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The Effects of Establishing an FSRU Terminal at the Gulf of Saros in Turkey for Balkan Countries

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THE EFFECTS OF ESTABLİSHİNG AN FSRU TERMİNAL AT THE GULF OF SAROS İN TURKEY FOR BALKAN COUNTRİES

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Central and Eastern European (CEE) countries are almost exclusively dependent on Russian natural gas for their consumption and most of them are seeking new alternatives to strengthen their energy security. New supply alternatives could be the solution to the dominance of the Russian gas. While the reason for the monopolistic status of Russia is providing the lowest prices to Europe, this benefit can be nullified by natural gas interruptions from Russia to these countries. The increasing number of new energy suppliers in the region may lead to an increase in the supply of natural gas, however, this may not eventually further decline in natural gas prices but may help to boost European natural gas supply security. Thus, new energy projects to provide alternatives such as the project in the Gulf of Saros in Turkey can provide an alternative to Russian gas for Balkan countries in the case of a need arises. The unique location Turkey has enables it to become not only a transit country but also with its developing new natural gas supply mechanisms. The FSRU facility at the Gulf of Saros may firstly help to diversify Turkey's energy supply and ensure its own energy security. Its main focus is to feed the demand of its heartland, the Marmara Region. The demand is the highest during the winter and Saros project can be a tool to make sure the region is also fed. Any surplus of natural gas can be sold to the CEE countries when they are in need. Secondly, it will also contribute to Europe's energy security, which was threatened by various natural and political turmoil such as Russia-Ukraine crises in the past. In 2009, Russia cut its gas supply which flows through Ukraine to Europe over a dispute, claiming that Ukraine diverts the natural gas supply from the transit route and steals it (CBSNews, 2009). In the light of the ongoing crises between Ukraine and Russia, there is no guarantee that a similar situation may not arise in the future. Lastly, Turkey may be able to supply the Balkan region – which actively seeks an alternative to Russian gas – when the region needs additional sources. However, the internal dynamics of the region may create difficulties for Turkey to be an alternative natural gas supply route. For instance, Moldova is highly dependent on Russian gas since 50% of the shares of Moldovan-Russian joint stock company Moldovagaz is held by Russia. The company that has a de facto monopoly on supply, transport and distribution and owned by Gazprom and currently has $6 billion debt to Gazprom. Russia also has leverage over Moldova regarding Transnistria – a region that broke away from Moldova after the collapse of the Soviet Union in 1992 – and it still keeps about 1,500 soldiers there against Moldova's will. In addition to the ongoing gas disputes between Russia and Ukraine, any conflict over natural gas supply between Russia and Moldova may result in further political dissent. On the other hand, the fact that Romania and Bulgaria are both European Union (EU) and the North Atlantic Treaty Organization (NATO) member states makes their hand against Russia stronger. Thus, selling gas to Bulgaria, Romania, Moldova and Ukraine are technically possible via the pipelines connecting them to each other, however, only Bulgaria, Romania and Ukraine might be able to afford to explore the alternatives to Russia. Furthermore, the

possibility of feeding Ukraine depends on the interconnectivity of Romania and Ukraine, which can only be done by bypassing Moldova. This report will focus on Bulgaria, Romania and Ukraine.

Table 1: International Natural Gas Pipelines in the Region

Pipeline	Length (km)	Capacity, 2018 (bcm/y)	Diameters of Pipelines (in)	Direction	Connection Countries
Blue Stream	1,261	16	55" (mainland) 47" (mountainous) 24" (submarine)	North-South	Russia-Turkey
TurkStream	930	31.5	32"	North-South	Russia-Turkey
West Line (Trans-Balkan)	845	14	-	North-South/ South-North	Russia-Ukraine-Moldova-Romania-Bulgaria-
TANAP	1,850	32	56" (to Eskisehir) 48" (until Greece) 36" (Marmara Sea)	East-West	Georgia-Turkey-Greece
TAP	878	10 (initial)	48"	East-West	Turkey-Greece-Albania-Italy
Eastring	1,208	20 (initial)	55"	North-South/ South-North	Slovakia-Hungary-Romania-Bulgaria-Turkey
Tesla	-	27	-	South-North	Greece-North Macedonia-Serbia-Hungary-Austria

Source: (Honoré 2018; PCI 2018)

Figure 1: Pipelines in the Region

Source: (ENTSOG 2017)

Table 2: Possible Scenarios for the Connectivity for Saros FSRU

Pipeline	Connections	Feeding Countries
West Line	ITB [project (3 bcm/y)] → EastRing	Bulgaria-Romania-Moldova-Ukraine-Hungary-Slovakia
	West Line until Romania → Medieşu Aurit-Tekovo Pipeline between Romania-Ukraine (4 bcm/y)	Bulgaria-Romania-Ukraine
TANAP	TAP (project) → Tesla → IGB	Bulgaria-Greece-Macedonia-Albania

Table 1 shows the international natural gas pipelines in the region and includes the information about their length, capacity, diameter, direction and connection countries. Figure 1 shows the locations of these pipelines in a map. In Table 2, the existing pipelines in Turkey and Europe which connects Turkey to its target countries are demonstrated. While Trans-Anatolian Natural Gas Pipeline (TANAP) is actively

transporting natural gas; Tesla, Trans-Adriatic Pipeline (TAP) and Eastring will be commercially operational in 2019, 2020 and 2025 respectively. These pipelines can significantly improve Turkey's reach to Balkans. CEE countries are looking for diversification in energy suppliers are considering reversing the flows of their interconnection pipelines in order to allow Middle Eastern and Caspian natural gas. Since most of the gas supply runs from North to South in the region, the pipelines/interconnectors between Ukraine, Romania and Bulgaria would have to be reversed. Eastring is one of the possible projects that aim to bi-directionally connect between Europe and natural gas reserves of the Caspian region and the Middle East (Project of Common Interest, 2018). Tesla is another project to address the gas demand of the region, but it is planned to be connected by the flow of the Russian natural gas into European markets. Therefore, the project may cause a conflict of interest in Turkey. A third option is to employ the already existing West Line pipeline – which is assumed to become inactive for the distribution of Russian natural gas in 2020 – and bypass Moldova on the way to use the direct connection between Romania and Ukraine. According to the Ten-Year Network Development Plan by Bulgartransgaz EAD, within the framework of the Central and South Eastern Europe Energy Connectivity (CESEC) initiative, a Memorandum signed between the operators of gas transmission systems of Greece, Bulgaria, Romania, Ukraine and Moldova plans to enable reverse flow of the Trans-Balkan gas pipeline (Bulgartransgaz, 2019). However, existing legal structure only allows long term contracted gas to be flowed through. Fortunately, interconnectors between both Bulgaria-Romania, and Romania-Ukraine are currently operating and are allowed to be reverse-flowed. Next, we will elaborate on these three countries and their energy outlooks, a discussion on an alternative FSRU facility in the region and how Turkey can contribute to the East European Energy Security.

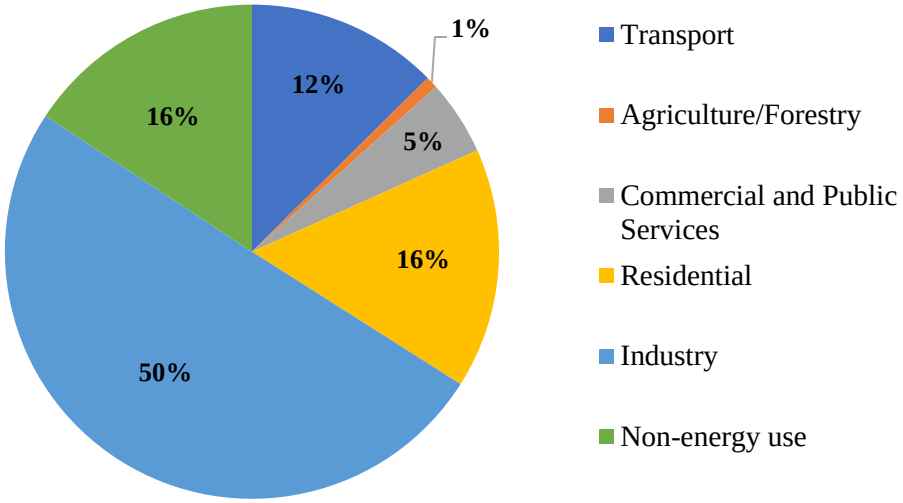
Bulgaria

Since 1974, Bulgaria has been exclusively dependent on Russia for its natural gas imports. Gazprom Export and Bulgarian natural gas company, Bulgargaz EAD, signed a new long-term gas supply contract for up to 2.9 billion cubic meters (bcm) per year (bcm/y). The contract covers the supply of natural gas from January 1, 2013, to December 31, 2022. In December 2006, Gazprom Export and Bulgargaz signed a Memorandum that extended the contract for Russian natural gas transport via Bulgaria to other countries until 2030, while keeping booked transit volumes to 17.8 bcm/y (Gazprom Export, 2019). By a simplified calculation comparing Bulgaria's annual spending on natural gas imports and its annual natural gas consumption, we concluded that Bulgaria's natural gas import price is around $6.51/MMBtu (see Appendix).

According to the 2016 data on Bulgaria's energy supply, Bulgaria's leading energy resources are coal and nuclear energy; coal-fired power plants provide for about the 45% of the country's energy demand

(Nishkov et al., 2015). However, as an EU country, Bulgaria has to cut at least 40% of greenhouse gas emissions compared with 1990 by 2030. Therefore, Bulgaria needs to consider alternative energy resources to comply with the EU targets. According to the EU statistics in 2018, CO_2 emissions fell by 8.1% in Bulgaria (Palen & Goll 2019). Even though there might not be a 40% cut of Bulgaria's carbon emissions, the country is still successful in decreasing it to a certain degree and will see a significant decrease in the foreseeable future. If done so, the country can either develop its nuclear energy or divert to natural gas. Thus, it is likely that Bulgarian Natural gas demand increase.

Figure 2: Share of Natural Gas Final Consumption by Sector in Bulgaria in 2016



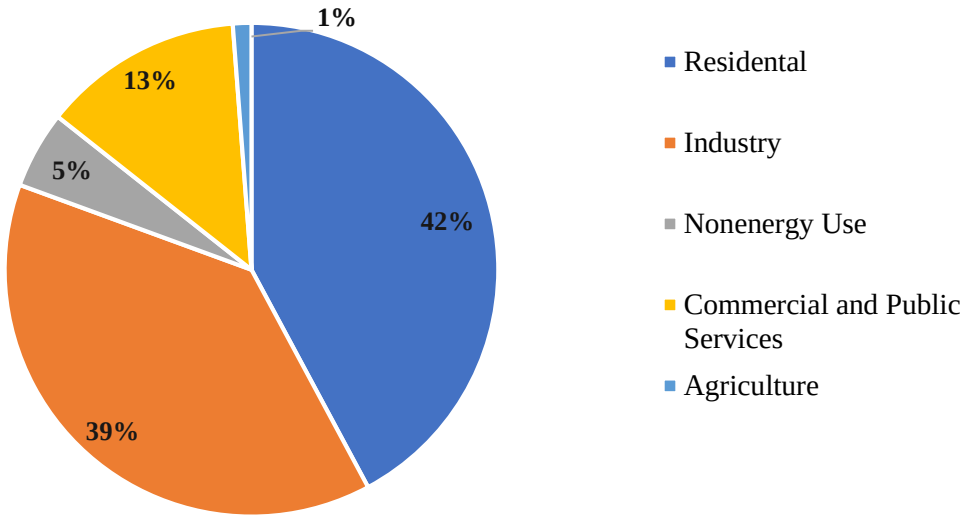
Source: (IEA, 2017)

Figure 2 suggests that natural gas is mainly used for industrial purposes in Bulgaria. However, according to the Energy Strategy document by The Bulgarian Ministry of Energy, only 1.5% of the households are gasified and a goal is set to increase this percentage to 30% by 2020 (Bulgarian Ministry of Energy, 2011). Even though Bulgaria's annual natural gas demand is only 3.2 bcm, when the usage of natural gas increases in households, Bulgaria's demand will increase as well. Bulgaria may need an additional natural gas supplier to fulfill its goals while decreasing the amount of coal used for its both electricity and heat production. In order for Bulgaria to consider buying gas via Turkey, the price for gas from Gulf of Saros should be close to or even lower than what Bulgaria is estimated to be currently paying or alternative suppliers. While Bulgaria is seeking to diversify its energy suppliers, if Turkey can manage to meet the numbers, it can become a reasonable alternative and can contribute to Bulgaria's efforts.

Romania

Since 1979, Russia has been the main natural gas supplier of Romania. Despite establishing an interconnector with Hungary to flow Hungarian gas into Romania, as of May 2019, Russia remains the sole exporter of natural gas to Romania (Melenciuc, 2019). At the same time, Romania has reserves on its own. However, according to World Energy Council, it has a small amount of proved natural gas reserves compared to some of the other significant global producers. Romania's annual production is expected to fall slightly to an average of 9-10 bcm during 2016-2030 (Republic of Romania Ministry of Energy, 2016). Its onshore production is expected to decline, whereas it aims to maintain a low degree of dependence from Russia on imports. In order to do that, Romanian-based company Black Sea Oil & Gas discovered two wells holding an estimated 10 bcm of gas in 2008 and only received the construction permit in February 2019 (Ilie, 2019). Recent information on the issue claims that Romania's offshore gas reserves are estimated at 200 bcm in the Black Sea (Ilie and Knolle, 2019). However, in the short term, Romania will have to import additional gas. Similar to Bulgaria, Romania has also been working towards decarbonization, while aiming to increase the number of its power plants, which run on natural gas.

Figure 3: Share of Natural Gas Final Consumption by Sector in Romania in 2016



Source: (IEA, 2017b)

Ukraine

Since the beginning of the conflict between Ukraine and Russia, Ukraine has been consistently decreasing the amount of gas imported by Russia. According to Naftogaz and MIT sources, Ukraine has not been buying Russian gas since 2016 and acquired all the gas it needs solely from 18 European suppliers (Naftogaz, 2019). Table 3 demonstrates Ukraine's annual natural gas imports from Russia and European countries separately.

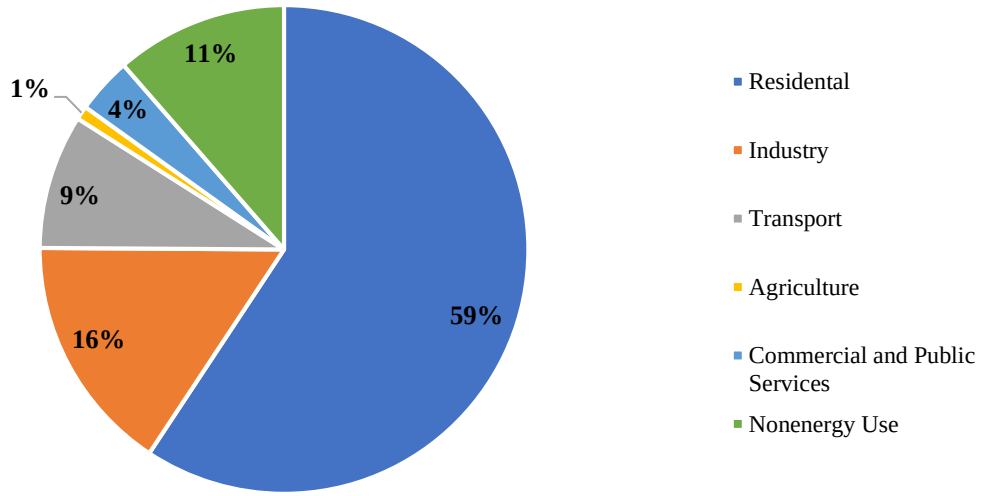
Table 3: Ukraine's natural gas imports between 2013-2017

Country/Year	2013	2014	2015	2016	2017
Russia	83%	56%	33%		-
European Countries	17%	44%	67%	21%	100%

Source: (MIT, 2019)

In October 2018, Ukrainian government reported that the prices hiked at $9.02/MMBtu compared to the $7.33/MMBtu in February 2018. The price is 40% higher than in Romania and Bulgaria. However, the good news for Ukraine gas market is that import share is decreasing constantly from 2011 (81%) to 2018 (33%) (Naftogaz, 2019).

Figure 4: Share of Natural Gas Final Consumption by Sector in Ukraine



Source: (IEA, 2017c)

In order for the Gulf of Saros to feed Ukraine, Moldova needs to be bypassed because Moldovagaz, under the political and economic influence of Gazprom, may not allow the gas to be transported through

Moldova to Ukraine. According to the Romanian Energy Regulatory Authority (ANRE), the interconnection between Ukraine and Romania in Tekovo has a possible reverse flow to Ukraine (Selavărdeanu, 2018). This means the gas from Saros can be supplied to Ukraine by bypassing Moldova.

An Alternative to Saros: Croatian FSRU on the Island of Krk

Croatia also aims to diversify and secure natural gas suppliers in the Balkan region by planning to construct a Floating Storage Regasification Unit (FSRU) terminal on the island of Krk. State-owned Liquefied Natural Gas (LNG) Croatia Company picked Golar Power to deliver the floating storage and regasification unit (FSRU) with an LNG storage capacity of 140,000 cubic meters and an annual technical regasification capacity of 2.6 bcm of gas (Harper, 2019). According to Croatia Minister of Environment and Energy, the implementation of the FSRU terminal project should be seen primarily through its security component and geopolitical significance for the Republic of Croatia and the EU (Trkanjec, 2019). The FSRU terminal is expected to start operating by January 1, 2021 (LNG World News, 2018). Nevertheless, Croatia has recently renewed its long-term gas contract with Gazprom for 10 years, which covers the country's baseload requirements, so the demand for additional LNG in the Croatian market itself will be limited (Harper, 2018). Table 3 demonstrates the target countries of the Croatian FSRU Terminal and their natural gas demands.

Table 4: Croatia's Target Countries for its FSRU Terminal

Country	Market Type	Gas Demand (bcm/y)
Croatia	Primary Markets	2.7
Hungary		9.5
Austria	Other Potential Markets	8.6
Czech Republic		8.2
Slovakia		4.7
Serbia		2.0
Slovenia		0.7
Bosnia & Herzegovina		0.2

Source: (Frančić, 2018)

Turkey's Potential for the Contribution of East European Energy Security

In order to understand how much Turkey can supply natural gas to Central and Eastern European countries the demands of those countries and the annual regasification capacity of the expected FSRU in Gulf of Saros should be studied. Table 4 reports the annual natural gas demands of the target countries. In Table 5, how much Gazprom supplies natural gas in those countries is shown to compare how much Turkey can become an alternative. The FSRU Terminal in Saros has planned 7.3 bcm/y send out capacity and the total demand of its market is 104.43 bcm per annum. Table 5 is generated according to the percentage of the demands of each country in the overall gas demand of the region. Assuming the countries in Table 4 requested for the regasified natural gas from Saros according to their own natural gas demands, the capacity of the Saros FSRU is distributed proportionaletly. Firstly, each country's natural gas demand is determined and compared based on their percentages in the pie chart. Then, 7.3 bcm/y is distributed to the countries according to their percentages.

This calculation certainly only illustrates an overall picture of what Gulf of Saros can accomplish. Since LNG can be way of providing natural gas via spot markets, the fluctuation of the demand of each country during the winter months should be taken into account. With building a new FSRU faciliy, Turkey's primary concern would be to cover for its own demand, while this also creates an opportunity for CEE countries to add one more supplier to their list in their path to further secure their energy suppplies. However, the LNG prices are usually higher than Russian natural gas supplied through pipelines. Turkey should offer a competitive prices to provide a feasible alternative for CEE countries as a such need arises. In geopolitical terms, Turkey offers an avenue to increase natural gas security of Europe with her Saros FSRU facility. New LNG suppliers such as the U.S., Qatar and Australia can benefit from this facility, considering their easier access to new markets through Turkey. Turkey has the potential to become a significant international and regional gas transit country and a physical hub connecting East with West. At the same time, Turkey's fast developing economy creates an increasingly important natural gas and energy demand its own, rendering Turkey a valuable market for especially U.S. LNG. While may be receiving large sums of gas from TurkStream, Turkey will continue to secure its energy supplies by investing on this FSRU facility, at the same time creating an option for the countries that have no other choice than being fully dependent on one supplier.

Table 5: Natural Gas Demands in Target Countries of Gulf of Saros in 2018

Countries	Natural Gas Demand in 2018 (bcm/y)
Bulgaria	3.03
Ukraine	29.20
Romania	11.00
Hungary	9.30
Slovakia	4.45
Turkey	47.45
Total	104.43

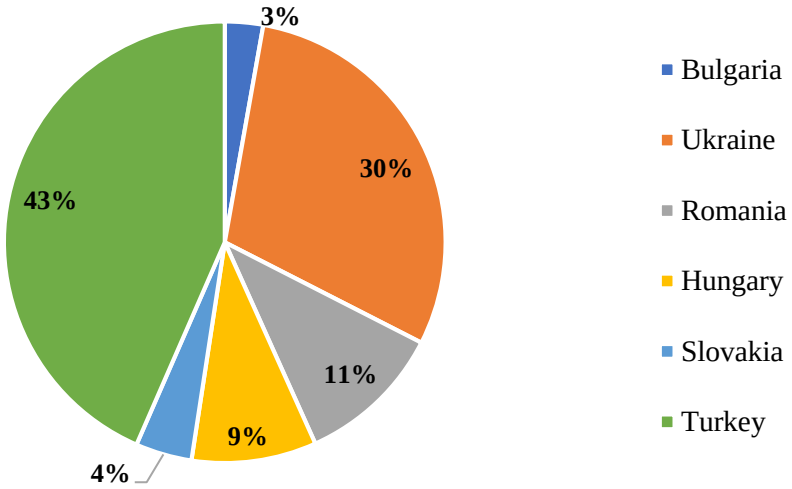
Source: (CEICData)

Table 6: Comparison of Gazprom and Gulf of Saros Project in Natural Gas Volume

Countries	Total Natural Gas Supply (bcm)	
	Gazprom Sales, 2018	Gulf of Saros (Possible)
Bulgaria	3.17	0.22
Ukraine	0	2.19
Romania	1.32	0.8
Hungary	7.41	0.66
Slovakia	5.08	0.29
Turkey	23.96	3.14
Total	40.94	7.3

Source: (Gazprom, 2019)

Figure 5: Gas Demands in Target Countries of the Gulf of Saros in 2017



Source: (Honoré, 2018)

Table 6: Transmission tariffs, gasification and natural gas prices of each country

Notes	$/MMBtu for minimum landing price	$/MMBtu	$/MMBtu for maximum landing price	$/MMBtu	Average Price of minimum and maximum ($/MMBtu)	The price they pay for imported NG except from Turkey ($/MMBtu)
Turkish landing prices in Saros [a]	7.25		11.15		9.2	
Gasification price in Saros [b]	0.50					
Turkish NG export-ready price at the border (Turkish landing price+gasification) [c]		7.75		11.65	9.7	2.02[j]
Turkish transportation cost to Malkoçlar (Bulgaria) [d]	2.85		2.85			
Border price for Bulgaria [e]		10.6		14.5	12.55	3.87[k]
Bulgarian ransportation cost to Negru Voda (Romania) [f]	3.62		3.62			
Border price for Romania [g]		14.22		18.12	16.17	5[l]
Romanian ransportation cost to Ukraine [h]	9.92		9.92			
Border price for Ukraine [i]		24.14		28.04	26.09	

Note a: According to data provided on Thomson Reuters, the maximum, minimum and average price of LNG per MMbtu in 2018 were calculated. **b:** Gasification price is proximately calculated by existing LNG regasification units of another countries on Bloomberg Intelligence. **c:** Summation of landing price of Turkey and regasification price in terms of $ per MMBtu. **d:** The cost of flow of NG from Saros to Malkoçlar (Turkish-Bulgarian border) with pipelines which was estimated from the report of Energy Community Regulatory Board called "Gas Transmission Tariffs in South and Central East Europe" in page 17. This cost was found comparing the cost of flow of NG in Bulgaria and the estimated length of these pipelines with the estimated length of pipelines in Turkey (from Saros to Tekirdağ 85 km and from Tekirdağ to Malkoçlar 125 km, in total 210 km). The estimated cost of building pipelines from Saroz to Malkoçlar was not added (See appendix for calculation). **e:** Summation of the Turkish NG import price at the border and Turkish transportation cost to Malkoçlar in terms of $ per MMBtu. **f:** the cost of flow of NG from Malkoçlar (Bulgarian border) to Negru Voda (Romanian border) which was estimated from the report of ECRB called "Gas Transmission Tariffs in South and Central East Europe" with page number of 17. **g:** Summation of the price of natural gas entered Bulgaria and Bulgarian transportation cost to Romania in terms of $ per MMBtu. **h:** the cost of flow of NG from Negru Voda (Romanian border) to Orlovka (Ukraine border) which was estimated from the report of ECRB called "Gas Transmission Tariffs in South and Central East Europe" with page number of 17. **i:** Summation of the price of natural gas entered Romania and Romanian transportation cost to Ukraine in terms of $ per MMBtu. **j:** Turkish NG import price was found from the database of Bloomberg as price of year 2018. The industrial NG prices were taken semiannually so that their average could be taken to calculate an average price for the year 2018. Then the unit was converged to $/MMBtu. **Note k:** According to the Bloomberg database, the imported industrial NG prices are found for Bulgaria in 2018 semiannually, then the average of these two prices were taken and converged to $/MMBtu. **Note l:** Romanian imported NG price (for 2016) is calculated from the report "The Outlook for natural gas in Romania and proposals for its value-added capitalization" published on June 2018 by Vasile Iuga and Radu Dudău. When it is converged to $ per MMBtu, it is 5 $/MMBtu

It is important that countries ensure the security of natural gas supply. For instance, Turkey bought natural gas for 11.15 $/MMBtu in 2018 although Turkey imports natural gas through pipelines for 2.02 $/MMBtu (see Note a and j). The purpose of table 6 is to assess the price of natural gas that can be charged at the borders of Bulgaria, Romania and Ukraine when LNG is purchased in Saros, gasified and sold.

In Table 6, we considered minimum, maximum and average landing price LNG of the year 2018 in Turkey as the LNG prices in Saros, and gasification cost $0.50/MMBtu (see Note b), transportation cost within Turkey as $2.85/MMBtu (see Note d), within Bulgaria as $3.62/MMBtu (see Note f), within Romania as $9.92/MMBtu (see Note h). The last column of the table is for the import prices (except from Turkey) of the corresponding countries. These numbers suggest that the Saros project is not feasible. However, LNG prices are so volatile, such as in 2018 Turkish LNG landed prices varies between 7.25 and 11.15 $/MMBtu. Importing and re-exporting LNG may be important and price inelastic when there is an excess demand of natural gas and existing contracts might be inadequate. Thus, the project still can be viable. It could be the case for Bulgaria, Romania, Ukraine and they may need to import from Turkey as lender of last resort.

Natural gas prices fluctuates depending on type of contract and volume. Natural gas is more expensive in winter time and daily purchases. If the volume is increased, the re-export price can be lower for Bulgaria, Romania and Ukraine. Long-term and high volume contracts would be a win-win situation for both importing country and Turkey. In this case, Turkey could guarantee its consumers to sell and importer countries could buy it cheaper.

Conclusion

Since Bulgaria is almost fully dependent on Russian gas, the projected supply to the country by FSRU will decrease Bulgaria's natural gas import dependency to Russia by 7%. Therefore, a price a bit higher than $6.51/MMBtu will still be favorable for Bulgaria. Romania is also looking to decrease its reliance on Russian gas. The major advantage of the country is that, Romania has the opportunity to invest and develop its own reserves. Even so, Romania will need another natural gas importer to increase energy security. Therefore, similar to the Bulgarian case, the gas selling price to Romania should be around $6.60/MMBtu.

Ukraine has higher import prices than Bulgaria and Romania. Since the total natural gas import share of the consumption is 33% as 2018, the selling prices should be lower than $9.02/MMBtu (European gas exporters' average price) to get a position in the market. Croatian FSRU on the Island of Krk could provide variety on energy security to Balkan Countries but, since the expected trade volume is lower than FSRU on Saros, this project does not provide a threat for Saros Project.

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Appendix

Calculating Bulgaria's Natural Gas Import Price

Building a pipeline between Saroz and Tekirdağ cost calculation:

Pipeline	Total cost of pipeline	Total lenght	Cost per km	Distance between Saros and Tekirdağ	Cost of connecting from Saros to Tekirdağ pipeline
Blue Stream	$ 3.3 million	1213 km	$ 271,918	85	$ 23,113,030

Bulgaria's Spending on Crude Oil and Natural Gas Import in 2017: €3,031,182,854

Conversion from EUR to USD according to the average currency rate in 2017: EUR/USD = 1.13

€3,031,182,854 = $3,425,236,625

Average Brent Crude Oil Price in 2017: $54.71/barrel

Bulgaria Imports of Crude Oil in 2017: 134.417 barrels/day

134.417 x 365 = 49.062.205 barrels/year

Bulgaria's Spending on Crude Oil Import in 2017: 49,062,205 x 54.71 = $2,684,193,235

Bulgaria's Spending on Natural Gas Import in 2017: $3,425,236,625 - $2,684,193,235 = $741,043,389

Bulgaria's Natural Gas Consumption in 2017: 3.21 bcm/y

Bulgaria's Spending on Natural Gas Import ($/$m^3$): $741,043,389/3,210,000.000 bcm/y = 0.23 $/$m^3$

In order to convert m^3 to MMBtu: 1 MMBtu = 28.2 m^3

Bulgaria's Import Price of Natural Gas Import ($/MMBTu): $6.51/MMBtu