuristic Support Tool: A Study on Features, Abilities, and Challenges. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations* **2023**, *2*, 100089. <https://doi.org/10.1016/j.tbench.2023.100089>
- Singh, S.; Himanshu, B. A Survey on Near-Human Conversational Agents. *Journal of King Saud University-Computer and Information Sciences* **2022**, *34*, 8852-8866. <https://doi.org/10.1016/j.jksuci.2021.10.013>
- Battineni, G.; Chintalapudi, N.; Amenta, F. AI Chatbot Design during an Epidemic like the Novel Coronavirus. *Healthcare* **2020**, *8*, 154. <https://doi.org/10.3390/healthcare8020154>
- Kapočiūtė-Dzikiėnė, J. A Domain-Specific Generative Chatbot Trained from Little Data. *Appl. Sci.* **2020**, *10*, 2221. <https://doi.org/10.3390/app10072221>
- Merdivan, E.; Singh, D.; Hanke, S.; Kropf, J.; Holzinger, A.; Geist, M. Human Annotated Dialogues Dataset for Natural Conversational Agents. *Appl. Sci.* **2020**, *10*, 762. <https://doi.org/10.3390/app10030762>
- Toader, D.-C.; Boca, G.; Toader, R.; Măcelaru, M.; Toader, C.; Ighian, D.; Rădulescu, A.T. The Effect of Social Presence and Chatbot Errors on Trust. *Sustainability* **2020**, *12*, 256. <https://doi.org/10.3390/su12010256>
- Cao, Y.; Zhai, J. Bridging the gap—the impact of ChatGPT on financial research. *Journal of Chinese Economic and Business Studies* **2023**, *1-15*. <https://doi.org/10.1080/14765284.2023.2212434>
- Singh, H.; Singh, A. ChatGPT: Systematic Review, Applications, and Agenda for Multidisciplinary Research. *Journal of Chinese Economic and Business Studies* **2023**, *21*, 193-212. <https://doi.org/10.1080/14765284.2023.2210482>
- Kooli, C. Chatbots in Education and Research: A Critical Examination of Ethical Implications and Solutions. *Sustainability* **2023**, *15*, 5614. <https://doi.org/10.3390/su15075614>
- Hutson, M. AI learns the Art of Diplomacy. *Science (New York, NY)* **2022**, *378*, 818-818. <https://doi.org/10.1126/science.adf8992>
- van Dis, E.A.M.; Bollen, J.; Zuidema, W.; van Rooij, R.; Bockting, C.L. ChatGPT: Five Priorities for Research. *Nature* **2023**, *614*, 224-226. <https://doi.org/10.1038/d41586-023-00288-7>
- Taecharunroj, V. What Can ChatGPT Do? Analyzing Early Reactions to the Innovative AI Chatbot on Twitter. *Big Data Cogn. Comput.* **2023**, *7*, 35. <https://doi.org/10.3390/bdcc7010035>
- Thorp, H.H. ChatGPT is Fun, But Not an Author. *Science* **2023**, *379*, 313-313. <https://doi.org/10.1126/science.adg7879>
- Graf, A.; Bernardi, R.E. ChatGPT in Research: Balancing Ethics, Transparency and Advancement. *Neuroscience* **2023**, *515*, 71-73. <https://doi.org/10.1016/j.neuroscience.2023.02.008>
- Rivas, P.; Zhao, L. Marketing with ChatGPT: Navigating the Ethical Terrain of GPT-Based Chatbot Technology. *AI* **2023**, *4*, 375-384. <https://doi.org/10.3390/ai4020019>
- ChatGPT. Available online: <https://chat.openai.com/chat> (accessed on 24 March 2023)
- Stokel-Walker, C.; van Noorden, R. The Promise and Peril of Generative AI. *Nature* **2023**, *614*, 214-216. <https://doi.org/10.1038/d41586-023-00340-6>
- Holly, E. Abstracts Written by ChatGPT Fool Scientists. *Nature* **2023**, *613*, 423. <https://doi.org/10.1038/d41586-023-00056-7>
- Haman, M.; Školník, M. Using ChatGPT to conduct a literature review. *Accountability in Research* **2023**, *1-3*. <https://doi.org/10.1080/08989621.2023.2185514>
- Brkić, D. Serbian Gas Sector in the Spotlight of Oil and Gas Agreement with Russia. *Energy Policy* **2009**, *37*, 1925-1938. <https://doi.org/10.1016/j.enpol.2009.01.031>
- Conley, H.A.; Sarić, D. Serbia-Kosovo Normalization Process: A Temporary US Decoupling. Center for Strategic and International Studies (CSIS), 2021. Available online: <https://www.csis.org/analysis/serbia-kosovo-normalization-process-temporary-us-decoupling> (accessed on 24 March 2023)

23. Resolution 1244 (1999) on the situation relating Kosovo adopted by the Security Council at its 4011th meeting on 10 June 1999. Available online: [https://undocs.org/S/RES/1244\(1999\)](https://undocs.org/S/RES/1244(1999)) (accessed on 24 March 2023)
24. Seliverstova, A. Serbian Official Discourse on Russia in the Context of the 2022 Ukrainian Conflict. Master's thesis, Masaryk University, Brno (Czechia), 2023. Available online: https://is.muni.cz/th/rqc27/Seliverstova_Anna_Thesis_06oqi.pdf (accessed on 24 March 2023)
25. Savković, M. Serbia and Russia: Continuity in a Changing Context?. In *Russia and the Future of Europe. The Future of Europe*, Kaeding, M., Pollak, J., Schmidt, P., Eds.; Springer, Cham, Switzerland, 2022, pp. 153-156. https://doi.org/10.1007/978-3-030-95648-6_37
26. Hellquist, E. Either With Us or Against Us? Third-Country Alignment with EU Sanctions Against Russia/Ukraine. *Cambridge Review of International Affairs* **2016**, *29*, 997-1021. <https://doi.org/10.1080/09557571.2016.1230591>
27. Dimitrijević, D. Chinese investments in Serbia—a Joint pledge for the future of the new Silk road. *TalTech Journal of European Studies* **2017**, *7*, 64-83. <https://doi.org/10.1515/bjes-2017-0005>
28. Dudić, B., Smoleň, J., Milošovičová, P., Dudić, Z. Advantages and Disadvantages of the Membership of the Republic of Serbia in the European Union. In *Economy, Finance and Business in Southeastern and Central Europe*, Karasavoglou, A., Goić, S., Polychronidou, P., Delias, P., Eds.; Proceedings in Business and Economics. 8th International Conference on the Economies of the Balkan and Eastern European Countries in the Changing World (EBEEC) in Split, Croatia, 2016, Springer, Cham, Switzerland, 2018, 113-122. https://doi.org/10.1007/978-3-319-70377-0_8
29. Fabry, M. The Contemporary Practice of State Recognition: Kosovo, South Ossetia, Abkhazia, and Their Aftermath. *Nationalities Papers* **2012**, *40*, 661-676. <https://doi.org/10.1080/00905992.2012.705266>
30. Fabry, M. *Recognizing States: International Society and the Establishment of New States Since 1776*. Oxford University Press: Oxford, UK, 2010. <https://doi.org/10.1093/acprof:oso/9780199564446.001.0001>
31. Crawford, J. *The Creation of States in International Law*. Oxford University Press: Oxford, UK, 2006. <https://doi.org/10.1093/law/9780199228423.001.0001>
32. Brkić, D. Serbian, Russian Pipeline Accord Enhances European Gas Security. *Oil & Gas Journal* **2008**, *106*, 52-54.
33. Dieckhoner, C. Simulating Security of Supply Effects of the Nabucco and South Stream Projects for the European Natural Gas Market. *The Energy Journal* **2012**, *33*, 153-181. <https://doi.org/10.5547/01956574.33.3.6>
34. Lochner, S. Modeling the European Natural Gas Market During the 2009 Russian–Ukrainian Gas Conflict: Ex-Post Simulation and Analysis. *Journal of Natural Gas Science and Engineering* **2011**, *3*, 341-348. <https://doi.org/10.1016/j.jngse.2011.01.003>
35. Garding, S.E.; Ratner, M.; Welt, C.; Zanotti, J. TurkStream: Russia's Newest Gas Pipeline to Europe. *Current Politics and Economics of Russia, Eastern and Central Europe* **2021**, *36*, 591-597. Available from: <https://www.proquest.com/scholarly-journals/turkstream-russias-newest-gas-pipeline-europe/docview/2584042378/se-2> (accessed on 28 March 2023)
36. de Jong, M.; Haesebrouck, T. Under pressure: A qualitative comparative analysis on the factors contributing to the success and failure of cross-border gas pipeline construction in Europe and Turkey. *Energy Strategy Reviews* **2023**, *45*, 101033. <https://doi.org/10.1016/j.esr.2022.101033>
37. Hebda, W. The North-South Gas Corridor in the Context of Poland's Gas Transmission System—A Perfect Opportunity to Diversify Gas Resources. *Energies* **2021**, *14*, 7188. <https://doi.org/10.3390/en14217188>
38. Vatansever, A. Is Russia Building Too Many Pipelines? Explaining Russia's Oil and Gas Export Strategy. *Energy Policy* **2017**, *108*, 1-11. <https://doi.org/10.1016/j.enpol.2017.05.038>
39. Baghirov, E. Turkish Stream Offers Russia Increased Export Control. *Oil & Gas Journal* **2015**, *113*, 86-91.
40. Richter, P.M.; Holz, F. All Quiet on The Eastern Front? Disruption Scenarios of Russian Natural Gas Supply to Europe. *Energy Policy* **2015**, *80*, 177-189. <https://doi.org/10.1016/j.enpol.2015.01.024>
41. Economides, S.; Ker-Lindsay, J. 'Pre-Accession Europeanization': The Case of Serbia and Kosovo. *JCMS: Journal of Common Market Studies* **2015**, *53*, 1027-1044. <https://doi.org/10.1111/jcms.12238>
42. Alexander, K.W. NATO's Intervention in Kosovo: The Legal Case for Violating Yugoslavia's National Sovereignty in the Absence of Security Council Approval. *Houston Journal of International Law* **1999**, *22*, 1-41. Available online: <http://www.hjil.org/articles/hjil-22-3-alexander.pdf> (accessed on 24 March 2023)
43. Anderson, J. Kosovo and the Legality of NATO's Actions. *Irish Studies in International Affairs* **2000**, *11*, 31-39. Available online: <https://www.jstor.org/stable/30001910> (accessed on 25 March 2023)
44. Accordance with international law of the unilateral declaration of independence in respect of Kosovo. Available online: <https://www.icj-cij.org/en/case/141> (accessed on 25 March 2023)
45. Newman, E.; Visoka, G. The European Union's Practice of State Recognition: Between Norms and Interests. *Review of International Studies* **2018**, *44*, 760-786. <https://doi.org/10.1017/S0260210518000104>
46. Rotaru, V.; Troncoță, M. Continuity and Change in Instrumentalizing "The Precedent". How Russia Uses Kosovo to Legitimize the Annexation of Crimea. *Southeast European and Black Sea Studies* **2017**, *17*, 325-345. <https://doi.org/10.1080/14683857.2017.1348044>
47. Mirović, D.M. Comparison of Crimea and Kosovo in the Context of Public International Law. *Political Review* **2014**, *4*, 163-174. <https://doi.org/10.22182/pr.4242014.9> (in Serbian)
48. Security Council resolution 757 (1992) on sanctions against Yugoslavia adopted by the Security Council 3082nd meeting on 30 May 1992. Available online: [https://undocs.org/S/RES/757\(1992\)](https://undocs.org/S/RES/757(1992)) (accessed on 25 March 2023)

49. Bo, H. Implications of the Ukraine war for China: can China survive secondary sanctions?. *Journal of Chinese Economic and Business Studies* **2023**, *21*, 311–322. <https://doi.org/10.1080/14765284.2022.2136933>
50. Tilev, D. The New EU Enlargement Methodology: Enhancing the Accession Process. Institute for Democracy, Skopje 2020. Available online: <https://idscs.org.mk/wp-content/uploads/2020/03/Final-Commentary-Dragan-Tilev.pdf> (accessed on 25 March 2023)
51. Blockmans, S.; Wessel, R.A. The European Union and Crisis Management: Will the Lisbon Treaty Make the EU More Effective?. *Journal of Conflict & Security Law* **2009**, *14*, 265–308. <https://doi.org/10.1093/jcsl/krp020>
52. Lavenex, S. Concentric Circles of Flexible ‘EUropean’ Integration: A Typology of EU External Governance Relations. *Comparative European Politics* **2011**, *9*, 372–393. <https://doi.org/10.1057/cep.2011.7>
53. Dionysiou, E. The European Union Enlargement in the Western Balkans: A Never-Ending Story of High Hopes and High Disappointments. In *Challenges and Barriers to the European Union Expansion to the Balkan Region*, Ferreira Costa, B., Eds.; IGI Global, 2022, pp. 39–66. Available online: <https://doi.org/10.4018/978-1-7998-9055-3.ch003> (accessed on 25 March 2023)
54. Mišćević, T. Ever Changing EU Accession Negotiation Process—the Case of Serbia—. *The Review of International Affairs* **2016**, *67*, 70–82. Available online: https://www.diplomacy.bg.ac.rs/pdf/ria/2016/RIA-1162-1163_2016.pdf (accessed on 25 March 2023)
55. Borozan, S.; Mateska, A.K.; Krstevski, P. Progress of the Electricity Sectors in South East Europe: Challenges and Opportunities in Achieving Compliance with EU Energy Policy. *Energy Reports* **2021**, *7*, 8730–8741. <https://doi.org/10.1016/j.egy.2021.11.203>
56. Fulli, G.; Masera, M.; Spisto, A.; Vitiello, S. A Change is Coming: How Regulation and Innovation are Reshaping the European Union’s Electricity Markets. *IEEE Power and Energy Magazine* **2019**, *17*, 53–66. <https://doi.org/10.1109/MPE.2018.2872303>
57. Gvozdenac, D.; Petrović, J. About the Serbian Energy Problems. In 3rd 2011 IEEE International Symposium on Exploitation of Renewable Energy Sources (EXPRES), Subotica, Serbia, 11–12 March 2011, pp. 45–52. <https://doi.org/10.1109/EXPRES.2011.5741814>
58. Sames, C.W. Enlargement: The mineral production of Turkey and the Western Balkans in comparison with the EU-27. *Minerals & Energy-Raw Materials Report* **2009**, *23*, 177–183. <https://doi.org/10.1080/14041040903020616>
59. Guan, Y.; Yan, J.; Shan, Y.; Zhou, Y.; Hang, Y.; Li, R.; Liu, Y.; Liu, B.; Nie, Q.; Bruckner, B.; Feng, K. Burden of the Global Energy Price Crisis on Households. *Nature Energy* **2023**, *8*, 304–316. <https://doi.org/10.1038/s41560-023-01209-8>
60. Podbregar, I.; Filipović, S.; Radovanović, M.; Mirković Isaeva, O.; Šprajc, P. Electricity Prices and Consumer Behavior, Case Study Serbia—Randomized Control Trials Method. *Energies* **2021**, *14*, 591. <https://doi.org/10.3390/en14030591>
61. Rizaj, M.; Beqiri, E.; McBow, I.; O’Brien E.Z.; Kongoli, F. The mineral base and productive capacities of metals and non-metals of Kosovo. *JOM* **2008**, *60*, 18–22. <https://doi.org/10.1007/s11837-008-0101-4>
62. Laković, M.; Jovčevski, M.; Stefanović, G.; Mitrović, S. Lignite as the Basic Energy Source in Serbia, the Characteristics and Capabilities for More Efficiency Use. Conference: In International Conference of Power Plants, Zlatibor, Serbia, 28–31 October 2014. Available online: https://www.researchgate.net/publication/284625104_Lignite_as_the_basic_energy_source_in_Serbia_the_characteristics_and_capabilities_for_more_efficiency_use (accessed on 25 March 2023)
63. Daničić, D.; Mitrović, S.; Pavlović, V.; Kovačev, S. Sustainable development of lignite production on open cast mines in Serbia. *Mining Science and Technology (China)* **2009**, *19*, 679–683. [https://doi.org/10.1016/S1674-5264\(09\)60126-5](https://doi.org/10.1016/S1674-5264(09)60126-5)
64. Čorović, N.; Urošević, B.G.; Katić, N. Decarbonization: Challenges for the Electricity Market Development—Serbian Market Case. *Energy Reports* **2022**, *8*, 2200–2209. <https://doi.org/10.1016/j.egy.2022.01.054>
65. Todorović, M.N.; Radenković, M.B.; Onjia, A.E.; Ignjatović, L.M. Characterization of PM 2.5 Sources in a Belgrade Suburban Area: A Multi-Scale Receptor-Oriented Approach. *Environmental Science and Pollution Research* **2020**, *27*, 41717–41730. <https://doi.org/10.1007/s11356-020-10129-z>
66. Cardu, M.; Ionel, I.; Ungureanu, C. Ecological aspects concerning the combustion of lignite in Romanian thermopower plants. *Energy Conversion and Management* **2005**, *46*, 1645–1654. <https://doi.org/10.1016/j.enconman.2004.07.010>
67. CO₂ Emissions per Capita. Available online: <https://www.worldometers.info/co2-emissions/co2-emissions-per-capita/> (accessed on 25 March 2023)
68. Cvetinović, D.; Stefanović, P.; Marković, Z.; Bakić, V.; Turanjanin, V.; Jovanović, M.; Vučićević, B. GHG (Greenhouse Gases) Emission Inventory and Mitigation Measures for Public District Heating Plants in the Republic of Serbia. *Energy* **2013**, *57*, 788–795. <https://doi.org/10.1016/j.energy.2012.09.063>
69. Radojević, D.; Pocajt, V.; Popović, I.; Perić-Grujić, A.; Ristić, M. Forecasting of greenhouse gas emissions in Serbia using artificial neural networks. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects* **2013**, *35*, 733–740. <https://doi.org/10.1080/15567036.2010.514597>
70. Klimenta, D.; Mihajlović, M.; Ristić, I.; Andriukaitis, D. Possible Scenarios for Reduction of Carbon Dioxide Emissions in Serbia by Generating Electricity from Natural Gas. *Energies* **2022**, *15*, 4792. <https://doi.org/10.3390/en15134792>
71. Plant, G.; Kort, E.A.; Brandt, A.R.; Chen, Y.; Fordice, G.; Gorchov Negron, A.M.; Schwietzke, S.; Smith, M.; Zavala-Araiza, D. Inefficient and unlit natural gas flares both emit large quantities of methane. *Science* **2022**, *377*, 1566–1571. <https://doi.org/10.1126/science.abq0385>
72. Serbia Electricity. Available online: <https://www.worldometers.info/electricity/serbia-electricity/> (accessed on 25 March 2023)
73. Brkić D. Energy Situation in the Republic of Serbia. In *4th Sustainable Energy and Environmental Protection SEEP*, Bari, Italy, 29 June –2 July 2010.
74. Mitrović, D.; Ignjatović, M.; Stojanović, B.; Janevski, J.; Škundrić, J. Energy Analysis of Repowering Steam Power Plants by Feed Water Heating. *Facta Universitatis, Series: Mechanical Engineering* **2022**, *20*, 53–72. <https://doi.org/10.22190/FUME200218017M>

-
75. Serbia Oil. Available online: <https://www.worldometers.info/oil/serbia-oil/> (accessed on 25 March 2023)
 76. Radukić, S.; Veselinović, M.; Marjanović, I. Technical Efficiency Analysis of Oil Companies in the Republic of Serbia. *Economic Research-Ekonomska Istraživanja* **2023**, *36*, 2180051. <https://doi.org/10.1080/1331677X.2023.2180051>
 77. Jovanović, J.; Jovanović, M.; Jovanović, A.; Marinović, V. Introduction of Cleaner Production in the Tank Farm of the Pančevo Oil Refinery, Serbia. *Journal of Cleaner Production* **2010**, *18*, 791-798. <https://doi.org/10.1016/j.jclepro.2010.01.002>
 78. Anđelković, A.S.; Bajatović, D. Integration of Weather Forecast and Artificial Intelligence for a Short-Term City-Scale Natural Gas Consumption Prediction. *Journal of Cleaner Production* **2020**, *266*, 122096. <https://doi.org/10.1016/j.jclepro.2020.122096>
 79. Kovačević, M.; Lambić, M.; Radovanović, L.; Kucora, I.; Ristić, M. Measures for Increasing Consumption of Natural Gas. *Energy Sources, Part B: Economics, Planning, and Policy* **2017**, *12*, 443-451. <https://doi.org/10.1080/15567249.2016.1179359>
 80. Čepić, Z.; Bošković, G.; Ubavin, D.; Batinić, B. Waste-to-Energy in Transition Countries: Case Study of Belgrade (Serbia). *Polish Journal of Environmental Studies* **2022**, *31*, 579-4588. <https://doi.org/10.15244/pjoes/149223>
 81. Vasić, G. Application of Multi Criteria Analysis in the Design of Energy Policy: Space and Water Heating in Households—City Novi Sad, Serbia. *Energy Policy* **2018**, *113*, 410-419. <https://doi.org/10.1016/j.enpol.2017.11.025>
 82. Lukić, N.; Jurišević, N.; Nikolić, N.; Gordić, D. Specific Heating Consumption in the Residential Sector of Serbia—Example of the City of Kragujevac. *Energy and Buildings* **2015**, *107*, 163-171. <https://doi.org/10.1016/j.enbuild.2015.08.012>
 83. Brkić, D.; Tanasković, T.I. Systematic Approach to Natural Gas Usage for Domestic Heating in Urban Areas. *Energy* **2008**, *33*, 1738-1753. <https://doi.org/10.1016/j.energy.2008.08.009>
 84. Dastan, S.A. Negotiation of a Cross-Border Natural Gas Pipeline: An Analytical Contribution to the Discussions on Turkish Stream. *Energy Policy* **2018**, *120*, 749-760. <https://doi.org/10.1016/j.enpol.2018.03.012>
 85. Jia, M.; Li, F.; Zhang, Y.; Wu, M.; Li, Y.; Feng, S.; Wang, H.; Chen, H.; Ju, W.; Lin, J.; Cai, J. The Nord Stream pipeline gas leaks released approximately 220,000 tonnes of methane into the atmosphere. *Environmental Science and Ecotechnology* **2022**, *12*, 100210. <https://doi.org/10.1016/j.ese.2022.100210>
 86. Chen, X.; Zhou, T. Negligible Warming Caused by Nord Stream Methane Leaks. *Advances in Atmospheric Sciences* **2023**, *40*, 549–552. <https://doi.org/10.1007/s00376-022-2305-x>
 87. Balkan Green Energy News. Available online: <https://balkangreenenergynews.com/putin-vucic-agree-on-new-gas-supply-contract-for-serbia/> (accessed on 25 March 2023)
 88. Ribeiro, V.M.; Soutinho, G.; Soares, I. Natural Gas Prices in the Framework of European Union’s Energy Transition: Assessing Evolution and Drivers. *Energies* **2023**, *16*, 2029. <https://doi.org/10.3390/en16042029>
 89. Al-Yafei, H.; Aseel, S.; Kucukvar, M.; Onat, N.C.; Al-Sulaiti, A.; Al-Hajri, A. A Systematic Review for Sustainability of Global Liquefied Natural Gas Industry: A 10-year Update. *Energy Strategy Reviews* **2021**, *38*, 100768. <https://doi.org/10.1016/j.esr.2021.100768>