

THE OVERVIEW OF THE MAIN GAS PIPELINES IN THE BLACK SEA REGION: POLITICAL AND ECONOMIC ASPECTS

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Topicality. The Black Sea region is very dynamic in terms of economic development, security problems and interstate relations. All of the countries in this region are heterogeneous but energy issue plays a pivotal role in their foreign policy priorities. It is the only one common denominator that can both foster cooperation and catalyze conflict in the Black Sea basin. The problem of transporting energy has an impact not only on the Black Sea countries, but also on the Southeastern Europe, Russia, the Caspian Sea, Middle East, and ultimately the European consuming markets. Thus, the issue of energy transition needs the experts' and scientists' attention fixed on the Black Sea region in order to come together facing the latter-day challenges. The energy challenge has a multi-dimensional nature. Aim. Thus, this paper aims to provide an overview of the energy transaction issues focusing on the economic effects of the most important gas pipelines within the Black Sea region. Particular attention is going to be paid to the problem of the energy routes' diversification and pipelines which connect the carbon-rich countries of the Middle East and Caspian region and Europe. Also, it is aimed to give a comprehensive analysis of the energy challenge within the Black sea region, focusing on energy efficiency of the gas pipelines which go through this extremely important energy hub. Methods - scientific methods of data analysis, historical and statistical overview, predictive analysis qualitative indicators, comparative method, method of description, case study. Results. The creation of a stable markets, interconnected and transparent natural gas supply would largely counteract the risks. The flexibility transport infrastructure, numerous and capable pipelines, underground storage capacities and their management may play an important role in the sector's ability to manage supply shocks.

Key words: energy efficiency, gas pipelines, economic effects, sustainable development, Black Sea region

Actualitatea. Regiunea Mării Negre este foarte dinamică în ceea ce privește dezvoltarea economică, problemele de securitate și relațiile interstatale. Toate țările din această regiune sunt eterogene, dar problema energetică joacă un rol esențial în prioritățile de politică externă. Acesta este doar un numitor comun care poate atât promova cooperarea cât și cataliza conflicte în bazinul Mării Negre. Problema transportului energiei are un impact nu numai asupra țărilor din Marea Neagră, dar și din Europa de Sud-Est, Rusia, Marea Caspică, Orientul Mijlociu, și piețele consumatoare europene. Astfel, problema tranzitului energiei necesită atenția experților și savanților "axate pe regiunea Mării Negre, în scopul prevenirii provocărilor viitoare. Problema energetică are un caracter multi-dimensional. Scop. Lucrarea își propune să ofere o imagine de ansamblu privind problemele de tranzitare a energiei concentrându-se pe efectele economice ale celor mai importante conducte de gaze din regiunea Mării Negre. O atenție deosebită se va acorda problemei diversificării și gazoductelor care conectează țările din Orientul Mijlociu, regiunea Mării Caspice și Europa. De asemenea se urmărește oferirea unei analize cuprinzătoare privind resursele energetice din regiunea Mării Negre, cu accent pe eficiența energetică a gazoductelor care trec prin acest centru energetic extrem de important. Metode. Metoda științifică de analiză a datelor, metoda istorică și statistică, indicatori calitativi, analiză predictivă, metoda comparativă, metoda de descriere și studii de caz. Rezultate. Crearea unei piețe stabile de alimentare cu gaze naturale interconectate și transparente care ar contracara în mare măsură riscurile. Infrastructura de transport flexibilă, numeroase conducte, capacitățile de înmagazinare subterană și

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managementul lor pot juca un rol important in capacitatea sectorului de a gestiona ocurile de aprovizionare.

Cuvinte cheie: *eficien a energetic , conducte de gaze, efecte economice, dezvoltare durabil , regiunea M rii Negre.*

JEL Classification: F5; L95; O19; P48; Q01; Q4.

Introduction. Within the realities of the post-Cold War period the Black Sea region has become one of the new scopes of the international relations. It is widely defined as the area covered by the twelve states participating in the organization of the Black Sea Economic Cooperation (namely Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, the Russian Federation, Republic of Serbia, Turkey and Ukraine) and the main states around the Caspian Sea, Kazakhstan and Turkmenistan.

Following the break-up of the USSR in 1991, almost all Black Sea countries were hit by crises due to dependency on the Soviet market and post-Soviet transition to the market economy. In addition, there were also prospects of asymmetries in economic growth in the region. The successor states of the former Soviet Union have only recently begun to make progress on their economic reforms. It should be mentioned that positive growth rates have been the result of economic programs primarily sponsored by the International Monetary Fund.

In general, there are many problems within the Black Sea region: the political crises in the Balkans, the Caucasus and the Caspian region, ethnic animosities, economic crises, refugees, environmental problems, disparities in military power and so on. On this background of complicated territorial and ethnic conflicts and competing interests the development of energy resources and their transportation take place.

Methodological overview. This article embraces a row of different scientific methods of data analysis, predictive analytics, historical and statistical overview, qualitative indicators, descriptive and comparative methods, case study etc.

The historical overview together with descriptive and comparative methods made it possible to trace back the history and reasons of the latter-day situation, to describe the present-day conditions and international position of the countries within the Black Sea area.

In the same time the statistical overview gave us necessary information concerning the main energy consumption indicators and others, and eventually, it let us shape the picture of current situation in this field. In addition, the predictive analysis focuses on application of statistical information for prediction and forecasting the Black Sea region's development in the nearest future.

Black Sea region: an overview

The Black Sea region is an important part of the East-West energy system. About 80 percent of Russian natural gas exports to Europe transit this region. Furthermore, the Caspian basin states, turned into independent hydrocarbon producers in the early 1990s, are striving to access Western markets through conduits which cross or which are designed to cross the region. However, the Central and Eastern European states exhibit a much higher degree of dependence on Moscow than do Western European ones. Whereas France, Italy, the Netherlands and Belgium depend on Gazprom's deliveries for about 20 percent of their needs, Finland, Slovakia, and Bulgaria all import over 90 percent of their gas from Russia, with several other EU members states' dependence exceeding 60 percent. Accordingly, the very meaning of energy security differs in these two cases: while Western Europe is primarily anxious about sufficient supplies of gas, Central and Eastern European states come to cherish the diversity of its supply sources. For Russia, instead, energy security primarily refers to unhindered access to markets and to its market share preservation.

It is worth mentioning, that conditions for a competitive geopolitical game of pipeline projects emerged after the end of the Cold War, when the Black Sea region states have seen their geography enhanced to a strategic level in light of the efforts of the Caspian and some Middle Eastern states to access the cash-rich European gas markets.

Energy politics in the Black Sea region

Nowadays, energy security is one of the main issues on the agenda of the EU foreign policy, and its geostrategic implications in the Black Sea region are the most apparent. Geographically, this strategic region connects Europe with Russia, the Caspian and the Middle Eastern countries that have a significant world's oil and gas reserves. Most transit routes from these regions transport oil and gas through the Black Sea region and adjacent states to Europe [24].

In spite of the fact that there are many factors which make the area prone to instability, the existence of large oil and gas reserves encourages cooperation, involving multinational consortia and external actors. Interestingly, in the framework of energy cooperation all partners are interdependent. On one hand, there is a flow which links the main regional energy producers (the Middle East, the Caspian Sea area and the Central Asia) with the energy consumer (the Euro-Atlantic community), and, on the other hand, there is a flow between the security producer (the Euro-Atlantic community) and the security consumer (the Middle East and Central Asia) [9]. Consequently, instability and conflicting trends, the energy resources and economic prospects make the international community involve directly within this area.

The most problematic aspect of the energy question, however, is the choice of a route for the oil and gas main lines. It is common knowledge, that today control over the pipeline routes is almost as important as the control over the resources which are being transported through them. The increased oil and gas production over the past two decades requires new infrastructure capacities for the Caspian states isolated from the shipping lanes. This problem has become a serious concern for the EU and the U.S. The underlying geopolitical problem resides in the diplomatic and military inability to choose a trajectory for the oil and gas pipelines ensuring 100 percent direct and controlled access to international waters for benefit of multinational companies. Nowadays, access to energy is fundamental for every country, and energy security is vital in the current global setting, as it provides the necessary stability for economic development.

For example, Russia and the United States, NATO and the EU are all trying to influence the countries of the Caspian and Black Sea regions in order to attract them to their sides. The United States and the European Union actively cooperate with countries of the Caspian and Black Sea regions in economic and investment spheres. This in the first rate refers to the implementation by the American and European companies of joint projects on oil and gas production in Azerbaijan and Turkmenistan. Besides, the USA and the EU provide a consistent support to the efforts of Azerbaijan and Turkmenistan to find alternative ways to foreign energy markets. Thus, the US and the EU are the main lobbyists for the project of the "Trans-Caspian" gas pipeline and participants of the "Nabucco" project. At the same time, American and European companies participate in the development of offshore oil and gas resources on the Black Sea coast of Ukraine and Romania, as well as in the development of shale gas fields at the

Ukrainian and Romanian territories; and invest into energy projects in Georgia and Moldova [10]. The Russian side opposes strengthening of regional positions of the USA, NATO and the EU, trying to convince these countries that construction of “Trans-Caspian” gas pipeline (on the bottom of the Caspian Sea) would be inappropriate.

Noteworthy, while there are several ways to transport oil from the Caspian region, the only way to transport Caspian gas to consumer markets runs through the pipelines only. There are several pipeline projects to supply Caspian gas to Western markets. Though, it should be noted, that the list of the Black Sea pipeline options and projects to bring gas and oil to Western markets extends much further, however, due to the economic efficiency and viability, the authors decided to concentrate on the most remarkable ones.

Main pipeline projects to supply Caspian Gas to western markets

It is common knowledge, that there is the Shah Deniz (SD) field located on the deep water shelf of the Caspian Sea, 70 km south-east of Baku, in water depths ranging from 50 to 500 m. It was discovered in 1999. It is one of the world’s largest gas-condensate fields, with 40 trillion cubic feet – over 1 trillion cubic meters of gas in place [21]. This requires enhancement of some existing infrastructure and development of a chain of new pipelines. One of the most distinguished pipeline projects dealing with the Azeri gas is **the Southern Gas Corridor**. It is arguably the global oil and gas industry’s most significant and ambitious undertaking yet. And it is a complex challenge involving many different stakeholders – including seven governments and 11 companies.

According to the decision of the Working Group of the Directorate General for the EU Commission several gas projects have been chosen as “crucial” for the overall energy security in Europe. This decision plays its role regarding the Southern Corridor developments, and the emerging architecture of natural gas infrastructure in Southeastern Europe [13]. The Southern Gas Corridor is launched to decrease the Russian monopolistic position as a gas supplier and it has the potential to meet 20% of the EU demand for gas in the future, with potential supply from the Caspian region, the Middle East and Eastern Mediterranean [8]. The official document on which the Southern Gas Corridor is rooted is thus represented by the Communication delivered in 2008 by the European Community (EC): the “Second Strategic Energy Review – an EU Energy Security and Solidarity Action Plan”. The document recognized the Southern Gas Corridor as one of the EU’s highest energy security priorities, outlying the need of a joint work between the EC, the EU Member States and the countries concerned (Azerbaijan and Turkmenistan, Iraq and Mashreq countries) [22].

It is worth mentioning that in 2002 the five-company consortium agreed to cooperate on the development of **Nabucco** as the main pipeline to transport gas from Azerbaijan, Turkmenistan, Iraq, Iran and Egypt to Southeast and Central Europe via Turkey [22]. However, notwithstanding the strong political commitment of the five transit countries and the unprecedented political support of the EU and the US, the Nabucco project has ultimately failed [12], mainly because of commercial and financial reasons: a very large scale pipeline project combined with a hugely uncertain demand outlook and the potential competition of the South Stream. In late June 2013, the consortium operating Azerbaijan’s Shah Deniz gas field selected the Trans Adriatic Pipeline (TAP) as the preferred gas transportation route to the European markets, offering superior terms and conditions over the competing Nabucco-West Pipeline [19]. Hence, TAP became the critical link in the overall Southern Gas Corridor project, moving Azeri gas from the Turkish border through the Trans-Anatolian Pipeline (TANAP), to European markets.

Thus, today, the pipelines forming the Southern gas Corridor are known as: 1. the existing *South Caucasus Pipeline* (SCP) which will be expanded with a new parallel pipeline across Azerbaijan and Georgia; 2. the *Trans Anatolian Pipeline* (TANAP) which will transport Shah Deniz gas across Turkey; 3. the *Trans Adriatic Pipeline* (TAP) which will take gas through Greece and Albania to Italy [17].

In its turn, Russia supported the “**South Stream**” pipeline project which was aimed to transport partly Russian partly Caspian gas to Europe via the Black Sea. However, in the light of recent news, it became known that this project seized to develop and, instead, Russia in close cooperation with Turkey launched a new gas project – the “**Turkish Stream**”. Facing objections from the European Union, Russia in December abandoned its \$40 billion South Stream project which would have passed under the Black Sea to Bulgaria and carried up to 63 billion cubic meters (bcm) of gas annually to Europe. It has now pinned its hopes on Turkey, hoping to construct a “Turkish Stream” pipeline with the same capacity to an as-yet unbuilt hub on the Turkey-Greece border by the end of 2016 [20].

According to Daria Nochevnik, the EU Energy Regulatory Affairs and Strategic Analysis Specialist and Deputy Head of the Greek Energy Forum's Brussels Division: "Russian gas supplies will remain important for the countries in the Black Sea region. However, the geopolitics of energy relations with Russia is very different across the countries in the area. While Romania is the least dependent on Russian supplies, Bulgaria relies almost exclusively on those, while experiencing the lack of interconnection with the neighboring gas markets.

In the case of Turkey, current geopolitical developments definitely play in its favor, and gas supplies from Russia will not only help meeting the growing domestic demand, but also reinforce Turkey's strategic position in the region.

When it comes to Ukraine, the situation is dramatically different. Although the first reverse-flows have been established and Ukraine has already experienced getting the so-called second hand Russian gas from Slovakia, it could only supply some 20% of country's demand. At the same time, under the current circumstances in the country, and due to current fiscal and legal policy of the new government, companies have to put all the upstream activities on hold" [14].

The above mentioned gas pipeline projects play a pivotal role in shaping the current energy security environment in the Black Sea region. "The race for control over the south-eastern route of gas supply into Europe is truly one of the main drivers of change in the Black Sea security environment" [11]. Notwithstanding the strategic guidelines laid down by Brussels to increase the EU's overall energy security, the various interests and perceptions of the EU member states regarding the "pipeline game" have led to a "collectively dissociated" energy policy. We see the profit-maximizing behavior of a handful of European energy majors as the main driver of Europe's energy relations.

Energy efficiency for sustainable development of the eu and Black Sea region

Today, the cost of energy along with the model of sustainability and the difficult access to finance for companies represent the major issue for the Europe's competitiveness. All of this is likely to derail the fragile revival of the European economy in recent years.

According to the European report „*Regional Challenges in the perspective of 2020*” the energy challenge has a multi-dimensional nature. The globalization, climate change, demographic change and migration, energy risks and social polarization play a major role in the future of regional economic trends. Europe as a whole has high earnings in all categories of external income except energy exports. By contrast neighboring regions are strong exporters of energy and little else [23]. The Europe 2020 target for energy efficiency is measured by the indicators "Primary energy consumption"¹ and "Final energy consumption"².

In order to meet the Europe 2020 goal of moving towards a 20% increase in energy efficiency, this value will have to decline by further 6.4% in the coming eight years. Although the EU currently seems to be on track to achieve this target, recent reductions in *primary energy consumption* have mainly been attributed to the slowdown in economic activities following the crisis rather than to structural shifts in energy consumption. Regarding the *final energy consumption* indicator, in 2006 it was at its highest level with 1190 Mtoe, but the consumption has fallen by 7.3%. The EU seems to reach the Europe 2020 target of 1086 Mtoe, however, the reductions in energy consumption have been registered [15]. In the context of efficiency of the gas pipelines, it can be stated that gas case studies have shown that *energy efficiency* is considered by pipeline operators as a part of processes in the minimization of pipeline's cost. It was demonstrated that pipelines which have a short build-up of demand to reach a long-term plateau will reach higher levels of compression from the early stages of the pipeline's life reflecting those that are optimal in the long run, at the demand plateau. This makes the most of significant economies of scale associated with pipe diameter needed for ultimate demand, while capturing the benefits of flexibility and deferral of investment in compression [16].

¹By "Primary energy consumption" indicator is meant the Gross Inland Consumption excluding all non-energy use of energy carriers and is used for measuring the true energy consumption and for comparing it to the Europe 2020 targets.

²By "Final energy consumption" indicator is meant all energy supplied to industry, transport, households, services and agriculture, it is used to measure the energy consumption at final place of energy use and for comparing it to the Europe 2020 targets.

The European Union is overwhelmingly dependent on energy imports, being the largest energy importer in the world (more than 53%). In this context, the weight of imports varies depending on the type of imported resources. This is demonstrated by the fact of steady decline in domestic production of the EU Member States in the last 20 years.

The EU dependence on imports has remained relatively constant at 52-53% (starting from 2006), due to increased production of electricity from renewable resources and lower demand of energy caused by the economic crisis and poor energy efficiency improvements. In the same time, regarding EU's gas consumption, it's around 440 mld m³ of natural gas.

In recent years, Europe's annual gas consumption (EU-28) has decreased and then stabilized, due to economic crisis, which led to reduced industrial consumption, but as well to the result of structural changes in the European economy (lower share of heavy industry), etc. Regarding the Central and Eastern Europe, the situation is quite vulnerable, because of high dependence of imports on Russia's natural gas that transits through Ukrainian territory. This implies higher prices for natural gas for the Central and Eastern Europe (about 30-40%), in comparison to the prices for the Western Europe.

Taking an overview through all important gas pipelines from the region, it can be mentioned that the *South Caucasus Pipeline* is based on the aim to supply Turkey and Georgia, and in a longer perspective the South Caucasus Pipeline will supply Europe with Caspian natural gas through the planned Southern Gas Corridor pipelines, such as Trans Adriatic Pipeline and Trans-Anatolian gas pipeline. It is worth mentioning, that Georgia has rights to take 5% of the annual gas flow through the pipeline in lieu of tariff and can purchase a further 0.5 billion cubic meters of gas a year at a discounted price.

The economic aspect of the *Nabucco pipeline* results in the diversification of the natural gas suppliers and delivery routes for Europe, thus reducing European dependence on Russian energy. Even if Nabucco pipeline supplies only a limited number of countries in South-East and Central Europe, the project has been criticized as uneconomic because there is no guarantee that there will be sufficient gas supplies to make it profitable and also because of the security aspect (the gas from Azerbaijan and Turkmenistan will have to pass near areas of instability in the South Caucasus). Also, this is confirmed by the fact that opening the Central Asia-China gas pipeline and the agreements to build the South Stream pipeline has been seen as the end of Nabucco project.

Regarding the *Trans-Anatolian Natural Gas Pipeline*, its construction is expected to be completed in 2018 and is considered as a central part of the Southern Gas Corridor that will connect the Shah Deniz gas field in Azerbaijan with Europe through the South Caucasus Pipeline, TANAP and the Trans Adriatic Pipeline. It is seen as an important and strategic project, both for Azerbaijan and Turkey, allowing Azerbaijan gas to be exported to Europe, through Turkey. *The Trans Adriatic Pipeline* - project to transport natural gas from the Caspian sea, starting from Greece via Albania and the Adriatic Sea to Italy and further to Western Europe. *The South Stream* is an abandoned pipeline project to transport natural gas of the Russian Federation through the Black Sea to Bulgaria and through Serbia, Slovenia, Hungary and Austria. The project created controversies due to non-compliance with the EU competition and energy legislation, such as the *Third Energy Package* which stipulates the separation of companies' generation and sale operations from their transmission networks. It was seen as a rival of the Nabucco pipeline project. The project was dropped by the Russian side in December 2014 following the numerous obstacles put by Bulgaria and the EU, the 2014 Crimean crisis and the imposition of European sanctions on Russia. Regarding Moldova's integration into our energy infrastructure is very important, namely, ensuring the connection in terms of energy between Moldova and Romania. Republic of Moldova has historically been 100% dependent upon supplies of natural gas from one source: Russia's Gazprom [18]. Starting from September 2014 Moldova and Romania inaugurated the *Iasi-Ungheni gas pipeline* in the Zagarancea village, western Ungheni district, confirming that Romanian gas will reach Moldova starting from 1 September. In this way, Chisin u is moving closer to the European energy market. Nonetheless, this project doesn't intend to suspend the import of gas supplies from the Russian Federation. It is aimed to ensure an alternative. The interconnection should be fully implemented by the end of 2016 [18].

Conventional natural gas potential of the countries of South East Europe region is reduced, while the shale gas is still unknown, and potential gas reserves in deep waters of the Black Sea could be about 2 billion BOE in the west, and about 5 billion BOE in the Eastern Black Sea basin.

Some analysts believe that the Black Sea could become for Southeast Europe the same as the North Sea for the Western Europe which is potentially the third largest natural gas production area [1]. Now, less

than 100 wells were drilled in the Black Sea and there is only one major discovery in *Neptun Block*, in the exclusive economic zone of Romania. Hydrocarbon potential of the Black Sea is considered high, being a drainage basin for the European rivers. Due to several explorations made here, the topography of the Black Sea is still little known. In recent years, however, major players in the sector have expressed their interest in the area and several countries in the Black Sea area (Bulgaria, Romania, Ukraine, Russia and Turkey) have already conducted auctions for concessions perimeters exploration of their exclusive economic zones [2].

Analysis regarding the impact of disruption of the Russian gas supply. Analyzing the EC's stress tests to assess the impact of disruption of gas supplies from Russia, were considered two scenarios: a) the interruption of gas supply from Russia; b) stopping the transit through pipelines from Ukraine. The scenarios evaluated the ability of alternative sources of supply and existing reserves of natural gas storage capacity, to overcome crisis, both in the summer, as in the case of peak consumption in January and February.

Following the results of the present analysis, it can be mentioned that Southeast Europe is the most vulnerable region, depending on both the imported Russian gas and transit through Ukraine. In case of transit disruption, natural gas demand of countries from the region could not be covered about 60% - 80%, going on the assumption of full solidarity between Member States of the EU. There are significant differences between countries in the region when it comes to vulnerability caused by interruption of transit through Ukraine, where Bulgaria and Macedonia would be the most affected; while Romania, Greece, Serbia, *Bosnia* and Herzegovina and Hungary would be less affected. The rest of Central and Eastern Europe would be affected only by a completely disconnect gas supply, because they can be supplied by pipeline that bypass the Ukrainian territory. In a scenario of a complete disruption of gas supplies from Russia during winter months, most European states would be affected (except the Iberian Peninsula countries and consumers in southern France).

Due to several factors, imports of natural gas will play an increasingly important role in the energy balance of the EU. We consider that best protection for Southeastern Europe is to develop gas fields in the region, to diversify the gas supplies, to settle the interconnection of national networks and to develop the underground storage capacity.

Main findings

The countries from the Southeast Europe are most vulnerable to potential shocks in supply. This will however require the interstate cooperation in the area with no tradition in this field. In the same time, countries like Turkey, Romania or Greece aspire to own the regional hub, which can lead to regional rivalries. With the help of the EU, countries in the region could learn to work together for the common benefit, since all are vulnerable in terms of energy security. We consider that Ukrainian crisis can act as a catalyst to encourage regional cooperation.

The creation of a stable markets, interconnected and transparent natural gas supply would largely counteract the risks. The flexibility transport infrastructure, numerous pipelines, underground storage capacities and their management may play an important role in the sector's ability to manage supply shocks.

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