Artículo de investigación

PROSPECTS FOR GAS INFRASTRUCTURE DEVELOPMENT IN COUNTRIES OF SOUTH-EASTERN EUROPE

ПЕРСПЕКТИВЫ РАЗВИТИЯ ГАЗОВОЙ ИНФРАСТРУКТУРЫ В СТРАНАХ ЮГО-ВОСТОЧНОЙ ЕВРОПЫ

PERSPECTIVAS PARA EL DESARROLLO DE INFRAESTRUCTURAS DE GAS EN LOS PAISES DE EUROPA SUDORIENTAL

Recibido: 3 de mayo de 2019. Aceptado: 15 de junio de 2019

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SPIN-código: 3872-8930

Abstract

Over recent years, South-Eastern Europe has become the main area for competition between gas producers for the promising European market. In the mid-term perspective, the southeast direction may become the second largest (after traditional routes from the Russian Federation) or the main channel of natural gas supplies to the EU territory. The region is actively involved in the creation of a new energy supply infrastructure from various sources. This article is aimed to consider the most important and worth mentioning gas projects in the region, to study the prospects for their implementation, as well as to analyze the sources of the southeast vector of EU gas imports. The article states that South-Eastern Europe will be one of the main "points of entering" natural gas to the EU market, with a sufficient resource base in the mid-term perspective.

Keywords: gas, South-Eastern Europe, Balkan Peninsula, Southern Gas Corridor.

Аннотация

Юго-Восточная Европа в последние годы стала главным полем противостояния производителей газа за привлекательный европейский рынок. В среднесрочной перспективе юго-восточное направление может стать вторым по величине (после традиционных маршрутов из РФ) или основным каналом поставок природного газа на территорию ЕС. В регионе активно создается новая инфраструктура поставок энергоносителей из различных источников. Цель статьи – рассмотреть наиболее значимые и заслуживающие внимания газовые проекты региона, изучить перспективы реализации этих проектов, проанализировать источники юго-восточного вектора газового импорта ЕС. Статья утверждает, что ЮВЕ будет одной из основных «точек входа» природного газа на рынок ЕС, а ресурсная база в среднесрочном периоде является достаточной.

Ключевые слова: газ, Юго-Восточная Европа, Балканский полуостров, Южный газовый коридор.

Resumen

En los últimos años, el sudeste de Europa se ha convertido en el área principal de competencia entre los productores de gas para el prometedor mercado europeo. En la perspectiva a medio plazo, la dirección sureste puede convertirse en la segunda más grande (después de las rutas tradicionales de la Federación de Rusia) o en el principal canal de suministro de gas natural al territorio de la UE. La región participa activamente en la creación de una nueva infraestructura de suministro de energía a partir de diversas fuentes. El objetivo de este artículo es considerar los proyectos de gas más importantes y dignos de mencionar en la región, estudiar las perspectivas de su implementación y analizar las fuentes del vector sureste de las importaciones de gas de la UE. El artículo establece que Europa sudoriental será uno de los principales

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"puntos de entrada" del gas natural en el mercado de la UE, con una base de recursos suficiente en la perspectiva a medio plazo.

Palabras clave: gas, Europa sudoriental, península balcánica, Corredor de gas sur.

Introduction

Due to objective reasons (to reduce dependency on a single source, EU policy focused on energy supply diversification, gas crises in 2006 and 2009), the European Union countries are working hard to create a new gas infrastructure and develop the domestic gas market based on "Gas-on-Gas competition".

With these changes taken into account, the countries of South-Eastern Europe are becoming the matter of great importance. The region has high chances to become the second after the Russian Federation "point of entering" natural gas to the EU territory. Currently, South-Eastern Europe has become the main area for gas competition between the European Commission and Russia. Five major sources compete for the promising European market: the countries of the Caspian basin, Russia, the Black Sea fields, the Mediterranean region and LNG. Beyond all doubt, a significant redirection of EU gas imports in favor of this direction is expected in the mid-term perspective.

Methodology

The gas energy projects in the South-Eastern Europe were used as the methodological foundation of this study, which allows for determination of the gas market development of the European Union in the midterm and long term.

General scientific principles of research are applied: historical, activity related, systemic, cognitive, involving the study of economic relations and phenomena in their development and interrelation. The study used general scientific and special research methods: scientific abstraction, analysis and synthesis, induction and deduction, methods of comparative analysis, as well as special methods of economic analysis, in particular, grouping.

Development of gas infrastructure in South-Eastern Europe

Over the recent decade, the European Commission facilitates maximum integration and growth of the European gas market resource base. In the southeast direction, these tasks are implemented owing to the construction of new pipelines, the development of a network of LNG-terminals, as well as connecting the fields of the Caspian, Black and Mediterranean Seas with the EU market. In addition, a new wave of political support as well as the "hand of the market" has a beneficial effect on the development of the South-Eastern Gas Corridor.

Nevertheless, the gas pipeline system in the countries of South-Eastern Europe remains unbalanced. In connection therewith, the EU authorities on a regular basis fund the new gas infrastructure, designed to implement free circulation of gas at competitive prices. Let us consider the most promising projects being under implementation and at the stage of negotiations.

Table 1. Projects of gas corridors and LNG-terminals

Project	Route / Country	Operator	Capacity, billion cubic meters /year	Budget, Euro	Status	The prospects for growth, billion cubic meters / year
Under implementation						

Trans Adriatic Pipeline (TAP)	Greece, Albania, Italy	Consortium BP, SOCAR, Snam, Fluxys, Enagás, Axpo	10	4.5 billion	I quarter of 2020	up to 20
South Stream Lite	Russia, Turkey, Bulgaria, Serbia, Hungary, Slovakia, Austria	Gazprom, Bulgartransgaz, Srbijagas, FGSZ, Eustream, GCA	15.8	1.3 billion	January 2021	—
BRUA	Bulgaria, Romania, Hungary, Slovakia, Austria	Bultransgaz, Transgaz, FGSZ, Eustream, GCA	1.75	500 million	I stage – January 2020 II stage – IV quarter of 2022	up to 4.4
LNG-terminal in Revithousa	Greece	DEPA	7	145 million	II quarter of 2019	—
Planned						
Ionian Adriatic Pipeline (IAP)	Albania, Montenegro, Bosnia and Herzegovina, Croatia	SOCAR, Albgaz, Montenegro Bonus, BH-Gas, Plinarco	5	600 million	2023	—
EastMed Pipeline	Greece, Cyprus, Israel	DEPA, Edison	10	6-7 billion	Completion of PFS – 2019, the start of construction – 2021	up to 20

Trans-Caspian Pipeline	Turkmenia, Azerbaijan	—	30	5 billion	2022	—
White Stream	Turkmenistan, Azerbaijan, Georgia, Turkey, Romania	—	16	—	2022	up to 32
AGRI Project	Azerbaijan, Georgia, Romania, Hungary	—	2	1.2 billion	2026	up to 8
LNG-terminal in Krk	Croatia	LNG Croatia	2.6	250 million	IV quarter of 2020	—
LNG-terminal in Alexandro upolis	Greece	Copelouzos Group, Bulgartransgaz, DEPA, GasLog	5.5	385 million	IV quarter of 2021	—

Source: statements by companies to the media

Trans Adriatic Pipeline (TAP). This gas pipeline serves as an extension to the TANAP pipeline and is one of the main projects of the Southern Gas Corridor. It passes through the territory of Greece, Albania and Italy (across the Adriatic Sea). To date, construction works are completed by 90%. Commissioning is scheduled for the first quarter of 2020. The gas pipeline will provide gas supplies to the Balkan States in the amount of 10 billion cubic meters per year.

It is planned to connect the TAP to the IAP gas pipeline project and the Greece-Bulgaria interconnector (IGB). By 2030, it is planned to increase the throughput capacity of TAP from the actual 10 to 20 billion cubic meters per year owing to the construction of two compressor stations. By the end of 2019, the gas pipeline operator plans to implement the first receipt of demands on additional capacity reservation (Trans Adriatic Pipeline, 2019).

South Stream Lite. The project relates to the Russian gas pipeline (onshore extension to the second string of TurkStream), with a capacity of 15.8 billion cubic meters per year, from Turkey to the Austrian gas hub Baumgarten. The major part of the gas pipeline, as planned, is to be built on the basis of the existing gas infrastructure of the countries of South-Eastern Europe. Gas extraction, as planned, is to be implemented according to the following configuration: Bulgaria – 3.5 billion cubic meters per year, Serbia – 2, Hungary – 6. The rest will be sold via gas hubs of Austria or Hungary (Interfax Global Energy, 2019a). The project is of key importance for Russia, since it is focused on preserving the Russian share of the European gas market.

Bulgaria-Romania-Hungary-Austria (BRUA) Pipeline. The project relates to the gas corridor from the TANAP pipeline to the gas hub of Baumgarten (Austria), with a capacity of 1.75 billion cubic meters per year. The project is announced by Romania. In some sources it is referred to as "BRU(SK)A", since in 2018 Slovakia was added to the gas pipeline route. Major part of the project is implemented on the basis of the created infrastructure. The most significant innovations include the construction of the Romania-Hungary (RO-HU) interconnector, the extension of the existing Hungary-Slovakia (HU-SK) gas connection or building the new Hungary-Austria (HU-AT) connection.

Currently, the construction of two compressor stations, according to the first stage of the project (1.75 billion), is under completion. In summer of this year, these capacities will be offered for sale at the CAM NC auction, operated by the

Hungarian company FGSZ (GIE Annual Conference, 2018).

In prospect, the project participants plan to increase the transit capacity of the BRUA corridor due to connecting the Romanian GTS with the Black Sea fields, extending the Hungary-Ukraine interconnector (6.1 billion) and building the Hungary-Slovenia-Italy connection (2 billion). By the end of 2022, it is planned to increase the capacity of the BRUA corridor to 4.4 billion cubic meters per year.

LNG-terminal in Revithoussa. It is the only one LNG-terminal in Greece (located on the islet of the Aegean Sea, west of Athens). Currently, Algerian liquefied gas is being supplied to the terminal. In 2019, the third gas storage was commissioned, by virtue of which the terminal volume capacity amounted to 225 thousand cubic meters (7 billion cubic meters per year). As planned, a share of this volume, amounted to 2 billion cubic meters of gas, is used to meet internal demand of Greece, and 5 billion cubic meters – to deliver to the European market via the TAP gas pipeline and the IGB interconnector (LNG World News, 2019).

In the mid-term perspective, these projects will change significantly the structure of natural gas supplies to the European market. In addition, there are still a number of promising projects at the stage of negotiations with respect to the territory of South-Eastern Europe, including projects from 110 candidates for the 4th "Projects of Common Interest" (PCI) list (European Commission, 2019a).

Ionian Adriatic Pipeline (IAP). The project relates to the pipeline, with a capacity of 5 billion cubic meters, in the Balkan States: Albania, Montenegro, Bosnia and Herzegovina, Croatia. The IAP is an extension of the Southern Gas Corridor to the European continent and provides access to the project of LNG-terminal on the island of Krk (Croatia). Gas extraction via IAP is planned to be implemented according to the following configuration: Albania – 1 billion cubic meters of gas, Montenegro – 0.5 billion, Bosnia and Herzegovina – 1, Croatia – 2.5.

Currently, the project participants, jointly with the Azerbaijani company SOCAR, involved as a technical adviser, are solving the issue of funding the gas pipeline. The IAP is included in the 4th "Projects of Common Interest" (PCI) list. Commissioning is scheduled for 2023 (Energy Community, 2018).

Eastern Mediterranean (EastMed) Pipeline. The project relates to the gas pipeline from Israel and Cyprus to Greece and Italy (via the Poseidon gas pipeline). Offshore gas reserves in the eastern part of the Mediterranean Sea, estimated at 1 trillion cubic meters, will serve as the pipeline resource base. Transit capacity of the promising gas pipeline will make 10 billion cubic meters per year.

Currently, the operator of Edison project is performing the project feasibility study. In March 2019, the countries-participants of the EastMed project, signed an intergovernmental agreement on the gas pipeline construction. According to the statements by companies, the pipeline construction could begin in mid-2021 with commissioning in 2025 (Ruble, 2017). The project is included in the EU "Projects of Common Interest" list and is actively supported by the United States as an alternative to Russian and Iranian gas supplies.

Trans-Caspian gas pipeline. The project relates to the gas pipeline between the Turkmen and Azerbaijani coast of the Caspian Sea with a capacity of 30 billion cubic meters. It is considered as one of the main sources of the Trans-Anatolian gas pipeline (TANAP) after the Caspian Sea gas reserves (Trans-Caspian Pipeline, 2019). Resulting from the adoption of the Convention on the legal status of the Caspian Sea, the legal base needed for the gas pipeline construction has been created. The European Commission supports the project in the absence of public statements by investors confirming their interest in the gas pipeline. Statements, referring to the project commissioning by 2022, sound extremely optimistic as well.

White Stream. The project relates to the pipeline with a capacity of 16 billion cubic meters across the Black Sea bottom to Romania coast. This pipeline serves as an extension to the Trans-Caspian gas pipeline, up to the EU territory (White Stream, 2019). As well as the Trans-Caspian gas pipeline, the project has been under negotiations for more than a decade and till now does not contain specific agreements. White Stream project implementation directly depends on the promotion of the Trans-Caspian gas pipeline project.

AGRI Project. The project relates to the construction of the first LNG-terminals in the Black Sea (on the coast of Georgia and Romania). The project is deemed to be an alternative to the White Stream subsea pipeline. Different configurations of the project

implementation are being considered: from the low-cost option of 2 billion cubic meters per year (1.2 billion Euros) to more expensive one – 8 billion cubic meters (4.5 billion Euros) (AGRI, 2019). There are no public statements on the project.

LNG-terminal in Krk. The project relates to the Croatian LNG-terminal, with a capacity of 2.6 billion cubic meters per year, on the island of Krk in the Adriatic Sea. In 2019, the project received funding from the Croatian Government. Krk terminal is included in the PCI list. The project operator plans to allocate 75% of the share capital between foreign investors, 25% – between Croatian companies (LNG Hrvatska, 2019). Currently, negotiations with the Hungarian Government on the acquisition of 25% shares of the terminal are going on.

LNG-terminal in Alexandroupolis. The project relates to the LNG-terminal in northern Greece with a capacity of 5.5 billion cubic meters per year. In December 2018, the project company Gastrade conducted the first "Open Season" procedure, and as a result 20 companies reserved the entire proposed capacity (Gastrade, 2019).

New projects as well as the development of internal connections of European gas transportation systems will significantly affect the change in the structure of natural gas supplies. Let us consider some of them.

Table 2. Projects related to interconnectors

Interconnector	Route	Capacity, billion cubic meters / year	Implementation status	The prospects for growth, billion cubic meters / year
Reverse of the Trans-Balkan gas pipeline	Greece, Bulgaria, Romania, Moldova, Ukraine	15.7	January 2020	—
HU-UA	Hungary, Ukraine	6.1	2022	—
HU-SI-IT	Hungary, Slovenia, Italy	2	I stage – 2020 II stage – 2022	—
RO-HU	Romania, Hungary	1.75	I stage – January 2020 II stage – IV quarter of 2022	up to 4.4
HU-SK-AT / HU-AT	Hungary, Slovakia, Austria	5.2	2022	up to 9
	Hungary, Austria	4	—	—
Interconnector Bulgaria – Serbia (IBS)	Bulgaria, Serbia	3-5	May 2022	—
Interconnector Greece – Bulgaria (IGB)	Greece, Bulgaria	3	IV quarter of 2020	up to 5

Eastring	Bulgaria, Romania, Hungary, Slovakia	20-40	2025	—

Thus, one of the worth mentioning projects is the physical reverse along the *Trans-Balkan pipeline*, which currently is used by the Russian Federation to transfer gas to Bulgaria and Turkey through Ukraine and Romania. The project is unique due to the fact, that it requires minimal changes and additional costs involved. Based on the results of April consultations of the CESEC working group, the parties agreed to conduct the first capacity reservation auctions in summer 2019, and also obliged the national GTS operators to provide the required volumes of gas by January 1, 2020 (European Commission, 2019b).

In April 2019, the competition between the operators of gas mains Gas Connect Austria and FGSZ (Hungary) for the configuration of the Austrian-Hungarian interconnector HU-AT was resumed. Earlier, the Hungarian company FGSZ included the Slovak GTS in the gas pipeline route, supporting the decision due to lower costs compared to building a new gas pipeline from Hungary to the Austrian hub of Baumgarten, while Austria insisted on the initial route (Interfax Global Energy, 2019b). As a result, the Agency for the Cooperation of Energy Regulators (ACER), made a decision to conduct the "Open Season" procedure for the HU-AT interconnector in summer of this year.

Another worth mentioning project is the *Eastring* interconnector with a capacity of 20 billion cubic meters per year with the possibility of performing transit in both directions. The interconnector will be an important link in creation of the North-Southern Gas Corridor. At the end of 2018, the project feasibility study was presented, with the results confirming the project's viability. The start of construction is scheduled for 2022 with commissioning in 2025 (Eastring, 2019).

Prospects for the implementation of gas projects

Having analyzed the development of gas infrastructure in the region, one can notice radical changes occurring in the European Union gas market. In the context of global raw material flows reorientation, the importance of South-Eastern Europe, in particular the Balkan Peninsula, as an important energy cross point suitable for importing natural gas from three continents, increases significantly. At the same time, an increase in competition for controlling the routes of these flows and geopolitical tensions in the region take place.

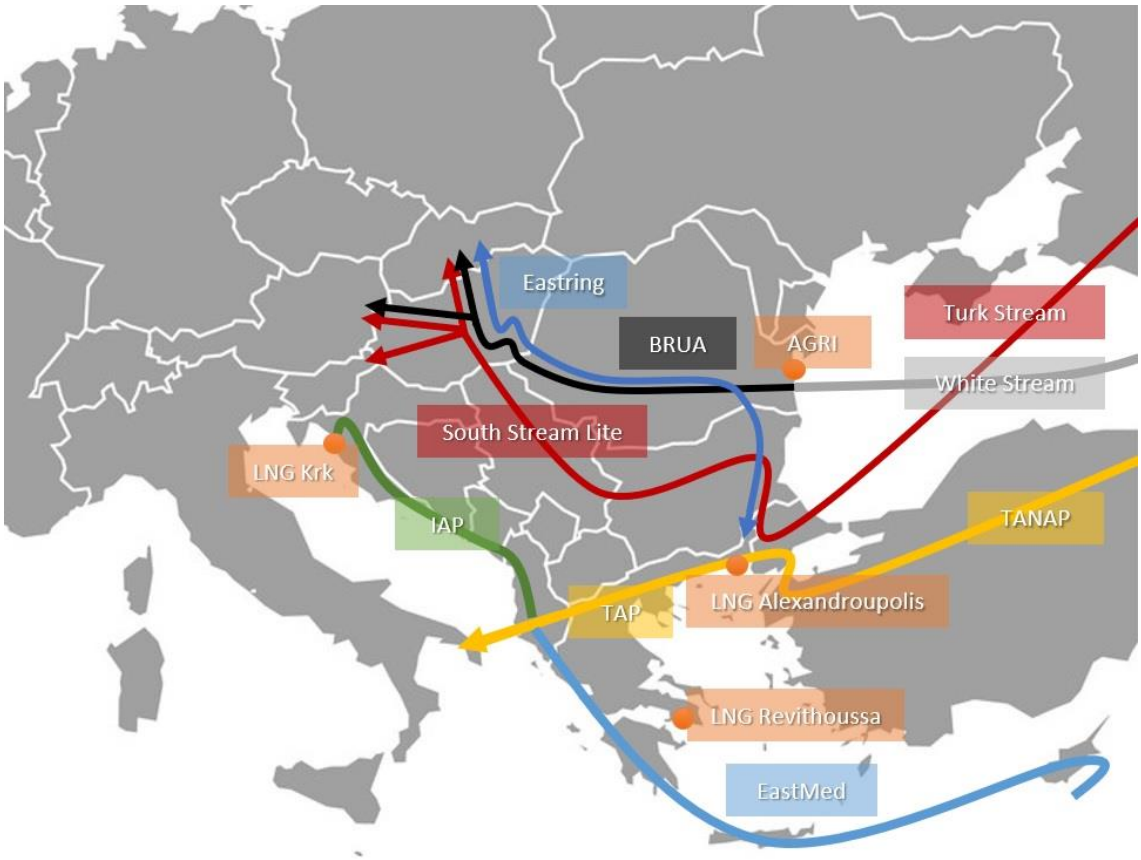

Fig. 1. Projects of gas corridors and LNG terminals

Source: prepared by the author

The main factors affecting the future of these projects include the cost of the created plans implementation, the investment structure, intergovernmental agreements signed and the absence of legal barriers. By many parameters, projects are not inferior to each other. Nevertheless, the state of the existing in SEE countries own infrastructure capacities allows one to conclude that they could hardly be involved in two or more projects, having similar characteristics by many parameters.

Let us analyze special aspects of competition between gas projects in the territory of South-Eastern Europe, the main risks associated with the implementation of these projects, as well as possible actions of the parties.

Table 3. Risks referring to the current and planned projects

Project	Risk
South Stream Lite	– Applying the rules of the EU Third Energy Package to the gas pipeline – Delay in the execution of construction caused by the countries participating in the project
BRUA	– Changes in the tax legislation of Romania
Trans-Caspian gas pipeline	– Eastern vector in gas exports of Turkmenistan – Counteracting from the side of "Gazprom"
EastMed Pipeline	– Political instability in the region and territorial disputes – Competing with the Turkish project TANAP – Technological complexity of the project implementation – Insufficient resource base

Eastring	– Delay in the project implementation
White Stream, AGRI	– Priorities of Romania in developing gas fields of the Black Sea

Referring to Russian gas projects, the role of the Balkans as a corridor for gas transfer depends not only on the Balkan states ability to create interrelations by way of negotiations, but on a diversity of external factors that go beyond the region.

One of the key challenging issues for the Government of the Russian Federation during the *South Stream* Lite project implementation is that the gas pipeline is a subject to the rules of the EU Third Energy Package. Nevertheless, the Russian gas monopolist "Gazprom" found the optimal solution and chose Serbia for laying the land extension to the Turk Stream. Serbia's independence from EU energy legislation allowed PJSC "Gazprom" to reserve 70% of Serbian section of the South Stream Lite (the relevant decision was made by the Serbian regulatory authority). Meanwhile, the said section is being built by the Serbian gas pipeline operator Gastrans controlled by PJSC "Gazprom" by 51% (Interfax Global Energy, 2019c).

At the same time, the South Stream Lite sections, passing through the territory of Hungary and Bulgaria, are subject to the rules of technical and economic performance. As a supplier, "Gazprom" will be guaranteed only 50% of capacity. The second half will be distributed on an auction basis, including 10% based on short-term contracts.

Under such circumstances, it can be assumed that "Gazprom" will either resell gas to other suppliers, or (if the auction has no alternative) apply for free capacity. The possibility to observe its practical implementation will appear upon the South Stream Lite commissioning in January 2021. At the same time, the attempts of pressure on Serbia by the European Commission should be expected, in particular, via the Energy Community, which is currently adapting Serbia's energy legislation within the framework of preparing Serbia for the European Union membership.

The delay in South Stream Lite construction remains to be an important risk. In the absence of a new transit agreement with Ukraine, any delay is critical for the Russian company. In addition, parallel gas corridors BRUA, IAP and Eastring commissioning prior to the Russian project will create serious competition opportunity for PJSC "Gazprom".

Another gas corridor, covered by the "risk zone", is the second phase of the BRUA project with an increase in capacity to 4.4 billion cubic meters per year. The unfavorable tax regulations in Romania, as entered into force at the end of 2018 (additional turnover tax of 2% till 2022 and the requirement to sell 50% of the produced gas to the local market at a controlled price), compromised the project implementation. During tender procedures, at most 40% of the planned gas pipeline capacity was reserved (1 billion cubic meters out of 2.6 billion) (Interfax Global Energy, 2019d). In addition, none of the gas producers (OMV Petrom, ExxonMobil, Lukoil, BSOG) confirmed their intention to further developing gas fields of the Black Sea.

Further extension of the BRUA will directly depend on the agreements between gas developers of the Black Sea and the Government of Romania. By now, oil and gas companies follow "wait and see" strategy. Nevertheless, on a long-term horizon, one could argue on the development of this corridor. During the last meeting of the Consultative Council for the Southern Gas Corridor, held in February 2019, the parties discussed the possibility of connecting the Southern Gas Corridor to the RO-BG interconnector and the BRUA pipeline. At the same time, plans to connect the BRUA to the promising White Stream or AGRI offshore projects remain unchanged.

The *Trans-Caspian gas pipeline* is one of many gas projects that have been discussed for decades. Last year, it was spoken about again within the framework of the Caspian Agreement adoption, making the Trans-Caspian gas pipeline construction legally feasible, which allows Turkmenistan to direct gas exports to the European market.

Despite vast support by European states and the "Southern Gas Corridor" project participants, Turkmenistan's ambitions are focused on the East direction nowadays. The Turkmenistan-Uzbekistan-Kazakhstan-China gas mains loading came close to 100% as of the end of 2018. It is planned to build the 4th string of the pipeline. According to experts, by 2030, China will increase gas imports by more than 2 times

from the actual 120 to 270 billion cubic meters per year, wherein Turkmenistan expects to take a leading position (International Energy Agency, 2019a). Moreover, Turkmenistan is focused on the sale of the TAPI gas mains (Turkmenistan-Afghanistan-Pakistan-India) with a capacity of 33 billion cubic meters per year. For the aim of comparison, the overall gas exports by Turkmenistan as of the end of 2018 amounted to 35 billion cubic meters (U.S. Energy Information Administration, 2019).

At the same time, in March 2019, negotiations were held between the Prime Minister of Turkmenistan M. Abylgaziyev and PJSC "Gazprom" chief executive, A. Miller, on the results of which the parties agreed to resume supplies of Turkmen gas to the Russian Federation (Interfax Global Energy, 2019e). It can be assumed that Russia's actions are aimed to reduce the interest of Turkmenistan in the "Southern Gas Corridor" project as much as possible.

West direction and the supplies of Turkmen gas to the EU should be considered as a long-term horizon. This year, Turkmenistan is going to host the first Caspian Economic Forum, as well as the Summit of leaders of the Caspian countries, wherein the Turkmen representatives are likely to take steps to eliminate all doubts concerning the Trans-Caspian gas pipeline and to obtain the most favorable terms for entering the project.

The *EastMed Pipeline* project, connecting the gas reserves of eastern Mediterranean to Greece and Italy, is a rather controversial matter. Lebanon argues against the project, saying that gas pipeline construction will violate the country's sea borders. It is likely that, the parties will not reach an agreement on the land and sea borders agreed division. The case will be referred to the International Tribunal for the Law of the Sea (the corresponding convention, in turn, is not signed by Israel). In addition, the delay in the project implementation may occur due to ongoing territorial disputes in Cyprus. Political situation of this kind has a chance to decrease the interest of potential investors, as well as to leave the project without funding by the European Commission.

The idea that the project creates additional competition to the TANAP corridor also has reasons to exist. The Turkish authorities will be interested in attracting the Mediterranean resource base to their gas flows and are able to directly affect the project implementation through the "Cyprus question".

In addition to political factors, experts mention high technological complexity of the project implementation. The EastMed route passes through a seismically active zone, and the pipes are to be laid at a record-breaking high depth of 3.3 km (compared to the Russian offshore projects on the Baltic Sea – 500 m and the Black Sea – 2 km). The gas pipeline resource base also remains a matter of doubt. In 2018, the project resource base estimates (1 trillion cubic meters of gas) were revised downwards (IAA Conference on Digitalization and Automation in the O&G Industry, 2018). Currently, project participants are negotiating with Egypt to involve a large Zohr field in the project.

For the successful implementation of the project, a constructive cooperation on equal terms with Israel, Cyprus and Greece should be achieved. The Summit of leaders of the three Mediterranean countries, held on March 20, 2019, and the Declaration on the creation of the so-called "energy triangle", signed based on the results of the meeting, prove that this is possible.

The *Eastring* gas pipeline project is one of the most powerful gas interconnectors in Europe. The first stage of the project implies pumping 20 billion cubic meters of gas, the second – 40 billion cubic meters per year, wherein the gas pipeline is designed double-piped and capable to pump gas in both directions. To date, this interconnector is unique, nevertheless, with the dynamic development of the competing BRUA and South Stream Lite corridors, the project risks to become irrelevant. The prospects for Eastring implementation depend on the efficiency of the project initiator, the Slovak gas transmission operator Eustream, as well as on the ability of the countries participating in the project to take mutual interests into account.

The main risks of the Black Sea projects implementation, the *White Stream* and AGRI Project, are associated with Romania's ambitions to increase the productive capacity of the offshore fields of the Black Sea and to establish regular sales of Black Sea gas to the EU market. It is for this purpose that Romania initiated the BRUA project. Having its own vast gas reserves, the Government of Romania will probably not be interested in supporting projects by competitive suppliers. However, within the next 2 years, Romania is expected to face presidential, parliamentary and municipal elections that can change national priorities.

Resource base of gas infrastructure in South-Eastern Europe

Taking the foregoing into account, it can be assumed that the "Southern Gas Corridor", actively supported by the EU countries; Russian pipeline projects; Romanian project BRUA; Eastern Mediterranean (EastMed) Pipeline and LNG-terminals have greatest chances of successful implementation within the territory of South-Eastern Europe. Thus, by 2025, five main transfer streams will be formed, in the southeast direction, with a throughput capacity of 52.65 billion in 2025 and about 97.05 billion cubic meters in 2030. Nevertheless, the question of these corridors fill rate still remains open.

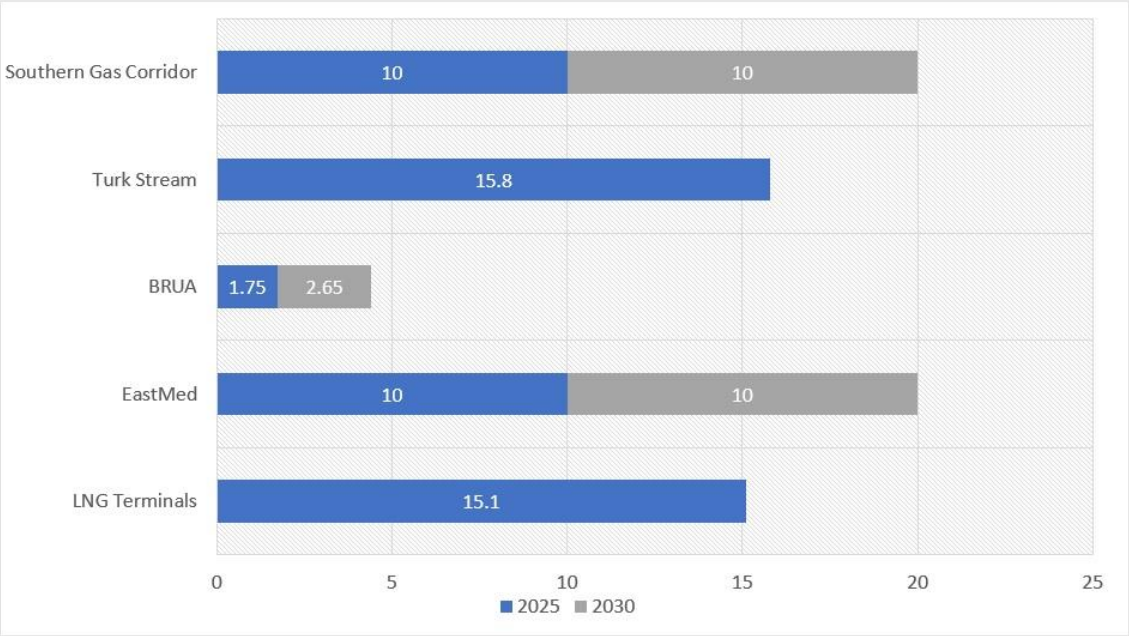

Fig. 2. Gas corridors capacity, bcm/y

Source: prepared by the author

Southern Gas Corridor. Currently, six sites of the Caspian basin are being actively developed. One of the flagship projects of Azerbaijan is the development of the "Shah Deniz" field. It is declared to be the raw material base of the "Southern Gas Corridor". In the first quarter of 2019 gas exports from the "Shah Deniz" field amounted to 2.6 billion cubic meters – by 27% higher than over the same period of 2018. Gas exports from the field accounted for 33.5% of all gas that was transported via gas pipelines in January-March 2019. The total amount of gas that was transported via the gas mains of Azerbaijan in the first quarter of 2019 made 7.8 billion cubic meters, which is by 16.8% higher than over the same period last year. As of the end of last year, Azerbaijani gas exports from the "Shah Deniz" field amounted to 8.4 billion cubic meters of blue fuel (Trend News Agency, 2019).

Commissioning the second phase of the "Shah Deniz" project, which by 2021-2022 is expected to increase peak volume of production to 16 billion cubic meters of gas per year, will be an important milestone in the "Southern Gas Corridor" development. This year, the BP plans to start drilling at the new Shafag-Asiman field. Preliminary reserves of 500 billion cubic meters of blue fuel witness in favor of the fact, that the project significantly exceeds the domestic market of Azerbaijan. At the same time, the French Total is developing both phases of the Absheron project with preliminary reserves of 300 billion cubic meters, and SOCAR is performing production from the Umid and Babek fields of 200 and 400 billion cubic meters, respectively (Pirani, 2018).

It can be stated above any doubt, that gas exports from the Caspian Sea shelf of Azerbaijan are possible only towards the European direction. In addition, the driver for the development of Azerbaijani fields is a high interest of gas developers in reserving capacities for the second phase of the TAP project. Even considering domestic consumption of Azerbaijan (about 13 billion cubic meters in 2018), Georgia (2 billion) and contracted gas volumes to Turkey (about 6 billion) (Enerdata, 2019), the resource base of the Southern Gas Corridor, taking into account the

low transit capacity of gas pipelines, being under implementation, seems to be sufficient.

An increase in the transit capacity of gas pipelines will require large volumes of gas, which, according to industry experts, Azerbaijan will not be able to provide. However, via adding gas pipelines from the Middle East and the Caspian Sea, the corridor has chances to become the main export gas pipeline and seriously improve Russian gas positions on the European market.

Turk Stream. The resource base for the Russian gas projects implementation does not cause any doubt. Despite the depletion of "mature" fields in the mining regions with a developed infrastructure (Volga region, Urals, Western Siberia), the Russian gas monopolist "Gazprom" consistently maintains the reserve replacement ratio of more than one, while the company's resource base continues to increase. Thus, in 2024-2027 PJSC "Gazprom" plans to add the Tambey group's new fields with estimated reserves of 1.3 trillion cubic meters of gas to the raw material base of the "Turkish Stream" (Neftegaz, 2019).

As for the resource support of its projects, Russia has more flexibility than its competitors, as it combines gas production and transit in the name of PJSC "Gazprom". In case of a shortage of resources, Kazakhstan and Turkmenistan can act as a source of the Russian project.

Moreover, a shortage of gas in this direction is hardly possible, since the part of transit, currently being delivered through Ukraine, will be redirected to the "Turkish Stream".

BRUA. To date, the Romanian project has a sufficient resource base. Gas producers are performing production from seven major sites. At the end of 2018, Total began drilling the Melnik 1 site, and in April of this year, Shell began a three-month drilling program at the Khan Kubrat field. The Neptun field with preliminary 84 billion cubic meters of blue fuel seems to be promising (Romania Ministry of Energy, 2019). Thus, even without considering the Neptun project, which is awaiting the final investment decision by the American developer ExxonMobil, the XII Pelican, Trident and Midia Shallow fields in Romania with overall reserves of more than 40 billion cubic meters are able to feed the gas pipeline BRUA for 9.5 years. With the Neptun field operational commissioning, the direction will be provided with raw materials for 28 years.

EastMed. According to the project participants, the Leviathan (Israel), Aphrodite (Cyprus), and Calypso (Cyprus) fields, with total reserves of about 1 trillion cubic meters of gas, will serve as the resource base for the Mediterranean gas pipeline. In the period between November 2019 and November 2020, seven drillings are planned at the said fields: five of them will be carried out by joint efforts of Total – Eni companies, and the other two – by ExxonMobil – Qatar Petroleum companies (Reuters, 2019).

Meanwhile, the EastMed supporters hope to invite Egypt to the project, which may become a net supplier of gas due to the discovery and quick development of the Zohr field (850 billion cubic meters of gas). It is worth noting that such concentration of resources in the region will be sufficient for a gas pipeline with a capacity of 20 billion cubic meters per year.

LNG-projects. LNG-terminals in Greece and Croatia by 2025 will be able to accept 15.1 billion cubic meters of gas, and there are no technological prerequisites for a shortage of energy resources as well. The load factor of these terminals will depend on the LNG market conditions in 2025. For now, liquefied gas cannot compete with its pipeline analogue due to its high cost, and the main producers of LNG (Qatar, Algeria, USA) are focused on more profitable Asian markets.

Table 4. Resource base estimates for gas corridors

Corridor	Field	Reserves, billion cub. m	Status
	Shah Deniz I	1 200	Production has been conducted since 2007.

	Shah Deniz II		Production has been conducted since 2018, the peak output is scheduled for 2020-2021.
Southern Gas Corridor	Umid-Babek	600	Production is underway
	Absheron I	300	Commissioning is scheduled for 2020.
	Absheron II		Survey by drilling is expected to commence
	Shafag-Asiman	500	Commissioning is scheduled for 2023.
Turk Stream	Tambey group	1 300	Commissioning is scheduled for 2024-2027.
	XII Pelican, Paula field	1.64	Additional reserves assessment is underway
	Trident block, Lyra field	30	Additional reserves assessment is underway, drilling is expected to commence
BRUA	XV Midia Shallow, Ana and Doina fields	9	The final investment decision was made in February 2019.
	Neptun block, Domino 1, Pelican South 1	84	Awaiting the final investment decision
	Block 1-21 Han Asparuh	—	Survey by drilling is expected to commence
	Block 1-14 Khan Kubrat	—	Survey by drilling is underway
EastMed	Leviathan	500	Commissioning is scheduled for the end of 2019.
	Aphrodite	129	Survey by drilling is expected to commence
	Calypso	450	Survey by drilling is expected to commence

Source: statements by companies to the media

The considered resource base, localized in the southeast direction, witnesses in favor of the sufficient fill rate of the above-mentioned gas corridors in the mid-term perspective. According to the International Energy Agency estimates, by 2030, the European Union gas imports will reach

237 billion cubic meters, and the demand for additional volumes of imports – 128 billion cubic meters of gas (International Energy Agency, 2019b). Consequently, by 2030, about 12% of the EU gas imports will be transported through the countries of South-Eastern Europe.

Conclusion

Having analyzed the prospects for South-Eastern Europe as one of the main gas export streams to the EU, one can specify two features. The direction has a prolific resource base, which in the mid-term and long-term perspectives can make a significant contribution to Europe's energy security, and the problem of raw materials supply to future pipelines will be irrelevant till 2030. In addition, gas projects within the SEE area have much in common in terms of the participating Balkan transit countries. In this regard, let us quote the words by Graham Sadler, an analyst from Wood Mackenzie: "it's difficult to commence and finance an infrastructure megaproject in the gas market, which already has access to gas supply sources at competitive prices". However, in view of tough competition between suppliers, the promising EU market remains economically viable for the implementation of such projects.

According to the author's opinion, South-Eastern Europe has a chance to become at least the second after Russia "point of entering" natural gas to the EU territory. Firstly, as for now, an extensive gas network has already been created for future supplies, in view of favorable prerequisites for the implementation of further projects. Secondly, this infrastructure has a reliable resource base. Finally, the unique geographical position of the region allows the EU to import gas from three continents.

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