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The role of Azeri natural gas in meeting European Union energy security needs

Fakhri J. Hasanov [a,b,c,*], Ceyhun Mahmudlu [d], Kaushik Deb [a], Shamkhal Abilov [e], Orkhan Hasanov [f]

[a] King Abdullah Petroleum Studies and Research Center, PO Box 88550, Riyadh, 11672, Saudi Arabia
[b] Research Program on Forecasting, Economics Department, The George Washington University, 2115 G Street, NW, Washington, DC 20052, USA
[c] Modeling Socio-economic Processes, Institute of Control Systems, 9 Bakhtiyar Vahabzadeh, Baku, 1141, Azerbaijan
[d] Department of Government, Cornel University, 214 White Hall, Ithaca, NY, 14853, USA
[e] Department of International Relations, Baku Engineering University, Hasan Aliyev 120, Khirdalan, AZ0101, Azerbaijan
[f] Department of International Relations, Baku Engineering University, Hasan Aliyev 120, Khirdalan, AZ0101, Azerbaijan

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ABSTRACT

Meeting the European Union's natural gas demand will require increasing volumes of imports in the foreseeable future. Recognizing the need to ensure uninterrupted and secure supplies of natural gas imports at all times, the European Union (EU) has actively sought to diversify its sources of supply, including obtaining natural gas from Azerbaijan through the Southern Gas Corridor (SGC). In pursuit of this objective, the EU has provided financial support for parts of the Southern Gas Corridor. In this paper, a combination of cost economics and Rational Choice Institutionalism (RCI) framework has been used to explain the policy choice made by the EU to support the SGC. We observe, that the choice of using the SGC as a supply source has been despite the relatively higher cost of delivery of Azeri natural gas into the EU. The motivation for the EU here is characterized by the strategic importance and part of its efforts to diversify sources of supply in the RCI framework. In this context, the EU is delivering energy security services to its member states who in turn have muted their sovereign rights in exchange for a diversity in the source of supply. This is possibly the only study that measures up the economic cost against choices made under RCI in natural gas security literature.

1. Introduction

The EU is one of the largest importers of energy resources, especially natural gas. This import dependency highlights concerns about security of energy supplies, especially for supplies from regions with the potential of social-economic or geopolitical conflicts. Some events from the recent past that have threatened energy supplies to the EU include the Russia-Ukraine natural gas dispute in 2009 and the annexation of Crimea by Russia in 2014. Such events highlight the need for a more substantive energy policy to overcome possible energy supply disruptions and to mitigate security challenges, particularly by diversifying supply options [1,2].

Such motivations drove the "European Energy Security Strategy", adopted in 2014, in which diversification of natural gas suppliers was one of the priorities [3]. The same strategy was also reflected in the Energy Union Package, in particular for Eastern and Central European countries who are more vulnerable due to the limited number of suppliers [4]. The European Commission considers the realization of the SGC, a major infrastructure project to bring natural gas from the Caspian region into the EU, to be an important element of the diversification strategy [1]. Reflecting this strong commitment to the SGC, the EU is also taking an active part in financing the Trans-Adriatic Natural Gas Pipeline (TAP), a component of the SGC currently being constructed to transit Azeri natural gas to European markets, with the European Investment Bank approving € 1.5 billion loan to TAP [5–7]. Currently, Azerbaijan is the only Caspian country that can deliver natural gas to Europe through the SGC with the existing infrastructure [8]. In addition, the execution of on-going and prospective projects such as Shah Deniz 2 and Shah Deniz 3 will substantially increase Azerbaijan's natural gas export capacity [9].

* Corresponding author. King Abdullah Petroleum Studies and Research Center, PO Box 88550, Riyadh, 11672, Saudi Arabia.
E-mail addresses: fakhri.hasanov@kapsarc.org (F.J. Hasanov), jm2733@cornell.edu (C. Mahmudlu), kaushik.deb@kapsarc.org (K. Deb), sebilov@beu.edu.az (S. Abilov), hesenovorxan@gmail.com (O. Hasanov).

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Number of authors have discussed the role of Azerbaijan and SGC in the energy security of the EU. Some of them assessed its role in the diversification of energy security of the EU [9,10]. Others have argued that it is not an economically viable project [11,12]. In this paper, we assess the EU's current natural gas balance and supply options with their costs to identify the role of natural gas imports from Azerbaijan. In addition, we employ RCI as an analytical framework to understand the EU preference towards the Azeri natural gas. This paper is one of few in natural gas security literature that has applied RCI theory in assessing the policy response of nations to energy security. Various institutionalism theories have been applied in a number of energy studies [13–19]. [20] claim that RCI fits well to explain decision making in the natural resources policies. However, very few qualitative research studies have applied RCI to assess energy security policy choices in the natural gas sector as has been done in this paper. In addition, we chose a combination of cost economics and RCI to explain the policy choice made by the EU to support the SGC.

The remaining paper is structured as follows. Section 2 describes the natural gas market in the EU and its governance structure. Theoretical underpinning of the analytical framework is described in section 3, which includes a discussion of the RCI. Section 4 discusses the results from the analysis and conceptualizes EU energy security. Finally, section 5 concludes the paper.

2. Natural gas in the EU

Natural gas is the second largest source of primary energy in the EU accounting for 24% of the total energy consumption in 2017. To meet this demand, the EU imported 349 Bcm accounting for 75% of total natural gas consumption of 466.8 Bcm with 55 Bcm as liquefied natural gas (LNG) and the remainder via pipelines [21,22].

2.1. Natural gas demand in the EU

GDP in the EU has grown by 1.4% p.a. since 2000 until 2017 despite population growth being much slower at just 0.3% p.a. during this period [23]. Going forward, both GDP and population are projected to grow at a slower pace until 2040 with GDP increasing by 32.2% and population by just 0.7% during 2017–2040 (Table 1).

The overall energy consumption in the EU has been in steady decline in the recent past, in particular since 2010. A GDP growth of 1.4% p.a. and an annual increase in population of 0.3% p.a. during 2000–2010 resulted in the overall energy consumption rising by 0.2% p.a. However, energy consumption declined by 0.7% p.a. during 2010–2017 in spite of the GDP and population increases at previous rates [24]. This decline in energy consumption is likely to continue with GDP growth slowing down and population flat lining over the next two decades.

The decline in natural gas consumption is forecast to be the weakest amongst all fossil fuels with the total decline of just 0.1% p.a. over 2017–2040, after rising by 0.1% p.a. during 2000–2017. The share of natural gas in total primary energy supply stays relatively constant around 24–25% over the period 2010–2040. Overall, the natural gas consumption in the EU is likely to stabilize around 460 Bcm in the foreseeable future (Table 1).

Natural gas production in the EU, on the other hand, has been declining rapidly, by 4.1% p.a. during 2000–2017, due to a combination of maturing of existing fields in the North Sea and seismic challenges in the largest producing field on the continent in Groningen. This decline is likely to accelerate going forward with annual production in 2040 less than half of that today [24]. As a result of the decline in natural gas production, there would be a deterioration in self-sufficiency in the region with the import ratio of natural gas rising from 75% to 88% between 2017 and 2040. Thus, the increasing import dependency for natural gas increases the importance of natural gas in energy security considerations for the region.

2.2. Import options for the EU

Natural gas is imported into the EU through pipelines and LNG. Natural gas pipelines connect the EU with Russia, Norway, Algeria, and Libya. Russia was the largest natural gas supplier to the EU via pipelines accounting for 43% of the total volume in 2017, followed by Norway (29%), and Algeria (9%). Netherlands and the United Kingdom (UK) are the other significant sources of natural gas within the EU that supply natural gas using pipelines. The EU also imports LNG from the United States, Peru, and Trinidad and Tobago in the Americas; Algeria, Angola, Egypt, Equatorial Guinea, and Nigeria in Africa; Qatar in the Middle East; and Norway and Russia in Europe [22]. Qatar was the EU's main LNG supplier (40%), followed by Nigeria (18%), Algeria (17%), Peru (7%), Norway (7%), the US (4%) and Trinidad and Tobago (3%) (Table 2).

The capacity of existing pipeline infrastructure to import natural gas into the EU is more than twice that of LNG, with over 46% of that being accounted for just by Russia-the EU pipelines (Table 2). Norway-EU pipelines account for another 40% with the remainder being pipelines from North Africa into Italy and Spain. The import capacity of pipelines from Russia itself exceeds the total LNG regasification capacity into the EU. Within LNG, Spain has the largest regasification capacity in the EU, followed by the UK, and France.

Interestingly, the capacity utilization of this Russia-the EU pipeline infrastructure is the highest amongst all the natural gas import options into the EU. Overall, nearly 80% of the total the EU pipeline import infrastructure was utilized in 2017. In comparison, only 25% of the LNG regasification capacity in the EU was used in 2017, revealing a much larger excess capacity (see [33] for the discussion of LNG sector and its influence on global gas markets).

2.3. Policy structure for natural gas in the EU

Energy was one of the main driving factors for the EU integration

Table 1
GDP, population, energy consumption, and natural gas demand in the EU.

Year	GDP, PPP exchange rate, real, US$ Billions at 2010 prices	Population, millions	Primary Energy Consumption, Mtoe	Natural gas Consumption, Bcm	Natural gas Production, Bcm	Natural gas Imports, Bcm
1995	12758.6	482.1	1678	389	221	168
2000	14736.2	486.2	1748	460	242	218
2005	16184.7	494.3	1836	518	221	297
2010	16913.0	502.6	1775	521	182	339
2015	17910.1	509.5	1649	418	124	294
2017	18731.3	512.5	1689	467	118	349
2020	19781.9	515.1	1694	483	104	379
2025	21274.4	517.3	1651	482	98	384
2030	22512.8	518.0	1577	465	81	384
2035	23626.8	517.5	1520	459	67	392
2040	24769.3	516.0	1475	457	56	401

Source. BP [24] and OE [23].

Table 2
Natural gas import infrastructure into the EU and utilization in 2017.

Pipelines			
From		Capacity (Bcm)	Volume in 2017 (Bcm)***
Russia	Nord Stream*	55	214.5
	Yamal*	33	
	Imatra**	7.91	
	Varska & Narva**	1.66	
	Brotherhood Complex via Ukraine**	115.96	
Norway******	Europipe I	16.8	109.2
	Europipe II	25.9	
	Franpipe	20.1	
	Norpipe	11.7	
	Vesterled	14.2	
	Zeepipe	69	
	Langeled	26.3	
Libya	Greenstream^	11	4.4
Algeria	Trans-Mediterranean^^	33.5	36.4
	Maghreb–Europe^^^	12.5	
	Medgaz^^^^	8	

Regasification terminals		
From	Capacity (Bcm)*****	Volume in 2017****
Belgium	9	1.2
Finland	0.11	0.07
France	34.25	10
Greece	5	1.74
Italy	14.73	8.12
Lithuania	4	1.16
Netherlands	12	1.05
Poland	5	1.73
Portugal	7.9	3.69
Spain	68.9	16.46
Sweden	0.6	0.44
United Kingdom	48.1	6.64

Source. * Gazprom Export [25]; ** Morrison [10] *** BP [21]; **** GIIGNL [26]; ***** Gas Infrastructure Europe [27]; ****** Gassco [28]; ^ WEC [29]; ^^ ENI [30]; ^^^ Europe Maghreb Pipeline Limited [31]; ^^^^ MEDGAZ [32].

from the inception of the EU project. This followed agreed treaties for the establishment of the European Coal and Steel Community and the European Atomic Energy Community, which laid down initial norms for a common energy policy of the EU [34]. However, the dominant role of national governments in the energy policy of member states prevented development of a single energy policy and related institutions within the European Community for a significant period [35]. Adoption of the "Single European Act" in 1987 was the first substantial initiative towards a single European Energy Policy. The Act did not directly form the basis of a single energy policy. However, this unified the European market, strengthened the position of the supranational institutions, and created new opportunities for the energy sector [36].

The importance of energy security for the Community was initially mentioned in the Treaty of Maastricht in 1992 [37]. The next notable step was the liberalization of the energy market in 1996, which adopted legislation for liberalization of the electricity market [36]. A similar legislation was adopted for liberalization of the natural gas market in 1998 [38]. The second liberalization directive was adopted in 2003 and it extended the scope of wholesale and retail competition in the internal energy market of the EU [36].

The need for a common energy policy of the EU particularly became topical after the enlargement of the Union in 2004 and 2007 as the energy policy concerns of the new members also needed to be taken into account [34]. While the Western European countries were more focused on issues regarding the completion of the Single Market and meeting climate change targets, the Eastern European countries, comprising the majority of the new members to the EU, focused more on prioritizing security of supply in the EU's energy policy. This was mainly due to Eastern Europe being more dependent on Russia for natural gas supplies [39].

Signing of the Lisbon Treaty in 2007 marked a turning point in the EU Energy Policy [40]. According to the treaty, the EU Energy policy should be designed to support the functioning of the energy market, provide security for supply, promote energy efficiency, foster the use of renewable energy sources, and establish interconnection network infrastructure. These provisions gave significant authority to the EU institutions to implement common energy policy, even though they did not prevent member states right to determine the conditions for exploiting their energy resources, their preference towards different energy resources, and general structure of their energy supply [41]; Art.194.2.

After annexation of Crimea by Russia in 2014, Donald Tusk, the former Prime Minister of Poland raised the issue of security of energy supply [42]. The European Energy Union Package was adopted shortly after Tusk took presidency of European Council [43]. Even though this package did not make energy security as a unified problem of the EU, it included security of energy supply as one of the important dimensions of the proposal. Security of supply problems were covered in the Energy Security Package presented by the European Commission in 2016 [43]. The package mainly focused on security of natural gas supply and for the first time introduced solidarity principles in the case of severe crises, proposed a shift from a national approach to a regional approach when designing security of supply measures, and called for reinforcing collaboration with neighboring countries. According to the package, the Commission will play a key role in the coordination of natural gas supply and will control whether the supply security framework is applied.

In addressing the issue of security of gas supply, the EU uses different tools/instruments to support strategic gas infrastructure that includes international pipelines and LNG importing terminals. The infrastructure projects can be considered as results of combinations of market-based instruments and direct forms of government intervention in the forms of planning, financial support, and new types of public involvement in ownership. These instruments can be classified into different categories, such as Projects of Common Interest (PCI), financial support instruments such as Connecting Europe Facility Energy (CEF-E) and diplomatic support [102]. As of 24 November 2017, the EU had 53 gas projects out of total 173 projects with the status of PCI, that is key cross border infrastructure projects linking the energy systems of the EU countries with the aim of help achieve affordable, secure and sustainable energy alongside de-carbonization of the economies.[1] These include the North-South gas interconnections in Western Europe (NSI West Gas), North-South gas interconnections in Central Eastern and South Eastern Europe (NSI East Gas), Baltic Energy Market Interconnection Plan in gas (BEMIP Gas), and the SGC. Trans-European Networks for Energy (TEN-E) can also be considered as one of the strategic tools of the EU to support its gas infrastructure projects. TEN-E identifies nine priority corridors and three priority thematic areas in linking the energy infrastructure of the EU countries. It is worth noting that the above-mentioned four gas infrastructure projects have been included in the list of the nine priority corridors.[2]

Financial support tools also play an important role in supporting energy infrastructure including those for natural gas. [102] states that the EU recently increased its financial support to promote pipeline and LNG infrastructures. In this regard, EU instruments such as CEF-E and the European Energy Programme for Recovery (EEPR), EU funds such as the European Regional Development Fund (EFRD) and the European

[1] For details of the PCI, see https://ec.europa.the.EU/energy/en/topics/infrastructure/projects-common-interest/overview#content-heading-5.

[2] For details of the TEN-E, see https://ec.europa.the.EU/energy/en/topics/infrastructure/trans-european-networks-energy#content-heading-1.

Fund for Strategic Investments (EFSI), as well as the European public banks such as the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD) should be highlighted.

Finally, the EU uses its diplomacy in the form of specific and continuous support from the European Commission and adopting new regulations to promote gas infrastructure projects for the security of gas supply [102,103]. The EU supported five LNG and two pipeline projects in this regard [102]. The above-mentioned instruments and their usage by the EU to promote different gas infrastructures (such as LNG terminals and pipelines) described in detail in [102].

2.4. Southern Gas Corridor

The SGC was proposed by the European Commission as one of "the EU's highest energy security priorities" [44]. It is a multi-component pipeline project aimed at bringing natural gas from the Caspian and the Middle East to the European market. The first part of the SGC plans to transport Azeri natural gas from Shah Deniz 2 to Greece and Italy in the EU via Georgia, Turkey, and Albania [45,46]. The other components include an expansion of the existing South Caucasus pipeline, from Baku to Erzurum in eastern Turkey, the Baku Tbilisi Erzurum Pipeline. From Erzurum, the network would be expanded to Greece by the Trans Anatolian pipeline (TANAP). TAP would then connect Greece to Italy via Albania[47].

Shah Deniz 2 is considered one of the main components of the SGC and is expected to raise the overall Shah Deniz production by 16 Bcm to 26 Bcm. The project became operational in 2018 with the start of commercial deliveries to Turkey. This new production is expected to flow into Europe by 2020 [45,46]. A 25-year deal was signed in 2013 to sell approximately 10 Bcm of natural gas, of which one Bcm will be sold to Bulgaria and Greece with the remainder to Italy [48].

Baku Tbilisi Erzurum natural gas pipeline, with an overall capacity of 20 Bcm, transports natural gas from the natural gas field in Shah Deniz to Georgia and Turkey [49]. It follows the same route the Baku-Tbilisi-Ceyhan crude oil pipeline [45,46]. The expansion plan aims to triple the natural gas volumes exported through the pipeline by construction of a new pipeline across Azerbaijan and two new compressor stations in Georgia. The pipeline there will link into other new pipelines to provide natural gas to Turkey and the EU.

TANAP links Georgia with Greece through Turkey and connects the SCP with the TAPto carry Azeri natural gas to Europe [50,51]. The pipeline will directly carry the natural gas from the Caspian region to the European market. Turkey will buy six Bcm of the Shah Deniz 2 production and the remainder will reach the EU. There are also proposals eventually to develop Shah Deniz even further in a phase 3 to produce an additional 5 Bcm by 2030 though these developments are more than 5 years away from being considered [52]. To support the development of TANAP, the EU granted €5 million to TANAP in its Connecting Europe Facility Energy in 2018 [50,51].

Finally, TAP is a project in the SGC that will provide the final connection for the Caspian natural gas to South Europe. The pipeline starts from the border of Greece and Turkey, where it is connected to TANAP. It will flow through Greece, Albania, and Italy. The initial capacity is 10 Bcm with a potential to double after additional energy supplies come on stream in the wider Caspian region [53]. Furthermore, TAP may carry natural gas via the Ionian Adriatic Pipeline and the Greece-Bulgaria-Romania interconnector pipelines to South East Europe that include Serbia, Montenegro, Bosnia and Herzegovina, Kosovo, Croatia, Romania, and Bulgaria [54]. Both TANAP and TAP are considered by the EU as PCI (European Commission 2017) that are key to linking energy systems within the EU countries and in helping to diversify the sources of energy supply.

3. Theoretical underpinnings

Although, the notion of energy security became the core of academic discussion in the USA and Europe after the oil crisis of 1973 when OPEC members launched their oil embargo, its history goes back to the 1920s when it became a concern in Latin America [55]. Energy security in its widest definition "means security of everything: resources, production plants, transportation networks, distribution outlets and even consumption patterns; everywhere: oilfields, pipelines, power plants, natural gas stations, homes; against everything: resource depletion, global warming, terrorism, 'them' and ourselves" [56]. The International Energy Agency defines energy security as adequate and affordable energy supply from the reliable partners [57]. It is important to analyze security of supply of energy resources from the perspective of availability, accessibility, affordability and acceptability to understand it better [58]. Availability means physical existence of energy resources. Accessibility is securely reaching the energy resources. Accessibility is geopolitical element of security of energy supply. Affordability as an economic element discusses suitable cost for energy resources. Acceptability of energy resources is an environmental element of energy supply. The intensification of the terrorist attacks on the oil and natural gas pipelines and other infrastructure in the 21st century, disruptions in energy transport by energy transit countries, and deepening disorder in various energy exporting countries have heightened the anxiety of the energy importing countries all over the world, especially in Europe [59].

From the perspective of the EU, security of supply of energy resources is one of the important components of its overall security. The development of internal and external geopolitical and economic processes directly influenced the changes in the EU's conceptualization of energy security, particularly after the two waves of enlargement, where new members brought their specific patterns of energy demand and supply into play [60]. Traditionally, energy security meant security of supply of oil. Recently, security of supply of natural gas has also become important for the EU. Unlike oil, natural gas is still traded in regional markets rather than as a global commodity and is mainly delivered by pipelines. This research is mainly focused on the concept of security of natural gas supply.

3.1. Rational Choice Institutionalism

Institutionalism broadly has two branches, old or traditional institutionalism and new or modern institutionalism. The old institutionalism, which dates between 1930 and 1970s, focusses on the understanding political life and its consequences using formal rules and organizations [61]. The focus here is on the narration of theory building and not the analysis of it [62]. New or modern institutionalism dates to the last two decades of the twentieth century. This had three main differences with old institutionalism [63]:

- Beginning with formal rules and structures, the new institutionalism expanded its analysis to include informal conventions and coalitions that shape political conduct.
- Refusing to take political institutions at face value, it instead took a critical look at the wayin which they embody values and power relationships.
- Rejecting the determinism of early approaches, it asserted institutions constrain individual conduct but are also human creations that change and evolve through the agency of actors.

The new institutionalism developed primarily into three main well-established approaches, namely sociological institutionalism, historical institutionalism, and RCI. These streams of the new institutionalism were built in reaction to the influential behavioral arguments of the 1960s and 1970s, which were trying to explain the role of the institutions in the determination of social and political consequences [64].

Institutional theories are now being widely applied in energy studies,

particularly for transition economies. For instance, [13] in her recent work analysed the EU energy policy from the perspective of historical institutionalism and evaluated the impact of Eastern Enlargement on energy policy of the Union. [14] used sociological institutionalism to analyze the liberalization of the EU natural gas market from the perspective of integration. [15] and [16] have applied institutional theories in their investigation of transition of energy structure of Eastern Europe and CIS countries. [19] investigated electricity market from the perspective of new institutionalism applied to network industries. Institutionalism was used by [18] to explain the low carbon transition by comparing the practices of UK, Germany, and China. [17] uses RCI to explain why the transition to wind power was successful in Denmark but failed in the UK.

In this research, we use conceptualization of RCI that was classified by [20]. According to them, there are three elements that define RCI: **(1)** the assumption of purposive individual choice; (2) the presumption that institutions matter; and **(3)** the focus on the nature of goods. RCI accepts individuals as a main unit of analysis and claims that decisions are made with the rational calculation of individuals in favor of their own interests. In their description, institutions are sets of rules that constrain the behavior of these rational individuals but also offer opportunities to make social choices and provide collective goods [65]. The presumption that institutions matter is the second element defining RCI. This implies that each institution has its own character and nature that affects the decision making for collective goods. Rules and norms of the institution may cause acceptance of decision in favor of one against another. The last element defining RCI is the focus on the nature of goods. Nature of goods, their importance, and necessity directly affect the decision-making process. In this case, it is determined whether goods can be supplied exclusively, or whether they have collective elements.

The substantive foci of RCI, such as collective action, characteristics of goods and institutions, show that it may be a good theoretical frame to explain preference of the EU towards Azerbaijan and SGC. RCI allows us to understand political decision-making processes within the frame of communication between micro level and macro level political behavior and explains the choices of political actors [65].

4. Analysis

We need to assess the increase in Azerbaijan's natural gas exports to the EU over the next few years in terms of the cost of supply and attempts to diversify sources of supply to understand the EU's proclivity for investing in the SGC to import Azeri natural gas. In doing so, we chose a combination of cost economics and RCI to explain the policy choice made by the EU to support the SGC. While these volumes are small relative to the EU's overall natural gas imports, the SGC introduces another source of competition to existing sources. Eventually, the SGC could also connect the EU with other natural gas rich countries in the Caspian and the Middle East.

4.1. Potential for natural gas exports from Azerbaijan

Development of natural gas in Azerbaijan started in 1955 after the exploration of onshore natural gas field 'Garadagh' and new offshore field development in the Caspian Sea in 1970s [66]. The turning point came after the discovery and exploration of new natural gas fields and investments by foreign energy companies after independence [67]. BP signed the contract to develop Shah Deniz, one of the largest gas fields in the world, in 1996 and started producing in 2006. The increase in production since 2007 opened the possibility of natural gas exports (Fig. 1). The natural gas exported from the Shah Deniz 1 to Georgia and Turkey was via the newly constructed Baku Tbilisi Erzurum gas pipeline. Thus, even as domestic natural gas consumption has increased by 20.7% during 2007–2017, exports have increased 4.9 times from 1.8 Bcm in 2007 to 8.9 Bcm in 2017. With greater exploration activity, the proved reserves of natural gas has increased from around 1100 Bcm during 1999–2013 to be more than 1300 Bcm since 2014 [22]. Shah Deniz 2 (in 2020) and Phase 3 (expected by 2030) are expected to add another 21 Bcm to the gas output from this field.

Other than Shah Deniz, a number of other potential developments are being pursued in Azerbaijan (Table 4). This expected spurt in domestic production has motivated Azerbaijan to develop export infrastructure projects such as the SGC.

Natural gas exports also have a strategic importance for the country and the government strongly supports it because of the following. The share of oil and natural gas revenues in overall budget revenues was

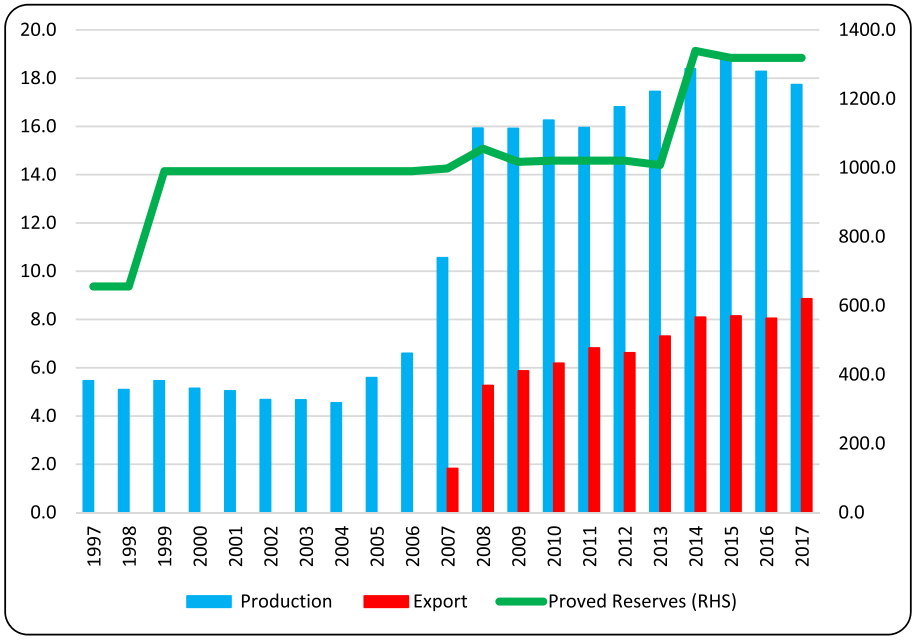

Fig. 1. Proved reserves, production, and exports of natural gas from Azerbaijan over the period 1997–2017.
Source. BP [21] and SSCA-CEIC [68].

Table 3
Delivered cost of natural gas to Italy.

Source	US $/MMBtu	Imports in 2017, Bcm	Capacity utilization, %
Pipeline			
Algeria-Italy	1.66	18	54
Libya-Italy	1.81	4.4	13
Russia-Ukraine-Slovakia-Austria-Italy	2.53	22.3	56
Norway-Germany-Switzerland-Italy	3.82	8.9	39
Azerbaijan-Georgia-Turkey-Greece-Albania-Italy (SGC corridor)	4.74	–	–
LNG			
Algeria	3.29	1.0	58
Qatar	3.49	6.8	
Egypt	4.15	0.1	
Trinidad and Tobago	4.31	0.3	
United States	6.53	0.2	
Norway	7.76	0.1	

Source. Nexant [74]; BP [21]; and BP [22].

Table 4
Prospective new natural gas developments in Azerbaijan.

Field Name	Estimated Reserves	Estimated Investment	Estimated Start Date of Production
Absheron	350 Bcm	$6.3 billion	2021–2022
Araz, Alov, Sharg	700 Bcm	$4 billion	–
ACG	280 Bcm	–	2027–2028
Umid	200 Bcm	$5 billion	2026–2027
Babek	400 Bcm	–	2026–2027
Shafag-Asiman	500 Bcm	–	–

Source. Adapted from Rzayeva [66,69].

more than 70% during 2010–2016 [70]. More significantly, oil and natural gas export revenues constitute greater than 97% of the total export revenues during the same period [71]. Oil export revenues have remained depressed following the oil price crash in 2014. This is further threatened by declining production (−3.8% p.a. during 2010–2017) and rising domestic consumption of oil (3.7% p.a. during 2010–2017) [22]. Going forward, the oil production will continue its decline, with OPEC projecting a decline to 7 million barrel per day in 2022 and 6 million per day by 2040 [72,73]. Given the current and future outlook of oil, the government is attempting to compensate the declining oil revenue by increasing natural gas exports. Hence, developing its natural gas reserves and exporting them is a key priority for Azerbaijan.

4.2. Cost of supply

To assess the cost competitiveness of Azeri gas supplies to the EU, this research compared the cost of delivering natural gas from Shah Deniz to the end point of the SGC in Italy, with the alternative sources of natural gas at that location. The Italian natural gas market can source natural gas from a variety of sources, including pipeline imports from Libya and Algeria in North Africa; imports from Russia and Norway via the interconnected European natural gas pipeline network, and as LNG through its three regasification terminals with a capacity of nearly 15 Bcm. Since Italy would be the first point of entry of Azeri natural gas into the EU, it would have to compete with all of these alternative sources of natural gas imports. Hence, Italy has been identified as the import node to assess the competitiveness of Azeri gas with alternative import options into the EU. If the SGC were to be extended to another country in the EU, the terminal point of the network would be the relevant node for comparing the cost of alternative supplies. This is the likely the first paper that provides costs of the delivered gas through SGC to Italy comparing its cost of delivery against all its alternatives, including as LNG and via pipelines, to the EU at the point of entry, in Italy.

This delivered cost for natural gas is calculated as a sum of the cost of production and transportation (Table 3). The cost of natural gas deliveries by pipeline is the sum of the average cost of existing gas production in the exporting country and the transmission tariff. In the case of Azerbaijan, this is the sum of the average cost of production in Shah Deniz field and that of transmission across the SGC pipelines. In the case of LNG, the cost of delivery is the sum of the average production cost of natural gas in the source country and that of LNG infrastructure and shipping. Only countries that supplied LNG to Italy in 2017 were included in this analysis. The data is obtained from Nexant's World Gas Model database [74].

Table 3 reports that the delivered cost of the Azeri natural gas through the SGC to Italy is amongst the more expensive alternatives with only LNG from the United States (US) and Norway costing more to deliver to Italy. In general, pipeline imports dominate natural gas trade into Italy. However, natural gas imports do not appear to be driven only by cost considerations since some of the lower cost sources are not dominating overall supply, even with sufficient excess infrastructure capacity. For instance, even though pipeline imports from North Africa are about 30–35% cheaper than from Russia, the latter dominates the natural gas import portfolio of Italy. This despite excess pipeline capacity existing in the Mediterranean region. Thus, there are likely to be other factors that influence import choices, including considerations of increased diversity in sources of supply and competition in the import portfolio than cost economics. This leads us to assess the EU's natural gas import choices in the RCI framework.

4.3. Applying the RCI

We argue that decisions regarding the SGC are made by individual politicians of the EU institutions who aim to build a common Energy Policy for the Union to respond to the collective demands of member and non-member neighboring countries. In addition, recently accepted norms and rules within the Energy Union Package allows related institutions to implement policy in favor of collective goods [75]. Moreover, as a commodity, natural gas and its perspective role in the diversification of the EU energy security also plays a crucial role in the decision-making regarding to the SGC.

In Europe, the foundation of positive state is being gradually eroded by globalization on one hand, and economic and monetary integration within the EU on the other [76]. These processes are increasing the regulatory power of the EU institutions who are introducing more rule making than the member states themselves. As a result, the Europeanisation of policy making in the EU is becoming more influential compared to member states themselves. Such rule making, particularly by the European Commission, in the formation of internal energy market gas become more effective in the recent past [34]. As [34] stated, solidarity in the integration of internal gas and electricity market caused a supranational transfer of authority from the member states to the EU. According to [61]; states may transfer their duties to institutions in order to decrease transaction costs and to increase their benefits. In this case, the EU is delivering energy security services to its member states who in turn have muted their sovereign rights in exchange for a diversity in the source of supply. This argument explains the gradual increasing role of the EU as regulatory actor for energy markets of its member states.

Traditionally, European gas markets consisted of national markets in which each state was individually responsible ensuring for supply of energy. In that situation, contracts between the consumer and supplier parties were signed as long-term contracts. Such practices prevented entry of new suppliers in the market and establishment of competitiveness, and the EU states were in a weaker position in comparison to non-member states who had monopoly supplier positions and were thought to be using their energy resources as political leverage against importing countries. To overcome these disadvantages, the EU

introduced itself as a regulatory actor and offered to solve the problem by establishing an integrated gas market based on free market principles. Vulnerability of energy supplies of member states motivated them to accept the EU as a market-oriented regulator actor and to tradeoff their sovereignty over the energy sector in favor of a common interest that promoted by the institutions of the EU [77]. Directive 2009/73/EC and Third Energy package established the main rules for the common energy market. One of the main aims of these rules was to destroy monopoly of the supplier countries through unbundling of the services into supplier, transporter, and distributor companies. Another aim is to increase the number of suppliers to provide competitiveness in the market [78]. Through the spread of its rules, the EU has attempted to give structural advantage to importing countries in their dealings with exporting countries [79]. To realize materialize this aim, the EU needs to bring more suppliers into the market with a wide diversity of costs, such as new suppliers through the SGC.

Diversification of energy suppliers became topical for the EU after the crisis between Russia and Ukraine. Some studies discussed concerns about Russia and the EU energy market from the Third Liberalization Package perspective [80–82]. The EU observed that Russia and Ukraine are not reliable supplier and transit countries [83]. Therefore, it focused in two directions: to prevent the implementation of the transport projects which would strengthen its dependency on a single supplier, and to support the materialization of alternative projects. For instance, the European Commission is not in favor of the Nord Stream 2 pipeline that will bring more Russian gas to Europe through Baltic Sea into Germany in the EU [84]. With the construction of Nord Stream 2, Russia would double its natural gas exports to Europe and consolidate its share in the EU natural gas market. The project is designed by Gazprom and its European partners Engie, OMV, Shell, Uniper and Wintershall, and is supported by the German government [85]. The EU believes that realization of Nord Stream 2 will challenge the diversification policy of the EU [86]. On the other hand, the EU supports realization of the SGC projects which will provide diversity to the natural gas market of the EU despite being that natural gas imports being more expensive.

We argue that the EU's energy policy towards Azerbaijan and its preference towards the SGC can be assessed from this perspective. A former vice president for Energy Union Maros Sefcovic stated in the opening ceremony of the TANAP that the SGC is strategically important for the EU and it would contribute for the establishment of pan-European energy market based on free trade, competition and diversified supplies, sources and routes [87]. Besides, the Energy Security Strategy (2014) and Energy Union Package (2015) also noted the strategic importance of the SGC and Caspian natural gas for energy security of the EU. In the Energy Security Strategy (2014), establishment of the SGC was determined as an important element in the expansion of the trade relations with Caspian states. The Energy Union package states, "to ensure the diversification in gas supplies, work on the Southern Gas Corridor must be intensified to enable Central Asian countries to export their gas to Europe". As can be seen, the EU accepts the SGC as an important element in the diversification of energy suppliers in its integrated energy market.

The EU does not only provide political and diplomatic support, but also offers financial assistance to the SGC. In the Energy Security Strategy (2014), it is mentioned that the EU would financially support energy infrastructure projects thorough its financial institutions. In this regard, recently European Investment Bank (EIB) allocated 1.5 billion for TAP and 1 billion for TANAP projects. Azerbaijan received full support from the EU leadership to receive those credits. Maros Sefcovic in his speech in the SGC Advisory Council Third Ministerial Meeting in Baku encouraged international financial institutions to finance the SGC [88]. EIB identifies the SGC as a PCI of the EU and claims that "it will offer a new source of competitively priced gas for the European Union market, as well as increasing diversity and security of supply" (EIB, 2018). EIB states that the SGC is economically justified based on its contribution to security of supply and by enabling a new source of cost-competitive natural gas. According to EIB, the project is economically profitable even with conservative assumptions. The bank also claims that in the future, the amount of the transported gas will be increased and the cost will be cheaper than in the initial stage, which in the end will make the project economically profitable. [47] argues that the involvement of the European Commission and EIB in promoting and financing the SGC is an example of the intervention of public agencies of the EU to influence the mechanisms of energy markets for political purposes. The EU has also provided regulatory exemptions to TAP in the form the requirements on third party access, tariff regulation and ownership unbundling for 25 years helping improve the project economics [89]. The EU support continued with the approval of the Greek-TAP Host Government Agreement in line with EU state aid rules [90]. The EU explicitly recognized the improvement in energy security with Azeri gas coming to Europe, and that this agreement is a necessary condition for the completion of the SGC.

Over time, the SGC may become an important route for the EU to access the energy resources of other Caspian littoral states such as Turkmenistan and Iran [8]. In the initial stage, the SGC will transport only Azeri natural gas to Europe, but in the long-term, the EU is interested in importing natural gas from Turkmenistan and Iran as well. In pursuit of this objective, the EU adopted a mandate to negotiate a legally binding treaty between the EU, Azerbaijan, and Turkmenistan on construction of Trans-Caspian Pipeline (TCP) system [91]. Currently, Turkmenistan exports nearly six million cubic meters of gas daily to Azerbaijan through Iran [92]. Azerbaijan is also interested in including Turkmenistan in the SGC [93].

To bring significant amount of Turkmen gas to Europe, the construction of TCP is necessary. One of the main hindrances for the construction of TCP was the status of Caspian Sea. Other littoral states like Russia and Iran were against construction of any energy infrastructure without the determination of the final legal status of the Caspian Sea [94]. Finally, in 2018, the littoral states signed a convention for the final status of the Caspian Sea. The Article 12 of the convention states that "Each Party shall, within its sector, exercise jurisdiction over the artificial islands, installations, structures, its submarine cables and pipelines" [95]. The convention now allows Azerbaijan and Turkmenistan to build energy infrastructure in their sector of Caspian Sea. Crucial to the realization of this project is the support of the US government. In March 2019, the US President Donald Trump sent a Nowruz message to President Gurbankulu Berdimuhammedov in which he underlined his hope that Turkmenistan would be able to take advantage of the signing of the convention on the legal status of the Caspian Sea and would start collaboration with the West for transportation of its natural gas to the European energy markets [96]. With the construction of TCP, Turkmen gas will be transported to Azerbaijan and delivered to European markets through the SGC. Turkmenistan can potentially provide 30 Bcm of natural gas annually.

SGC is also important for the EU from the perspective of external dimensions of its internal energy market. According to [79]; the aim of external energy governance of the EU is to export its regulated energy market rules to neighboring countries. As he states, the SGC is more important for the EU from this perspective than simply to bring a new supplier to the market and argues that the aim of export of regulated energy rules beyond the EU "is geared towards minimizing uncertainty in dealing with non-member countries and narrowing down the strategic policy options available for the latter". Thus, the EU aims to depoliticize its energy supply and to bring market rules for all players. In this regard, the SGC can play an important role in the diffusion of the rules and norms to energy governance of the partner countries. To export its market regulated rules abroad within the framework of multilateral institutionalization, the EU founded the Energy Community and included Ukraine, Moldova, Georgia and West Balkan countries as "contracting-parties" to its integrated energy market. The aim of the Energy Community is to assist those contracting parties to redesign their energy structure in accordance to the rules of the Union. Besides, the EU

wishes to include more countries to its regulated market rules, particularly the SGC countries. In this vein, the EU continues its negotiation with Azerbaijan for a new partnership agreement, which will also include an energy partnership. In the [97]; it is emphasized that in the future they will establish a strategic program for a gradual harmonization of its energy legislation with the Community legislation. It is evident that with the new agreement the EU wishes to expand its market rules to Azerbaijan also [98]. However, the expansion of the EU market rules is not limited to Azerbaijan, with the implementation of the SGC all players of this project may be included into a common institutionalized structure [79].

RCI tells us that nature of goods is important in the decision making by the institutions. Natural gas as an energy resource is important for the EU not only to provide energy demand but also to have a cleaner environment. The EU's preference towards the SGC can also be explained from this perspective. Indeed, the EU aims to reach low levels of greenhouse gas emissions. According to this program, the EU plans to cut greenhouse emission by 20% by 2020 and 40% by 2030. To reach these goals, it is necessary to provide natural gas supplies from diverse and reliable sources [24]. Given a declining natural gas production capacity within the EU, this climate agenda would need to increase import from diverse resources, including the SGC.

5. Conclusions

The recent policy push in the EU has focused on solving multi-dimensional energy problems of member countries such as security, diversification, and sustainability. Mitigating energy security risks in the import of natural gas gained particular attention following the disputes between Russia and Ukraine. In this regard, the EU has supported various energy projects to diversify sources of natural gas imports into the region.

Azeri natural gas is amongst the more expensive import options for the EU. However, despite the availability of cheaper alternatives, natural gas imports from Russia dominate the import mix in the EU, and in particular in Italy which will be the entry point for Azeri natural gas via the SGC into the EU. We assess that there are energy security factors in the form of diversity in sources of supply and competition in the import portfolio that is driving the import choices in the EU.

Analysis based on the RCI theoretical framework demonstrates that the EU's preference and support for importing Azeri natural gas specifically, and the SGC in general fit well into its diversification strategy, even though these imports are not the most economical for the region. The EU, as a regulatory state, has chosen this as a key step in implementing its energy strategy among the member countries and in nearby countries. Support for the project comes in the form of investments, regulatory incentives, and political endorsements. The EU support for the project is based on its public good intention and strategic choices. In the long-term perspective, the EU's interest in having other suppliers in the SGC, such as Iran and Turkmenistan in order to further improve the member states energy security, diversification and sustainability rationalizes its actions.

Declaration of competing interest

We, the authors, do not have any conflicts of interest to declare.

CRediT authorship contribution statement

Fakhri J. Hasanov: Data curation, Investigation, Methodology, Project administration, Supervision, Validation. **Ceyhun Mahmudlu:** Conceptualization, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing - original draft. **Kaushik Deb:** Conceptualization, Data curation, Investigation, Methodology, Software, Visualization, Writing - review & editing. **Shamkhal Abilov:** Data curation, Writing - review & editing. **Orkhan Hasanov:** Data curation, Writing - review & editing.

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