

**ALTERNATIVE SUPPLIERS AND SUPPLY ROUTES FOR THE EUROPEAN  
UNION NATURAL GAS MARKET: CAN TURKEY BE A TRANSITING STATE?**

**by**

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ALTERNATIVE SUPPLIERS AND SUPPLY ROUTES FOR THE EUROPEAN UNION  
NATURAL GAS MARKET: CAN TURKEY BE A TRANSITING STATE?

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To my family

## ABSTRACT

### ALTERNATIVE SUPPLIERS AND SUPPLY ROUTES FOR THE EUROPEAN UNION NATURAL GAS MARKET: CAN TURKEY BE A TRANSITING STATE?

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**Key Words:** European Union, Southern Gas Corridor, dependence, energy and supply security, diversification.

The European Union (EU) is one of the world's largest energy importer; and import two thirds of its gas needs from non-EU sources.<sup>1</sup> Every day the need for imported gas increases and by 2030 the EU is expected to import 74 percent of its natural gas from non-EU sources. The growing dependency on natural gas is a threat for the EU both environmentally, especially with respect to climate change, and politically as it creates a high dependency on the natural gas suppliers. Hence, diversification of suppliers and the supply routes are the most important issues for the Union to ensure energy security. The EU supports the Southern Corridor projects which foresee the transportation of the natural gas reserves from the Caspian and the Central Asian region with possible addition of Middle Eastern and North African gas via Turkey. This thesis sets out the current and the potential new suppliers and routes to the EU and the possible role of Turkey in supplying gas to Europe. In order to achieve this aim, this study examines the EU's gas market as well as the potential supplier countries' markets and future projects regarding gas transmission. On the basis of these analyses, conclusions will be drawn regarding transportation of the future supplies to Europe and the possible role of Turkey as a transit country.

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<sup>1</sup> Norway is counted as a non-EU source and included in the percentage.

## ÖZET

### AVRUPA BİRLİĞİ DOĞAL GAZ PAZARINA ALTERNATİF KAYNAKLAR VE TEDARİK YOLLARI: TÜRKİYE TRANSİT ÜLKE OLABİLİR Mİ ?

DUYGUGÜLCAN

Avrupa Çalışmaları Yüksek Lisans Programı, Tez, 2012

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**Anahtar kelimeler:** Avrupa Birliği, Güney Gaz Koridoru, bağımlılık, enerji ve arz güvenliği, çeşitlilik.

Avrupa Birliği (AB) enerji ihtiyacının üçte ikisini AB dışı kaynaklardan elde etmektedir ve bu nedenle dünyanın en çok enerji ithal eden ülke ve birliklerden biridir.<sup>2</sup> AB'nin enerji ihtiyacı her geçen gün artmaktadır ve 2030 yılına kadar AB'nin doğalgaz ihtiyacının yüzde 74'ününün AB dışı kaynaklardan sağlanması beklenmektedir. AB'nin artıta olan doğalgaz ihtiyacı, iklim değişikliğini tetiklediği için çevresel; dışa bağımlılığı arttırdığı için de politik açıdan AB'ye ciddi bir tehlike oluşturmaktadır. Bu nedenle, AB için enerji sağlayan kaynak ülkelerin çeşitlendirilmesi enerji güvenliğini sağlamak açısından oldukça önemlidir. Bu çerçevede, AB, Hazar ve Orta Asya doğalgaz kaynaklarının ve muhtemel Orta Doğu ve Kuzey Afrika gaz kaynaklarının da Türkiye üzerinden taşınmasını öngören Güney Gaz Koridoru projelerini desteklemektedir. Bu çalışmada, AB'ye gaz ithal eden ve gelecekte ithal etmesi muhtemel olan yeni kaynak ülkeleri ile iletim güzergâhlarını ve bu kaynakların Türkiye üzerinden taşınıp taşınmayacağını incelemektedir. Bahsi geçen analize ulaşmak adına, bu tez AB'nin doğalgaz pazarını, muhtemel kaynak ülkeleri ve gaz ithalatı için geleceğe dönük yapılan güzergâh tahminlerini içermektedir. Bu incelemeler ışığında, bu çalışmada, Türkiye'nin AB'ye doğalgaz çeşitliliğini sağlamak adına transit ülke olarak oynayabileceği muhtemel rolü de erlendirmektedir.

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<sup>2</sup> Norway is counted as a non-EU source and included in the percentage.

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## ABBREVIATIONS

/person:	per person
/y:	per year
AGP:	Arab Gas Pipeline
bcf:	billion cubic feet
bcm:	billion cubic meters
BOTA :	Boru Hatları ile Petrol Ta ıma Anonim irketi
BP:	British Petroleum
BTC:	Baku-Tbilisi-Ceyhan
BTE:	Baku-Tbilisi-Erzurum
CBM:	Coal-Bed Methane
CEE:	Central Eastern European
CEO:	Chief Executive Office
CH <sub>4</sub> :	Methane
CNPC:	Central Asia-China Pipeline
CO <sub>2</sub> :	Carbon dioxide
CRS:	Congressional Research Service
EC:	European Community
ECSC:	European Coal and Steel Community
EEC:	European Economic Community
EEZ:	Exclusive Economic Zone
EIA:	Energy Information Administration
EP :	European Parliament
ETS:	Emission Trading Scheme
EU:	European Union
Euratom:	European Atomic Energy Community

FDI:	Foreign Direct Investment
GAS:	Golden Age of Gas Scenario
GIS:	Geopolitical Information Service
GLE:	Gas LNG Europe
ICAP:	International Carbon Action Partnership
IEA:	International Energy Agency
ITGI:	Italy-Turkey-Greece Interconnector
JKT:	Japan-Korea-Taiwan
LNG:	Liquefied Natural Gas
mcm/mm <sup>3</sup> :	million cubic meters
Medgaz:	Mediterranean Gas
MEG:	Maghreb-Europe Gas Pipeline
MLE:	Menzel Ledjmet East
mmbtu:	million metric British thermal units
MMD:	Mott MacDonald
MOL:	Magyar Olaj- és Gázipari Nyilvánosan m köd Részvénytársaság- Hungarian National Oil Company
mtoe:	million tonnes of oil equivalent
NIS:	Newly Independent States
NOC:	Libyan national Oil Company
OECD:	Organization for Economic Co-operation and Development
OME:	Observatoire Meditteranean de l'Energie
OMV:	Österreichische Mineralölverwaltung-
OPEC:	Organization of the Petroleum Exporting Countries
RWE:	Rheinisch-Westfaelishes Elektrizitaetswerk
SEE:	South Eastern European Countries
SEEP:	South East European Pipeline

SOCAR:	State Oil Company of Azerbaijan Republic
SUMED:	Suez-Mediterranean Pipeline
TANAP:	Trans-Anatolian Pipeline
TAP:	Trans-Adriatic Pipeline
TAPI:	Turkmenistan-Afghanistan-Pakistan-India pipeline
tcm:	trillion cubic meters
TGI:	Turkey-Greece Interconnector
TSGP:	Trans-Saharan Gas Pipeline
U.S.:	United States
UAE:	United Arab Emirates
UK:	United Kingdom
UNFCCC/FCCC:	United Nations Framework Convention on Climate Change
WAGP:	West African Pipeline
WLGP:	Western Libya Gas Project

## INTRODUCTION

Energy is the most essential component of an individual's life. Life without energy is barely thinkable. It is essential for every aspect of daily life. Being that much important even for an individual, energy is even more important for countries. It became crucial for sustaining industrial and economic development. The demand for energy resources increases in proportion to population increase and growth rate of the country. Therefore, the securitization of energy resources evolved into a significant subject in the twenty-first century.

“Energy security” is a term that was coined in the earlier nineteenth century; nevertheless, the term itself gained importance after the second half of the twentieth century, after the 1973 oil crisis when the Organization of Petroleum Exporting Countries (OPEC) stopped oil exports the effects of this crisis were felt globally. But it caused a particularly difficult situation in Europe. Western Europe, in the 1970s, was experiencing a high growth rate and was one of the biggest consumers of hydrocarbon resources in order to stimulate the growth. The first and the second OPEC crises occurred in 1973 and 1979 affected Europe deeply. The importance of energy security once more emphasized with Russian crises of 2006 and 2009, this time relating natural gas. Both crises taught Europe as well as to the world the significance of energy security and the urgent need for coherent energy policies.

The European Economic Community (EEC), predecessor of the European Union (EU), took several measures in order to ensure energy security. Having limited hydrocarbon resources of its own, the EEC had to import considerable amounts of oil and gas from non-EEC sources which make it vulnerable to fluctuations in energy price. In order to decrease its vulnerability, the first priority was to adopt measures to ensure energy security. Supply security was determined as the most significant component for energy security and in order to provide supply security; the diversification of the suppliers and supply routes were the essential prerequisites. This point is the starting point of this thesis. In order to ensure the supply security, the EEC searched and today the EU is still seeking alternatives to the current suppliers.

Another important component of supply security is supply diversification. The aim is to use variety of different sources of energy and to increase the use of domestically produced energy resources. The shift is towards the renewable energy sources in the EU; nevertheless, renewable energy is inadequate to meet energy deficit of the EU. Therefore, natural gas is used as another alternative for coal and oil, which is available in the neighboring regions and cleaner to consume.

The second important element for energy security is environmental concerns. The EU is initiating policy objectives in order to protect the environment and ensure sustainability. In this respect, a shift in the fossil fuel consumption is made, from oil and coal; the targeted energy source became natural gas. Natural gas is far cleaner compared to oil and coal; it helps to protect the environment and to diversify the current supplies of hydrocarbons. In the light of this, the natural gas consumption increased in the EU, particularly after the 1990s. Since then there has been a growing demand for natural gas within the EU, and in order to ensure supply security of natural gas, the diversification of supply and supply routes are the top priority in the agenda. This thesis deals with the question of how the EU can diversify its sources of supplies for natural gas and in what ways the natural gas could be transported to the EU.

The most favorable solution for the diversification of the supplies is considered as the Southern Gas Corridor project of the EU which has been also strongly supported by the U.S. since 1990s. The aim of this thesis is to reach non-Russian sources via non-Russian territories. The Southern Gas Corridor project aims to carry the Caspian and the Central Asian natural gas (Azerbaijan and Turkmenistan), combined with potential Middle Eastern gas (Iran and Iraq) and the North African gas (Egypt) via Turkey to the EU. Taking these initiatives and the willingness of the EU to reach different sources and routes for supply, especially in the Caspian basin, this study also explains the possible role of Turkey with regard to the transportation of natural gas to the EU. The potential future suppliers and the transportation of the future supplies to the EU and the possible role as a transit/bridge country of Turkey is the main analysis of this study.

This thesis undertakes to investigate the forgoing questions in three chapters:

Chapter One, “The EU as a Natural Gas Consumer”, intends to explore the natural gas market of the EU with regard to production, consumption, import and the export volumes of the Union. In the beginning, brief historical background information is given about “energy security” followed by “the global outlook of natural gas.” The current suppliers of the EU are also indicated in this chapter. The main supplier of the EU is Russia from which the EU seeks diversification. In Chapter One, four different countries of the South East European (SEE) region are analyzed in detail in order to assess the importance of supply diversification. These four countries are chosen deliberately, all having high dependence rates to Russian supplies and vulnerable to any fluctuations and curtailments in natural gas flows. This proves that not all countries in the EU have the same dependency on and vulnerability towards Russian supplies. Therefore, diversification of the supplies is much more important for the SEE states compared to other countries mainly the major ones.<sup>3</sup> Especially after the Eastern Enlargement, this issue became more important for the EU, as the then acceding countries were highly dependent on Russian supplies of natural gas.

Chapter Two, “The Potential Future Suppliers” focuses on different regions: the Caspian and Central Asian Region, the North African Region, the Middle East and the Gulf Region, The West African Region, the Arctic Region and the Eastern Mediterranean Region. Specific countries in those regions will be analyzed in detail. The natural gas markets of these countries are examined in detail with their production, consumption patterns and import, export capacities. The extra gas, if any, that could be exported to the EU is also calculated for related countries.

Chapter Three, “The Transport Options and Turkey as a Transit State”, begins with the explanation of Turkey’s geographical importance and its natural gas consumption. Secondly, this chapter sets out the possible suppliers of natural gas to Europe and the potential transportation routes. The analysis of transport routes include the ones that could pass through the Turkish territory and the feasibility of various competing projects.

On the basis of this information, the thesis first analyses the EU’s natural gas market and consumption patterns with future export demands and in the second chapter tries to find alternative suppliers for the increasing demand for exports. In the third chapter the alternative

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<sup>3</sup>The major ones are: France, Germany, England, Italy and Spain.

routes for the transmission of these supplies to the EU are indicated with a special emphasis on Turkey's contribution as a transit state.

## CHAPTER ONE

### 1.1 The European Energy Security

Energy is all around us and affects every aspect of our lives. Without energy, a life is unthinkable. We drive, eat, heat, produce, and we even socialize with the use of energy. As this is the case, the security of this valuable commodity came out to be of great importance. It is not unfamiliar to us to encounter wars because of petroleum; or to see one of the pipelines attacked because of a conflict between the states. Energy is a dangerous but a charming weapon, granted to a nation by birth or by exploitation by force unless it is paid for as agreed.

Energy as a commodity and the efficient use of that commodity, have always been important for the EU since its inception. The establishment of the EU started with the unification of coal and steel mines between Germany and France, showing the importance of energy security. This achievement is followed by two other significant steps related to the unification of the energy resources. The first step was *European Coal and Steel Community (ECSC)*. Initiated by Robert Schumann in 1950, it aimed to “make war not only unthinkable but materially impossible.” After this first step, in 1957, *European Atomic Energy Community (Euratom)* was founded by the Treaty of Rome. *Euratom* was responsible for the development and distribution of nuclear energy and the sale of the surplus to non-community members.<sup>4</sup> The third community introduced was the *European Economic Community (EEC)*, having the responsibility for allocating energy sources, such as electricity, oil and gas. Placing that much importance on energy, the security of this commodity also became the essential part of the EU policies.

Energy security leads a country to take measures and to determine an appropriate policy serving its own interests. The best known components of energy security are (a) security of supply, (b) security of demand, (c) affordability, (d) environmental concerns, and (d) reliability. The importance given to these components change according to the countries' individual interests. For instance, being one of the major energy producers, Russia places security of demand at a higher level of importance than other components. The EU, being a major consumer and importer of energy, is interested in the security of supply. Energy

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<sup>4</sup> “Nuclear energy: The European Atomic Energy Community (EURATOM)”, European Commission. [http://ec.europa.eu/energy/nuclear/euratom/euratom\\_en.htm](http://ec.europa.eu/energy/nuclear/euratom/euratom_en.htm)

security simply could be defined as the availability of sources at affordable prices without any disruption.<sup>5</sup>

The term “energy security” became highly important for the world and for the EC after the first and second oil crises of 1973 and 1979. It was in 1973 that the Organization of Petroleum Exporting Countries (OPEC), operating as a cartel, decided to put an embargo to the oil exported to the U.S. and the Netherlands as a result of their support for Israel in the Arab-Israeli War (Yom Kippur War).<sup>6</sup> Following the embargo, oil prices rose by more than 475 percent. This initial shock for the oil imports was followed by the second OPEC crisis in 1979, which increased the prices by another 134 percent.<sup>7</sup> As a response to the supply disruptions, the International Energy Agency (IEA) was established in 1974 to “develop response measures, such as the establishment of emergency reserves, and to co-ordinate a collective response to any future major disruptions in oil supply”.<sup>8</sup> These measures were particularly critical for countries having high import dependence and lacking of the necessary regulatory framework, such as the EC.

The first and the second OPEC crises of 1973 and 1979 brought the question of security of supply. Then, oil was the major hydrocarbon that was being used in the EEC and OECD Europe. In 1974, after the first OPEC crisis, the Community agreed that the dependency on imports of oil which was 64 percent would be decreased by 50 percent by diversification and conservation policies. Accordingly, with the diversification strategy, the consumption of natural gas increased as well as other alternative energy resources such as renewable resources, and nuclear power. In time, natural gas consumption reached that of oil and became the second most widely used hydrocarbon in the EU.

Having limited natural gas reserves itself, the EU has to import 65 percent of its consumption from outside.<sup>9</sup> The increasing demand for natural gas resulted in increasing dependence on foreign suppliers, particularly Russia. Russia accounted 37 percent of the total

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<sup>5</sup>International Energy Agency (IEA), Website, “Energy Security”.

<http://www.iea.org/topics/energysecurity/>

<sup>6</sup> IEA, Website, “Responding to major supply disruptions”.

<http://www.iea.org/topics/energysecurity/respondingtomajorsupplydisruptions/>

<sup>7</sup> Hitiris, Theo. *European Union Economics: 4<sup>th</sup> Edition*. Prentice Hall, 1998. pp. 327-331.

<sup>8</sup> IEA, Website, “Responding to major supply disruptions”, *op. cit.*

<sup>9</sup> Eurogas, “Statistical Report 2011”.

[http://eurogas.org/uploaded/Statistical%20Report%202011\\_091211.pdf](http://eurogas.org/uploaded/Statistical%20Report%202011_091211.pdf)

natural gas imports to the EU in 2006.<sup>10</sup> As experienced with the OPEC crises, in 2006 and in 2009 two other crises occurred, this time for gas. The gas supplies to the EU were cut off in 2006 and in 2009 because of political and economic tensions between Moscow and Kiev.<sup>11</sup> The cut down of the supplies by Gazprom, the state-owned Russian gas company, left the EU in the cold, particularly the South East European states.<sup>12</sup> Both the oil and the gas crises showed the EU one thing that it should diversify its supplies as well as suppliers and find more reliable sources. After these crises, the EU realized the necessity of coherent policy measures in order to prevent further supply disruptions.

Since the foundation of the EU, the major steps taken on the issue of energy security are as follows. 1991 *Energy Charter Declaration* paved the way for the 1994 *Energy Charter Treaty* which “provides a multilateral framework for energy cooperation that is unique under international law.”<sup>13</sup> Moreover, the Treaty was “designed to promote energy security through the operation of more open and competitive energy markets, while respecting the principles of sustainable development and sovereignty over energy resources.”<sup>14</sup> In the 1995 White Paper, *An Energy Policy for European Union*, regulations concerning the internal energy market were made. The first policy initiative was the *Green Paper: Towards a European Strategy for the Security of Energy Supply*, published in 2000. In this policy paper, the main questions were how to define and how to protect “energy security”.<sup>15</sup> The 2006 *Baku Initiative* was introduced with the aim of establishing a cooperation mechanism between the Caspian Sea countries and the Black Sea region. The *Baku Initiative* was constructive; it introduced an energy roadmap that was agreed on. In 2007 the Commission adopted a new policy which puts energy at the core of European relations with the third countries. In this policy, the transportation of Caspian energy resources became the major aim which

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<sup>10</sup>Eurogas, “Statistics 2006”, pp. 30.

[http://eurogas.org/uploaded/Eurogas%20Annual%20Report%202006-2007\\_%20statistics.pdf](http://eurogas.org/uploaded/Eurogas%20Annual%20Report%202006-2007_%20statistics.pdf)

<sup>11</sup>Henning Gloystein and Charlie Dunmore, “Russian gas supply falls further, EU says no crisis”, Reuters, 3 Feb 2012.

<http://www.reuters.com/article/2012/02/03/eu-gas-supply-idUSL5E8D32MX20120203>

<sup>12</sup>David Gow, “Russia-Ukraine gas crisis intensifies as all European supplies are cut off”, Guardian, 7 Jan 2009. <http://www.guardian.co.uk/business/2009/jan/07/gas-ukraine>

<sup>13</sup>Energy Charter, Website, “1994 Treaty”.

<http://www.encharter.org/index.php?id=28>

<sup>14</sup>*Ibid.*

<sup>15</sup>Ahmet Evin, “Energy and Turkey’s Neighborhood: Post-Soviet Transformation and Transatlantic Interests,” in Linden, Ronald and Evin, Ahmet and Kiri ci, Kemal and Straubhaar, Thomas and Tocci, Nathalie and Tolay, Juliette and Walker, Joshua, (eds.) *Turkey and Its Neighbors: Foreign Relations in Transition*. Lynne Rienner Publishers, Boulder, Colorado, pp. 98.

emphasizes the importance of Turkey and the Nabucco pipeline within an overall perspective.<sup>16</sup>

The EU's energy security, as noted, takes account of both supply security and diversification along with environmental protection. In this respect, the EU has recently launched two policy objectives. The first one is the *EU 20-20-20 Climate Change and Energy Package*. This new energy policy foresees that the EU would achieve (a) 20 percent decrease in greenhouse gas emissions in comparison to 1990 levels; (b) increase energy efficiency by 20 percent, and (c) give at least a 20 percent share to renewable in the energy mix by 2020.<sup>17</sup> The 2020 package was endorsed by the European Parliament (EP) and the European Council in December 2008.<sup>18</sup> The second package related to energy, particularly the carbon market is the 2050 *Energy Roadmap* aiming to reduce the carbon emissions to 1990 levels below 80-95 percent by 2050. The EU aims to provide a higher level of “decarbonisation”, “energy security”, and “competitiveness” in this report. The goal of the *Energy Roadmap* is to create a long-term European framework energy market and include all the stake holders in this network.<sup>19</sup>

To conclude, the EU has been founded as an energy community and the notions of energy security and supply security became more significant for the EU after the first and the second OPEC oil crises in 1973 and 1979. These notions further caused trouble for the EU in Russian natural gas crises of 2006 and 2009. Having been heavily reliant on imports, the EU became highly vulnerable to any curtailments and interruptions in the imported gas supplies. The EU faced and still “faces serious energy challenges concerning sustainability and greenhouse gas emissions as well as security of supply, import dependence and the competitiveness and effective implementation of the internal energy market.”<sup>20</sup> In order to cope with these challenges and ensure energy security, the EU launched several initiatives in order to form a common policy and a non-fragmented EU market. These initiatives are 1991

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<sup>16</sup> Europa, Website, “Summaries of EU Legislation, Energy”.

[http://europa.eu/legislation\\_summaries/energy/index\\_en.htm](http://europa.eu/legislation_summaries/energy/index_en.htm)

<sup>17</sup> European Commission, Europe 2020, “Priorities”.

[http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/index\\_en.htm](http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/index_en.htm)

<sup>18</sup> Edward Hunter Christie, “EU natural gas demand: uncertainty, dependence and bargaining power”, Turku School of Economics, 2010.

[http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/Julkaisut/Christie\\_netti\\_final.pdf](http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/Julkaisut/Christie_netti_final.pdf)

<sup>19</sup> Europa, Website, “Energy Roadmap 2050”.

[http://ec.europa.eu/energy/energy2020/roadmap/index\\_en.htm](http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm)

<sup>20</sup> *Ibid.*

*Energy Charter Declaration; 1994 Energy Charter Treaty; 1995 White Paper: An Energy Policy for European Union, 2000 Green Paper: Towards a European Strategy for the Security of Energy Supply; 2006 Baku Initiative; EU 20-20-20 Climate Change and Energy Package; and 2050 Energy Roadmap.* In short, the policy objectives on energy security initiated by the EU are competitiveness, ensuring environmental sustainability, and most importantly diversifying the supplies and increasing the share of natural gas.<sup>21</sup>

## **1.2 The global natural gas market**

The global population is rising at a high speed, bringing a corresponding rise in global natural gas consumption. The world population is expected to reach 8.5 billion by the year 2035.<sup>22</sup> Accordingly, the global energy consumption will increase by 40 percent during 2009-2035.<sup>23</sup> According to *Exxon Mobil 2012 Outlook*, coal consumption in the world will reach a peak and then show a gradual decline. Oil will remain as the highest consumed primary energy with gas following. The share of oil and gas in the global energy demand will remain more or less at the same level, as the consumption of natural gas will show a sharp increase and the consumption of oil on decline. According to the International Energy Agency (IEA), gas has not yet lived its Golden Age and it will live it in this era.<sup>24</sup> The primary driving factor behind the increased consumption of natural gas is environmental concerns. Natural gas is a cleaner form of energy, and it is the cleanest hydrocarbon resource. It helps to reduce the CO<sub>2</sub> emission levels which are an important indicator of environmental sustainability at the global level.<sup>25</sup>

Figure 1.1: World primary energy demand by scenario

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<sup>21</sup> ktisadi Kalkınma Vakfı, *Avrupa Birliği'nin Enerji Politikası*, İstanbul, 2005.

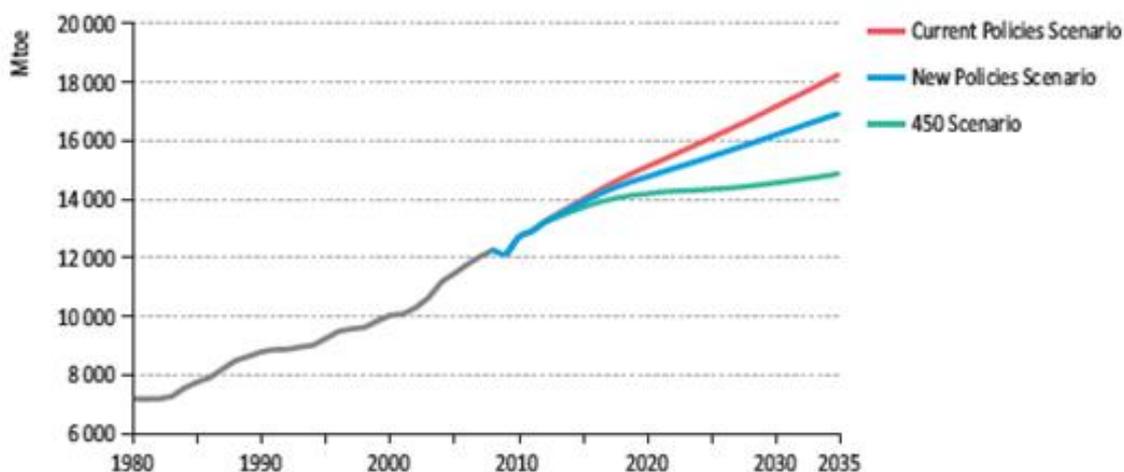
<sup>22</sup> United Nations, Website, "Population".

<http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf>

<sup>23</sup> OECD/IEA, *World Energy Outlook (WEO)*, 2011 pp. 69.

<sup>24</sup> OECD/IEA, *WEO 2011- Are We Entering a Golden Age of Gas? (GAS 2011)*, Special Report, 2011.

<sup>25</sup> Exxon Mobil, *An Outlook for Energy 2040, 2012*.



Source: *WEO 2011*.

As is understood from the Figure 1.1, the energy consumption is on the rise according to all three different scenarios of the IEA. These three scenarios are based on following assumptions: *Current Policies Scenario* is, as the name indicates, assumes that without changes in policies current consumption trends will continue. The *New Policies Scenario* assumes that the governments will abandon the current policies and develop new policies regarding energy consumption. The *450 Scenario* assumes that the consumption of what is beneficial for the environment will be continued while the consumption of the harmful to the environment will be abandoned.<sup>26</sup> The demand for the natural gas will be high and will continue rising in all three scenarios.<sup>27</sup>

In 2010, two significant things happened causing a substantial change in the natural gas trade and the effects were felt in major natural gas markets. The first one is the “Arab Spring” that began in Tunisia in December 2010, causing civil unrest by pro-democracy demonstrations, revolutionary activities, and protests.<sup>28</sup> Spreading to parts of the Middle East and North Africa, this unexpected development influenced the global oil and gas markets.<sup>29</sup> This unrest caused the use of emergency oil stocks by the IEA member countries for the third time in IEA’s history.<sup>30</sup> The second crucial development in the same year was the devastating

<sup>26</sup>OECD/ IEA, *WEO 2011*, pp. 70.

<sup>27</sup>*Ibid.*, pp. 72.

<sup>28</sup>Ashley Terry, “The Arab Spring”, *Global News*, 2011.

<http://www.globalnews.ca/2011/arab-spring/>

<sup>29</sup>OECD/IEA, *WEO 2011*, pp. 50.

<sup>30</sup>*Ibid.*

earthquake in Japan, causing a destructive tsunami and damage to the Fukushima nuclear reactor, leading to its closure as well as many others in the country.

This unfortunate incident affected mainly the global natural gas and LNG markets because as of May 5, 2012 all the nuclear reactors in Japan were shut down and the huge energy deficit of Japan is being compensated by imported hydrocarbon sources, mainly natural gas in LNG form.<sup>31</sup>

Other reasons causing a shift in the global natural gas markets are (a) the fast development in the markets of China and Brazil and increase in their natural gas demand; (b) the discovery of unconventional gas reserves in the U.S.; and (c) the improvement in LNG technology, leading to a decrease in LNG prices. These, combined with the global increase in the natural gas demand, influenced the natural gas production trends and trade patterns.

The IEA concludes that the global consumption of natural gas is expected to show global annual growth rate of 1.7 percent.<sup>32</sup> The natural gas production also increases in order to meet the growing demand with the advancement of the new supply sources such as unconventional resources in the market.<sup>33</sup> These developments will lead to the creation of new gas supply markets which will be discussed in Chapter Two, “The Potential Future Suppliers”.

### **1.3 The importance of natural gas for the European Union**

Natural gas, as an energy source, has always been important for the European Union; however, it was after 1990s that its share began to rise in the total primary energy consumption.<sup>34</sup> From then on there was a steady increase in the natural gas consumption of the Union and this trend is likely to continue. Neither the IEA officials nor the company

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<sup>31</sup> David Jones, “Renewables and natural gas battle it out post- Fukushima”, Platts, 2 June 2011.

[http://www.platts.com/weblog/oilblog/2011/06/02/renewables\\_and.html](http://www.platts.com/weblog/oilblog/2011/06/02/renewables_and.html)

“Tamari shut down leaves Jpana with no nuclear power”, BBC, 5 May 2012.

<http://www.bbc.co.uk/news/world-asia-17967202>

Paul L. Joskow, *The Future of Nuclear Power After Fukushima*, Sloan foundation and MIT, 7 Feb 2012.

<http://www.law.upenn.edu/academics/institutes/regulation/papers/JoskowParsonsNuclearPower.pdf>

Tony Johnson, “Post-Fukushima: Will natural gas replace nuclear energy?”, IBTimes, 10 June 2011.

<http://www.ibtimes.com/articles/160674/20110610/fukushima-energy-future-nuclear-natural-gas-future-energy-global-gas-market-obstacles-germany-japan.htm>

<sup>32</sup> OECD/ IEA, *WEO 2011*, pp. 74.

<sup>33</sup> OECD/IEA, *GAS 2011*.

<sup>34</sup> Eurogas, “Statistics 1994-2009”.

[http://eurogas.org/figures\\_statistics.aspx](http://eurogas.org/figures_statistics.aspx)

officials like Enno Harks, CEO, BP-Germany, foresee a slowdown in gas consumption, particularly in the European Union.<sup>35</sup>

The share of natural gas in total energy consumption of the European Union is likely to increase from 25 percent in 2009 to 30 percent in 2035.<sup>36</sup> Oil will continue to dominate the transportation sector (83 percent); however, natural gas will be widely used in industry and households. In 2009 natural gas composed 25 percent of the energy demand while oil's share was 34 percent. It is projected by IEA that the share of the natural gas in total primary energy demand will increase to 28 percent in 2025 and 30 percent in 2035 while the share of oil will steadily decrease first to 28 percent in 2025 and 25 percent in 2035.<sup>37</sup>

According to Eurogas Statistics 2011, in 2010, the ratio of natural gas in primary energy demand of the EU was 25 percent and that of oil was 34 percent. It is expected that natural gas consumption will increase by 5 percent, while oil consumption will decrease by 5 percent by 2035. Compared to oil, in all projection scenarios, natural gas consumption shows a continuous growth pattern. There are two main reasons for this increase in natural gas consumption.<sup>38</sup>

Firstly, natural gas is much cleaner compared to other fossil fuels, especially to coal and oil. In today's world new concepts began to dominate the global politics and one of the most important of them is environment and climate change. The climate change and environmental safety issues have become important in the mid-1980s and are likely to become ever more important for a sustainable future.<sup>39</sup> On the international scale, it was first in 1992 that the *United Nations Framework Convention on Climate Change (UNFCCC or FCCC)* was adopted in order to stabilize the "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."<sup>40</sup> UNFCCC was followed by 1997 Kyoto Protocol which aims to reduce "greenhouse gas (GHG) emissions ... to an average of five per cent against 1990 levels over

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<sup>35</sup> Personal Interview, Enno Harks, 30 March 2012.

<sup>36</sup> OECD/ IEA, *WEO 2011*, pp. 80.

<sup>37</sup> *Ibid.*, pp. 83.

<sup>38</sup> Eurogas, 2011.

<sup>39</sup> Heinrich Böll Stiftung, Website, "Climate Change".

<http://www.za.boell.org/web/climate-change-496.html>

<sup>40</sup> United Nations, "Framework Convention on Climate Change",

[http://unfccc.int/essential\\_background/convention/background/items/1353.php](http://unfccc.int/essential_background/convention/background/items/1353.php)

the five-year period 2008-2012.”<sup>41</sup> The latest initiative at the international level is *International Carbon Action Partnership (ICAP)* which was initiated by the leaders of more than 15 governments in Lisbon, Portugal, on 29 October 2007 and ICAP “was formed to contribute to the establishment of a well-functioning global cap and trade carbon market.”<sup>42</sup> At the European level, on the other hand, the EU launched the *European Climate Change Program (ECCP)* in order to reduce the greenhouse gas emissions at the international level in 2000, which was linked to the Kyoto Protocol.<sup>43</sup> The EU plus Norway, Iceland and Liechtenstein have adopted *European Union Emission Trading Scheme (ETS)* in 2005 which is the main pillar of *European Commission Climate Action Program*.<sup>44</sup> The recent adoption of the EU 20-20-20 objectives also foresee reduction of the CO<sub>2</sub> emissions by 20 percent by 2020 which is binding for all EU member states.<sup>45</sup> Taking all these initiatives and actions into consideration, it is clear that the climate change and the emission of greenhouse gas as have become a highly important matter and deserve global attention. Because natural gas, compared to other fossil fuels, facilitates reduction of greenhouse gas emissions and reduces the momentum of climate change, it is not surprising that the gas demand at the EU level has sharply increased.

Secondly, the recent technological developments North America and Canada facilitated the extraction of unconventional gas resources. This advancement in natural gas production created surplus of gas firstly in the U.S. and then in other parts of the world with the transportation of the extra American gas to the world markets. The discovery of unconventional reserves in America spread to other parts of the world including Europe.<sup>46</sup>

As a result, the natural gas consumption in the European Union as well as in many parts of the world is expected to increase at a higher speed because (a) it is clean and (b) thanks to technical developments, proven reserves are increasing both at the global and at the

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<sup>41</sup> United Nations, “Framework Convention on Climate Change – Kyoto Protocol”.

<sup>42</sup> [http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php)

<sup>43</sup> International Carbon Action Partnership. Website.

[http://icapcarbonaction.com/index.php?option=com\\_content&view=article&id=52&Itemid=2](http://icapcarbonaction.com/index.php?option=com_content&view=article&id=52&Itemid=2)

<sup>44</sup> European Commission, “European Climate Change Programme”.

[http://ec.europa.eu/clima/policies/eccp/index\\_en.htm](http://ec.europa.eu/clima/policies/eccp/index_en.htm)

<sup>45</sup> European Commission, “European Emission Trading Scheme (EU ETS)”.

[http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm)

<sup>46</sup> European Commission, “Europe 2020”.

[http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm)

<sup>46</sup> Unconventional gas reserves are found in the EU; nonetheless, they cannot be utilized as the legal requirements for extraction have not yet been finalized.

Union level. “Because of “its green properties” and highly efficient application technologies”, natural gas is going to remain the fuel of choice for the EU and will continue to contribute significantly to energy supply in the EU.<sup>47</sup> Following this argument, in this chapter, the consumption and the production patterns of the EU will be examined.

#### **1.4 European natural gas market**

European Union has always been, since its foundation, one of the biggest energy consumers in the world and it is not wrong to say that the EU has been the most appealing energy market for most of the suppliers. Although this concept is changing nowadays with China and India getting into the market relatively fast, the EU is likely to remain as one of the biggest consumers for a long period of time.<sup>48</sup> There are clear reasons for this argument. First of all, the indigenous production<sup>49</sup> of the EU shows a steady decline every year. Although new unconventional gas reserves are found, the extraction of these sources will take time and effort, especially the necessary regulations have to be established before prospecting can begin. Therefore, in the foreseeable future these reserves cannot be counted on in the projections. Secondly, as mentioned, the environmental issues and climate change matter a great deal for the EU. Therefore, the natural gas will remain as the most consumed energy resource and the import ratio will remain the highest.<sup>50</sup>

The figures for the natural gas consumption of the EU may vary depending on the source being used. Nevertheless, the shares of imports and production remain more or less the same. In this chapter, the figures are taken mainly from *Eurogas*; nonetheless, the IEA statistics are also cited where needed. Although the numbers differ, the ratio of consumption, import remains more or less the same for all sources. In this part, most of the data is taken from Eurogas reports as they are more detailed and specifically designed for the European Union natural gas market and the figures of *IEA, Energy Information Administration (EIA), and British Petroleum (BP)* where worldwide figures and estimates are indicated. For the EU-specific figures Eurogas and for global figures such as reserve estimates and international comparisons the latter sources are used.

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<sup>47</sup> Eurogas, “Natural Gas Demand and Supply, Long-term outlook to 2030”.

<http://www.eurogas.org/uploaded/Eurogas%20long%20term%20outlook%20to%202030%20-%20final.pdf>

<sup>48</sup> OECD/ IEA, *WEO 2011*, pp. 80.

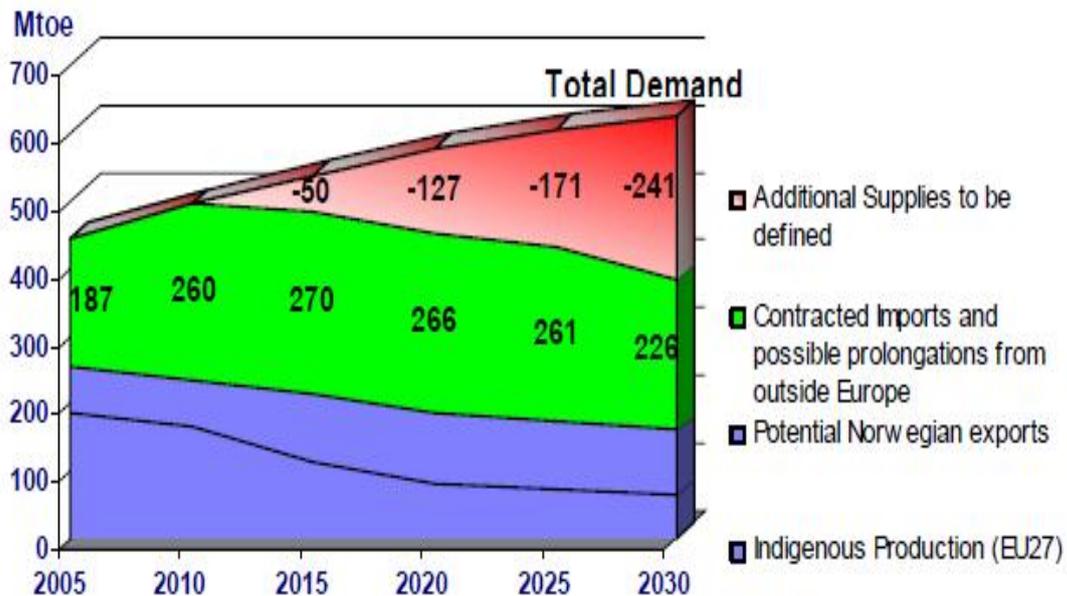
<sup>49</sup> The calculations for the indigenous production of the EU excludes Norway which is a major exporter of natural gas to the EU. The EU has imported 92.8 bcm (19 %) of its natural gas from Norway in 2011.

<sup>50</sup> Eurogas, 2011.

The consumption of the EU is increasing steadily every year. In 2010, it increased by 7.5 percent compared to the 2009 statistics as revealed by Eurogas.<sup>51</sup> In 2009, the natural gas consumption of the EU was 429.6 bcm which rose to 463.2 bcm in 2010.<sup>52</sup> In 2008 and 2009 the consumption of natural gas experienced a radical fall due to Russian gas crises and the global financial crises.<sup>53</sup>

The current EU consumption is expected to rise to 486 mtoe in 2020 and 566 mtoe in 2035, reflecting a 1.2 annual growth if the current policies are continued according to *WEO 2011*. The 1.2 percent growth rate is considered as high with respect to global growth rate of 1.7 percent.<sup>54</sup>

Figure 1.2: The projected natural gas demand for the EU by 2020



Source: Eurogas.<sup>55</sup>

<sup>51</sup> Eurogas, "Statistics 2008-2011".  
[http://eurogas.org/figures\\_statistics.aspx](http://eurogas.org/figures_statistics.aspx)

<sup>52</sup> Eurogas, 2011.

<sup>53</sup> OECD/IEA, *GAS 2011*, pp. 29-30.

<sup>54</sup> OECD/IEA, *WEO 2011*, pp. 40.

<sup>55</sup> Eurogas, "Natural Gas Demand and Supply, Long-term outlook to 2030".

The reserves are the countries' "extractable gas potential." The proven gas reserve assumptions are dependent on "technological developments, the current production of the country, "profitability of the future extraction and new discoveries."<sup>56</sup> That is to say, even if the country has gas resources but does not have the necessary technology to extract it, its resources is not counted as proven reserves. The European Union has nearly 7.03 tcm of gas; nevertheless, only 3.3 tcm<sup>57</sup> of it is classified as proven reserves. Unconventional gas resources are not counted as the proven reserves.<sup>58</sup>

The proven reserves of the EU as 3.3 tcm and can be considered as limited, considering the reserves of major natural gas producing countries such as Russia, Iran and Qatar, having 44.6 tcm, 33.1 tcm, and 25.0 tcm of natural gas reserves respectively.<sup>59</sup> In addition, currently, the EU is consuming 463.2 bcm/y of natural gas, 186 bcm of which can be indigenously produced.<sup>60</sup> That is to say, even if it is used at full capacity, it will only be enough for nearly 6-7 years if the current consumption trend is followed. While calculating the natural gas figures of the EU, Norway's production volume of 106.4 bcm/y as of 2010 and reserves of 2.0 tcm accounting 1 percent of global proven reserves, are not included.<sup>61</sup> Norway, as a politically and geographically close country to the EU, is a reliable and forward looking gas supplier for the EU.<sup>62</sup> Therefore, the diversification of the supplier issue is not a valid argument for Norway. Nevertheless, only a limited number of countries could benefit from Norwegian gas because of the inefficient transmission system within the EU.

In addition to Norway, as the largest European supplier to the EU, the UK and Netherlands hold the largest natural gas reserves in the European Union with an off-shore extraction of gas. Romania, on the other hand, was added to this list after its membership into

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<sup>56</sup> Christie, *op. cit.*, pp. 16.

<sup>57</sup> British Petroleum(BP), Statistical Review of World Energy 2012, June 2012.  
[http://www.bp.com/assets/bp\\_internet/globalbp/globalbp\\_uk\\_english/reports\\_and\\_publications/statistical\\_energy\\_review\\_2011/STAGING/local\\_assets/pdf/statistical\\_review\\_of\\_world\\_energy\\_full\\_report\\_2012.pdf](http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf)

<sup>58</sup> Christie, *op. cit.*

<sup>59</sup> BP, 2012.

<sup>60</sup> British Petroleum(BP), Statistical Review of World Energy 2011, June 2011.  
[http://www.bp.com/liveassets/bp\\_internet/globalbp/globalbp\\_uk\\_english/reports\\_and\\_publications/statistical\\_energy\\_review\\_2011/STAGING/local\\_assets/pdf/statistical\\_review\\_of\\_world\\_energy\\_full\\_report\\_2011.pdf](http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2011.pdf)

<sup>61</sup>BP, 2012.

<sup>62</sup> GASSCO, "Norwegian gas to Europe: reliable and forward-looking".  
[http://www.gassco.no/wps/wcm/connect/eebc5c8046ff4108b441b4bb467833c3/11771-Gassco\\_hovedbrosjyre2011\\_engelsk\\_WEB.pdf?MOD=AJPERES](http://www.gassco.no/wps/wcm/connect/eebc5c8046ff4108b441b4bb467833c3/11771-Gassco_hovedbrosjyre2011_engelsk_WEB.pdf?MOD=AJPERES)

the Union in 2007.<sup>63</sup> Despite the decline in its production capacity, Romania still accounts for a significant percentage in the EU reserves.

The indigenous production provided 36 percent of total consumption of the EU in 2009 with 181 bcm it has slightly changed to 35 percent with 186 bcm in 2010.<sup>64</sup> Although there is a relatively small increase in the domestic production of natural gas, it should not be misleading. The consumption increased much more than the production, therefore, the domestic production's share fell and this trend is likely to continue.

As mentioned, the EU experienced a fall in the natural gas consumption between 2008 and 2009. According to the Eurogas *Statistics of 2005*, the consumption of the EU was 499 bcm which was higher than 2009 levels and during that time the domestic production accounted for 38 percent of total consumption with 208 bcm of volume.<sup>65</sup> The statistics show that in 2009 the European Union's consumption has decreased by 50 bcm, approximately 9.5 percent, as compared to the previous year.

The indigenous production of the Union, on the other hand, reached its peak during 1990s of 270 bcm, and remained of a plateau until around 2005 then started to decline.<sup>66</sup> The production of the EU is expected to decline from 181 bcm in 2009 to 90 bcm in 2035, showing a 50 percent drop.<sup>67</sup> As it is also clear from the Figure 1.3, the last two producer countries are Netherlands and the UK, productions of which are expected to decline to a considerable degree.

Figure 1.3: Change in annual natural gas production in selected countries, New Policies Scenario

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<sup>63</sup> Europa, "Romania-EU Romania Relations".  
[http://ec.europa.eu/enlargement/archives/romania/eu\\_romania\\_relations\\_en.htm](http://ec.europa.eu/enlargement/archives/romania/eu_romania_relations_en.htm)

<sup>64</sup> Eurogas, 2011.

<sup>65</sup> Eurogas, "Statistics 2005".

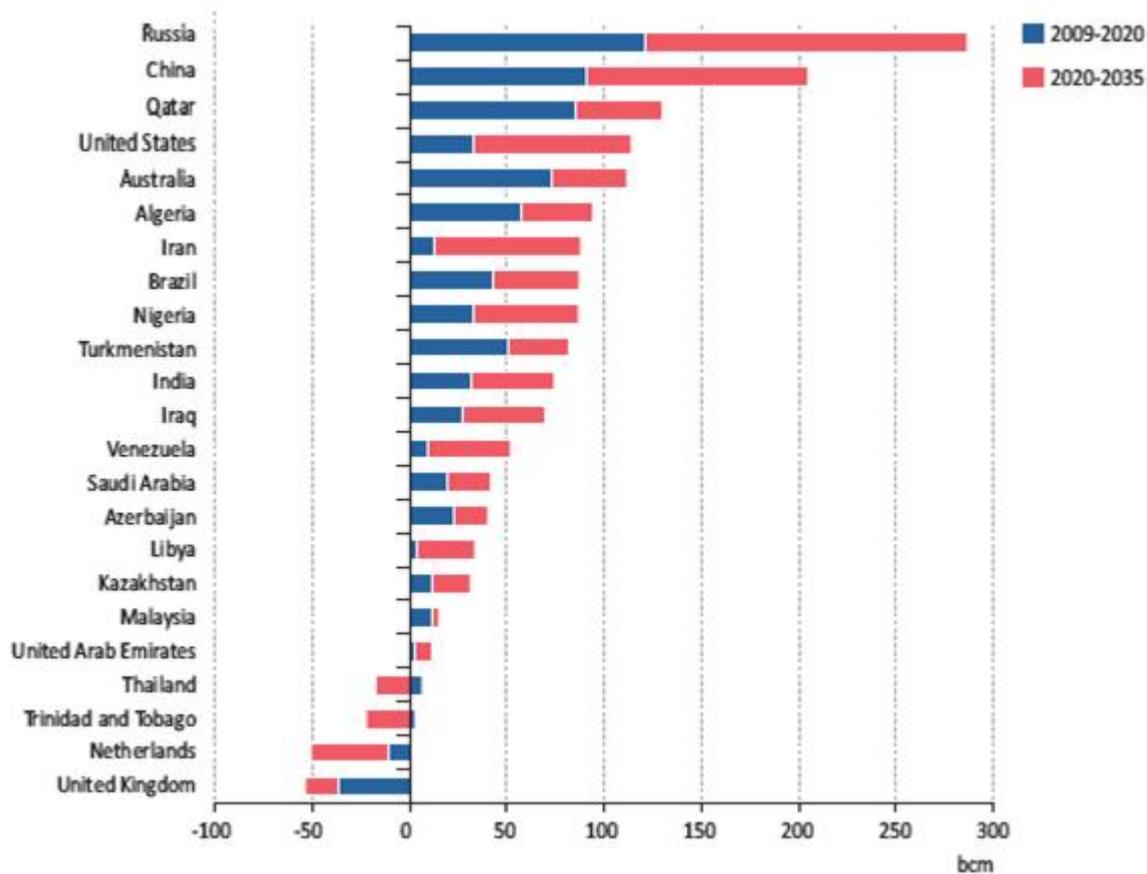
<http://www.eurogas.org/uploaded/statistics%202005.pdf>

Eurogas, "Statistics 2009".

[http://www.eurogas.org/uploaded/Eurogas%20Statistical%20Report%202010\\_Final%20291110.pdf](http://www.eurogas.org/uploaded/Eurogas%20Statistical%20Report%202010_Final%20291110.pdf)

<sup>66</sup> Christie, *op. cit.*

<sup>67</sup> OECD/ IEA, *WEO* 2011, pp. 163.



Source: *WEO 2011*.

Although the recoverable reserves of the Union are diminishing, there is another type of natural gas resource that is the unrecoverable reserves. The only possibility for the further production in the EU today is unconventional gas. This form of gas can be found in some EU countries such as Poland, France, and Romania. As mentioned previously, given the success of unconventional production in the U.S. and Canada, the countries in Europe also wish to extract their unconventional resources.<sup>68</sup> However, this is not easy for the EU member states as they need to be granted permission at the EU level. That is to say, the shale gas developments are gaining momentum in Ukraine, which is not a part of the EU but Europe, therefore, is not obliged to confront to the EU rules.<sup>69</sup> The main reason of the EU's objections towards unconventional sources is the environmental concerns regarding the extraction process. The EU has initiated certain environmental regulations and directives which are

<sup>68</sup> S. Buisset, O. Oye, and J. Selleslaghs, "Lobbying Shale Gas in Europe". <http://www.pacteuropa.eu/pact/wp-content/uploads/2012/06/Lobbying-shale-gas-in-Europe.pdf>

<sup>69</sup> "Ukraine sees 2017 for commercial shale gas output", *Reuters*, 16 May 2012. <http://www.reuters.com/article/2012/05/16/ukraine-gas-shale-idUSL5E8GGAJY20120516>

binding in member states.<sup>70</sup> This issue has been on the agenda of the European Union for some time and it is more likely to remain as one of the hot topics in the future. Any improvements regarding the extraction of unconventional gas may bring a relief from import dependence of the Union. Unconventional sources and the constraints in the extraction will be described in the next chapter.

Storage capacity is another important factor in respect to energy security. The need for storage capacity for any country, or for the whole of the EU for that matter was brought to the forefront by the gas crises of 2006 and 2009. Since then, the capacities as well as the numbers of the storage facilities have been increased. In 2006 the number of storage facilities of the EU was 127, with a maximum working volume of 75 bcm. In 2009 the EU reached 79 bcm capacity with 130 storage facilities. In 2010, 6 storage facilities were closed, one in Germany and five in Slovakia, but the maximum working volume of the remaining facilities have been raised. As of 1 January 2011, the EU had 124 storage facilities, with a maximum working volume of 86 bcm.<sup>71</sup> In the future, “many countries are planning to construct new or expand existing storage sites” of their storage capacities.<sup>72</sup> This is projected to lead to an increase in the numbers of facilities and the working volumes of natural gas. The numbers of the facilities above do not include LNG storage capacities that are operationally significant in Greece and Spain.

Table 1.1: Natural Gas Underground Storages at 1 January 2011

Countries	Number of storage facilities	Maximum working volume (mm <sup>3</sup> )	Maximum withdrawal capacity (mm <sup>3</sup> /day)
AUSTRIA	5	4744	55
BELGIUM	1	600	12
BULGARIA	1	600	4
CZECH REPUBLIC	8	3127	52
DENMARK	2	1020	18

<sup>70</sup> Philippe and Partners, “Final report on shale gas in Europe”, 8 November 2011, pp. 48.

[http://ec.europa.eu/energy/studies/doc/2012\\_unconventional\\_gas\\_in\\_europe.pdf](http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf)

<sup>71</sup> Eurogas, 2011.

<sup>72</sup> *Ibid.*

ESTONIA	0	0	0
FINLAND	0	0	0
FRANCE	15	11900	200
GERMANY	46	21297	515
GREECE	0	0	0
HUNGARY	5	6330	72
IRELAND	1	230	3
ITALY	10	14747	153
LATVIA	1	2325	24
LITHUANIA	0	0	0
LUXEMBOURG	0	0	0
NETHERLANDS	3	5000	145
POLAND	7	1640	32
PORTUGAL	1	159	2
ROMANIA	8	2760	28
SLOVAKIA	1	2785	39
SLOVENIA	0	0	0
SPAIN	2	2367	13
SWEDEN	1	9	1
UNITED KINGDOM	6	4350	86
<b>EU 27</b>	<b>124</b>	<b>85990</b>	<b>1453</b>
SWITZERLAND	0	0	0
TURKEY	2	2661	18

Source: Eurogas, 2011.

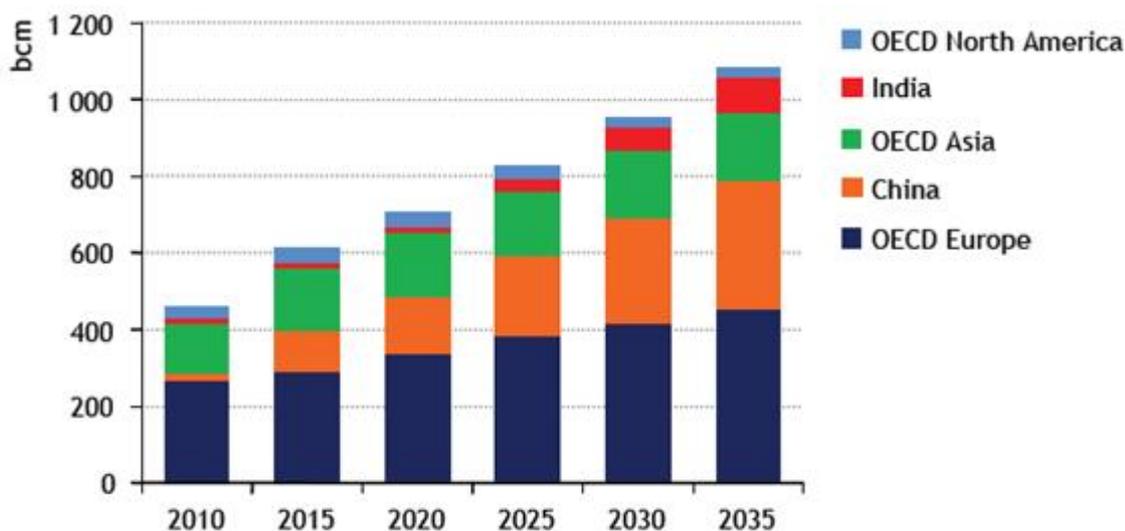
The import of natural gas into the EU is increasing as a result of the increasing consumption. In 2005, before the first gas crisis, 287 bcm of natural gas was imported to the EU constituting nearly 60 percent of total natural gas consumption. The 60 percent of import dependence in 2005 changed respectively to 63 percent and to 64 percent in 2008 and 2009. The latest statistics indicate that in 2010 the ratio of imported gas reached 65 percent with a volume of 336 bcm.

Table 1.2: The import dependence ratios in the IEA and Eurogas Scenarios

Year	IEA Base Scenario	Eurogas
2007	59 %	59 %
2015	69 %	70 %
2020	76 %	80 %
2025	81 %	86 %
2030	84 %	89 %

Source: Christie, pp. 25.

Figure 1.4: Natural gas imports by major regions \*

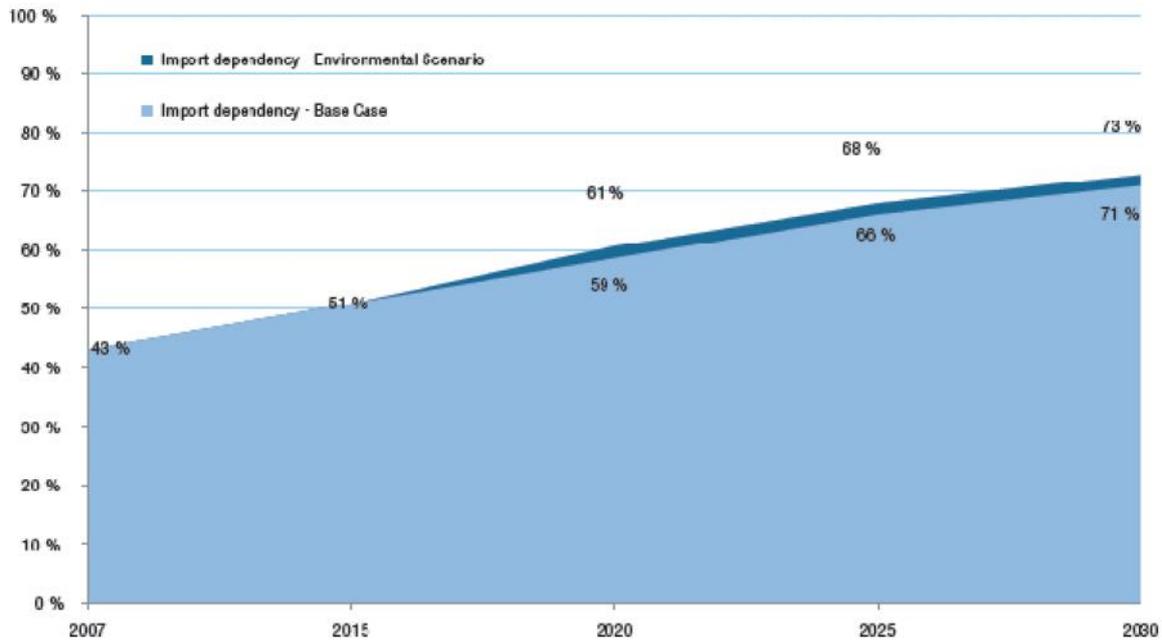


\*According to the GAS

Source: *GAS 2011*.

From the figures it is quite clear that the EU's import dependency is rising continuously without any interruption no matter which scenario is considered. The ratio of 60 percent import dependency reaches 89 percent which means indigenous production nearly diminishes by 2030. These figures can change if European unconventional sources are utilized. If not, the EU will certainly need more imported gas to meet the growing demand. This will increase the import dependency of the EU which is a strong bargaining chip for the supplier countries, reducing EU's credibility in the long run.

Figure 1.5: The EU Import dependency from outside Europe



Source: Eurogas.<sup>73</sup>

IEA projects that the import demand of the Union will increase from 310 bcm in 2009 to 540 bcm in 2035 and the import dependence rate increases from 64 percent in 2009 to 86 percent in 2035 including the imports from Norway.<sup>74</sup> The import dependence of Europe to Norway is 19 percent and this figure is not likely to change substantially in the foreseeable future. When the annual growth rate of Norwegian imports is taken, the share of the Norwegian gas in the EU energy mix may climb up maximum to 30 percent by 2035 if the developments in the Arctic Region yield good results.<sup>75</sup>

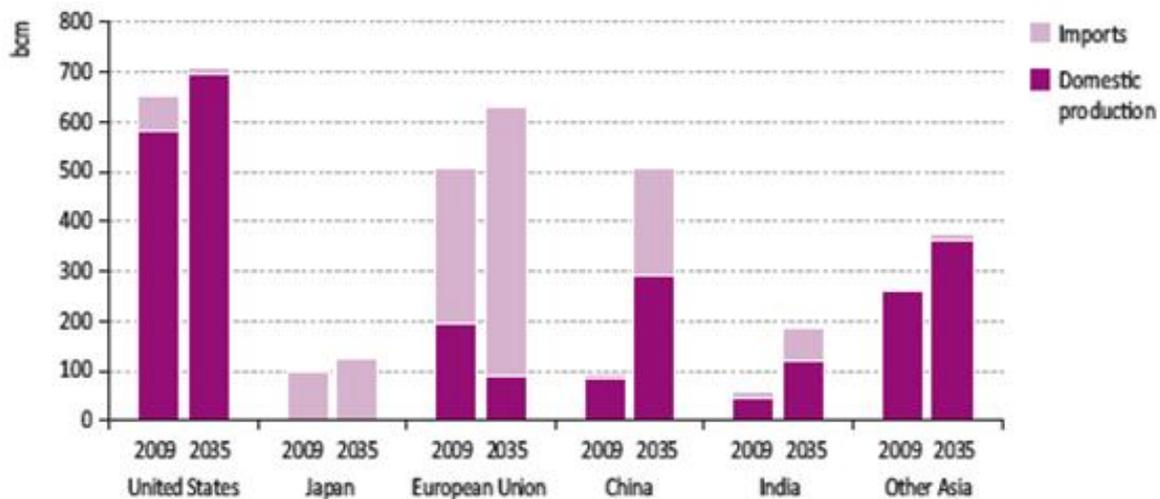
Figure 1.6: Natural gas demand and the share of imports by region\*

<sup>73</sup> Eurogas, "Long term Outlook for Gas Demand and Supply, 2007-2030".  
[http://www.eurogas.org/uploaded/Eurogas%20LT%20Outlook%202007-2030\\_Final\\_251110.pdf](http://www.eurogas.org/uploaded/Eurogas%20LT%20Outlook%202007-2030_Final_251110.pdf)

<sup>74</sup> *Ibid.*, pp. 93.

<sup>75</sup> Eurogas, 2011.

My own calculation.



Note: Other Asia had net natural gas exports of 56 bcm in 2009.

\*According to New Policies Scenario

Source: *WEO 2011*.

Eurogas estimates that the European Union’s import dependency will rise to 68 percent in 2020, 71 percent in 2025 and to 74 percent in 2030.<sup>76</sup> The IEA projects a sharper increase up to 86 percent by 2035.<sup>77</sup> While the dependence on foreign sources increases, the question of how and from where to meet this demand comes to foreground. Nearly 560-590 bcm of gas will be needed by the European Union by 2035, and current agreements supply only 421 bcm of natural gas to the Union.<sup>78</sup> The current natural gas suppliers of the EU are Russia, Norway, Algeria, Qatar, Nigeria, Libya, Trinidad and Tobago, and Egypt all of which will be discussed in detail in Chapter Two.

## 1.5 Country Analyses

In the previous part, the energy market dynamics of the European Union have been examined and the consumption, production, the import pattern and the import dependence of the EU have been considered. This section aims to make country analyses for South East European Countries (SEE); Bulgaria, Greece, Romania, and Hungary. The aim of this section

<sup>76</sup> Eurogas, “Natural Gas Demand and Supply, Long-term outlook to 2030”.

<sup>77</sup> OECD/ IEA, *WEO 2011*, pp. 93.

<sup>78</sup> *Ibid.*, pp. 564-565.

Micheal Ratner, Paul Belkin, Jim Nichol, and Steven Woehrel, “Europe’s Energy Security: Options and Challenges to Natural gas Supply Diversification”, Congressional Research Service, 13 March 2012. <http://www.fas.org/sgp/crs/row/R42405.pdf>

is to examine their individual natural gas markets including natural gas consumption, production, the import patterns and storage facilities.

There are several common aspects of these states. Being located in EU's periphery bordering Russia, they all place high importance to the "energy security" especially to "supply security" as they are heavily reliant on the imported natural gas. The countries in this region are 69 percent dependent on imported gas, 90 percent of which is supplied by Russia.<sup>79</sup> Those countries have long-term supply contracts with Russia, increasing their dependence to Russia even more.<sup>80</sup> Any disruptions caused by the supplier country, as happened with 2006 and 2009 Russia-Ukraine gas crises, affects the region more than any other.

In order to ensure supply security, the SEE countries try to diversify their suppliers and supply routes, increase their domestic production and decrease the consumption of energy. However, they cannot decrease their energy demand by a considerable amount because most of them are developing countries in need of energy to sustain their development. Apart from Romania, they have limited volumes of natural gas reserves that are shrinking fast.<sup>81</sup> Some of the countries in/around the region have considerable amounts of unconventional gas, such as Poland, Hungary, and Romania; nevertheless, due to environmental concerns and EU sanctions, they are unable to extract them at the moment.<sup>82</sup> Like the EU, the SEE region also relies on imported gas as the production steadily falls and the consumption is on continuous rise.

### **1.5.1 Bulgaria**

Bulgaria is a country having a 100 percent dependence on imported gas which only flows from Russian sources. The consumption of natural gas is relatively low compared to the EU average and the production of the country is negligible. The country imports gas from

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<sup>79</sup>Judith Pinter, "Central and Eastern Europe - Shale gas development "inevitable"", KMPG Global Energy Institute, 6 Jun 2012.

<http://www.kpmg.com/CEE/en/IssuesAndInsights/ArticlesPublications/Documents/press-release-cee-shale-gas-outlook.pdf>

<sup>80</sup> KMPG Global Energy Institute, "Central and Eastern European Shale Gas Outlook", pp. 12.

<http://www.kpmg.com/HU/en/IssuesAndInsights/ArticlesPublications/Documents/KPMG-CEE-Shale-Gas-Outlook.pdf>

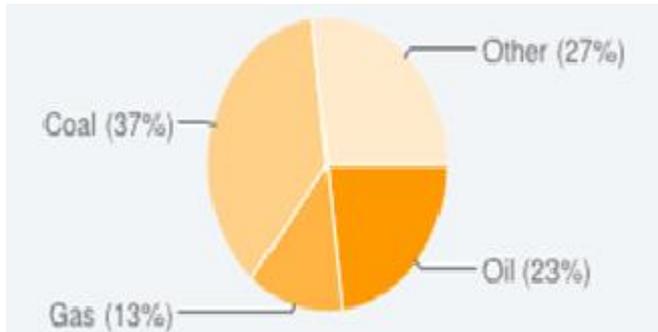
<sup>81</sup> BP, 2012.

OECD/IEA, *GAS 2011*.

<sup>82</sup> KMPG Global Energy Institute, *op. cit.*

the only connection which comes through Romania and Ukraine carrying Russian gas. There is a limited capacity for the gas supplies coming from Turkey and Greece which has been created after the 2009 Ukrainian gas crises, yet had not been utilized as of 2011.<sup>83</sup>

Figure 1.7: Total primary energy consumption of Bulgaria (2010)



Source: Energy Delta Institute<sup>84</sup>

The natural gas consumption in Bulgaria is relatively low compared to its neighborhood. It consumed 2,9 bcm of natural gas in 2011.<sup>85</sup> The Bulgarian consumption was 2,6 bcm in 2010 and 3,2 bcm in 2008.<sup>86</sup> The gas consumption in the country is expected to rise, especially in industry and public sectors as well as in power generation.

The use of natural gas in total energy mix accounts for nearly 13 percent with a continuous rise in demand.<sup>87</sup> Widely used in residential sector, natural gas is also consumed heavily in industry. Still the gasified household average is well below the EU levels.

Figure 1.8: Natural gas consumption pattern of Bulgaria

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<sup>83</sup> Dimitar Doukov, “Energy Efficiency: A Cost Effective Solution for Energy Security”, Bulgarian Energy Efficiency Fund, 6-7 July 2009.

<http://www.osce.org/eea/37903>

<sup>84</sup> Energy Delta Institute, Energy Business School, “Bulgaria”.

<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/bulgaria>

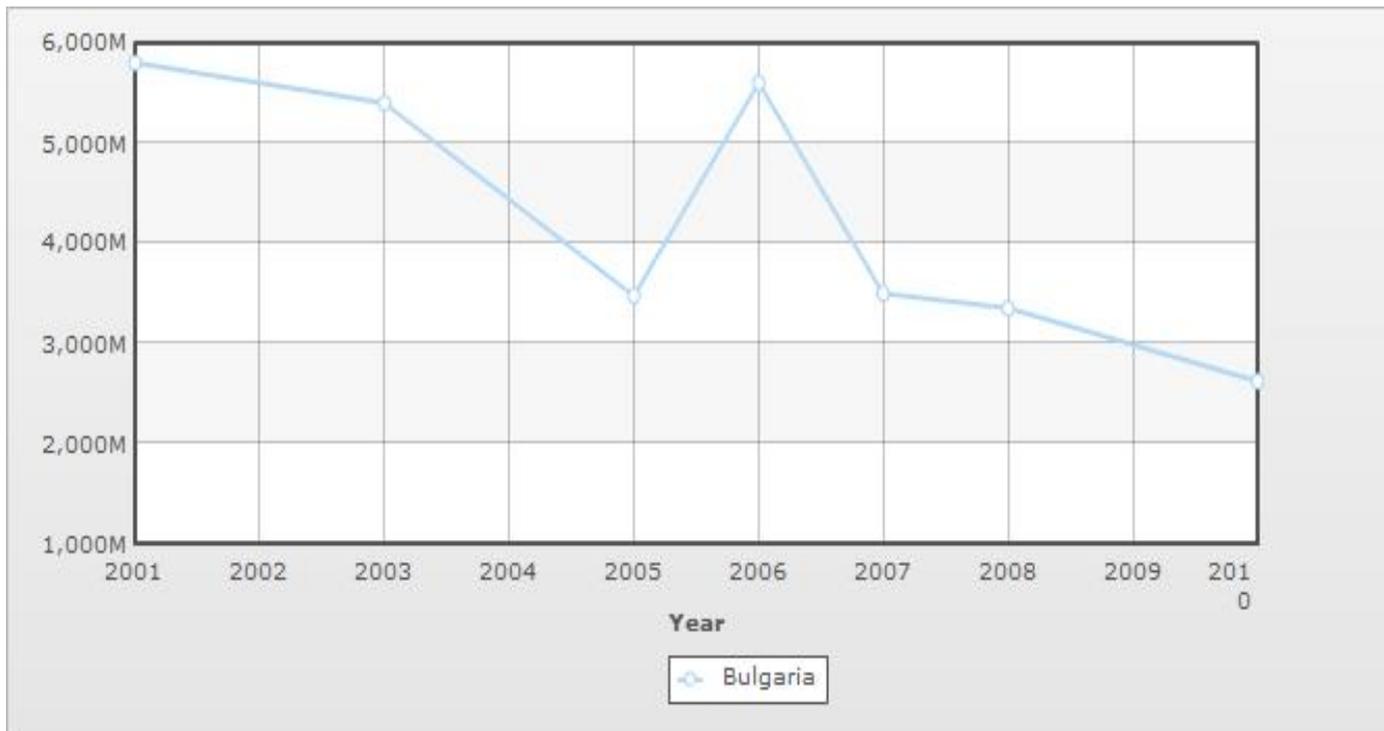
<sup>85</sup> BP, 2012.

<sup>86</sup> Bulgarian Association Natural Gas, “In Bulgaria- General Facts”.

[http://www.naturalgas.bg/en/pages/index/page/in\\_the\\_country](http://www.naturalgas.bg/en/pages/index/page/in_the_country)

<sup>87</sup> *Ibid.*

Energy Delta Institute, Energy Business School, “Bulgaria”.



Source: Index Mundi<sup>88</sup>

According to the IEA, Bulgaria has a small volume of natural gas reserves around 5 bcm.<sup>89</sup> Considering the low volume of the reserves, there is hardly any production in the country. The indigenous production was 0,2 bcm in 2008,<sup>90</sup> 0,03 bcm in 2010 and 0,06 bcm in 2011.<sup>91</sup> It relies on imports to meet its natural gas demand. The 2,9 bcm consumption in 2010 was met by 2,7 bcm of imports coming from Russia. Bulgaria is 100 percent dependent on Russian gas imports. The dependence of the country to Russian gas in total energy mix is 93 percent.<sup>92</sup>

The gas transportation capacity in Bulgaria is 8 bcm/y maximum. In 2011, Bulgargaz, the national gas company responsible for transmission, transported 3.5 bcm of gas within the Bulgarian borders.<sup>93</sup> Using the Bulgarian territory, the gas is transported from Russia to the Balkans. The country also plays an important role by transmitting Russian gas supplies to three other directions: Turkey, Greece, and Macedonia. The gas transiting Bulgaria supplies

<sup>88</sup> Index Mundi, Website, "Economy-Bulgaria natural gas consumption by year chart".

<http://www.indexmundi.com/g/g.aspx?c=bu&v=137>

<sup>89</sup> OECD/IEA, "Natural Gas Information", 2011.

<sup>90</sup> Bulgarian Association Natural Gas, "In Bulgaria- General Facts".

<sup>91</sup> Eurogas, 2011.

<sup>92</sup> Energy Delta Institute, Energy Business School, "Bulgaria".

<sup>93</sup> Bulgartransgaz<sup>a</sup>, "Transmission of natural gas to end consumers within Bulgaria".

<http://www.bulgartransgaz.bg/en/index.php?page=13&sid=23>

100 percent of Macedonian gas consumption. On the other hand, Greece and Turkey also benefit from the gas transiting Bulgarian territory. Greece meets 70 percent of its gas consumption while Turkey meets 35-40 percent.<sup>94</sup> Hence Bulgaria can be an important meeting point for the gas coming from both East and West following in both directions. In 2011, 15 bcm of gas has been transmitted, which was 12 bcm in 2010. The maximum transport capacity for Bulgarian transmission system is 18.7 bcm.<sup>95</sup>

The two big gas market actors in the country are Bulgartransgaz responsible for transit, storage and transportation of the natural gas and Bulgargaz that is the supplier and distributor of natural gas in Bulgaria. There are also other distribution companies.<sup>96</sup> Considering its geopolitical position, Bulgaria plays an important role in the region by its transmission capacity especially to the Balkans. Upcoming projects to carry natural gas via interconnectors and pipelines are planned with Greece and Romania; however, these are long-term projects which require smart calculations hence they will take time.<sup>97</sup>

For the Bulgarian economy, the transportation of the energy resources by pipelines plays an important role. Bulgaria wishes to play its most important role in its transport history with the Southern Gas Corridor Projects or the South Stream Pipeline project. With the South Stream Pipeline project, which is expected to run under the Black Sea carrying Russian gas to European market via Bulgaria, the country hopes to be an active and significant transit route in the region. According to the terms of the South Stream agreement, Russia and Bulgaria both will have 50 percent stake in this project. While the former Bulgarian Prime Minister Sergei Stanishev declared that 50 percent share will fully protect the interests of the country, Ognyan Minchev who is the director of the Bulgarian office of the European Council of Foreign Relations, claimed “the 50-50 deal is not enough to defend Bulgaria’s national interests.”<sup>98</sup> This agreement will further increase Russian control of the Bulgarian gas market.

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<sup>94</sup>Bulgartransgaz<sup>a</sup>, *op. cit.*

<sup>95</sup>*Ibid.*

<sup>96</sup>Bulgarian Association Natural Gas, “In Bulgaria- General Facts”.

<sup>97</sup> Bulgartransgaz<sup>b</sup>, Website, “Transit transmission of natural gas”.

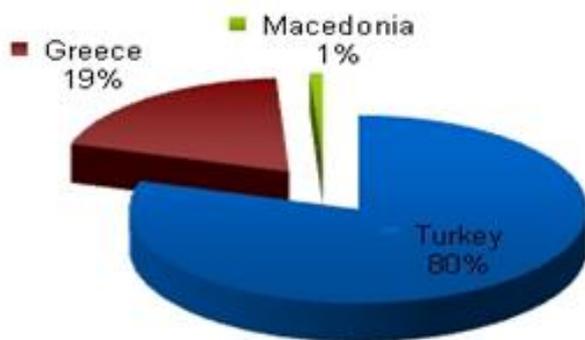
<http://www.bulgartransgaz.bg/en/index.php?page=13&sid=24>

<sup>98</sup> Matthew Brunwasser and Judy Dempsey, “Russia signs deal to bring natural gas pipeline through Bulgaria”, The New York Times, 18 Jan 2008.

[http://www.nytimes.com/2008/01/18/world/europe/18iht-putin.4.9333114.html?\\_r=2](http://www.nytimes.com/2008/01/18/world/europe/18iht-putin.4.9333114.html?_r=2)

Sofia will play an even greater role if the Southern Gas Corridor project will be realized. Gas coming from the Caspian region will be transported to Bulgarian border and then to the EU. Nevertheless, currently there are no developments regarding the pipeline projects that will carry Caspian gas through Bulgaria. No matter what project will succeed, whether the South Stream or the Southern Gas Corridor project, Bulgaria stands to play an important role for the transmission of the natural gas from Caspian or Russian sources.

Figure 1.9: The transmission of gas through Bulgaria in 2011



Source: Bulgartransgaz<sup>99</sup>

Bulgaria has one underground storage capacity located in Chiren where “348.51 mcm of natural gas were injected and 367.69 mcm were withdrawn” and “the current capacity of the storage facility is 420 mcm depending on the conditions of the injection/withdrawal program.”<sup>100</sup> The capacity of the storage facility is enough for the time being, considering the low demand of natural gas. Nonetheless, the country is expected to increase its natural gas consumption in the future. Given the country’s vulnerability to disruptions in gas flows, the storage capacities need to be increased.

As can be understood from the above statements, Bulgaria’s natural gas market is tightly tied to Russian Federation. The importance of the South Stream for the country is obvious; however, it will not help the country to reduce its dependence on Russia. On the contrary, it will even become more reliant on Russian exports. "Russia has an almost full monopoly over Bulgaria's energy market and the EU shockingly acts like a naïve bystander, completely blind

<sup>99</sup> Bulgartransgaz<sup>b</sup>, *op. cit.*

<sup>100</sup> Bulgartransgaz<sup>c</sup>, Website, “Natural Gas Storage”.

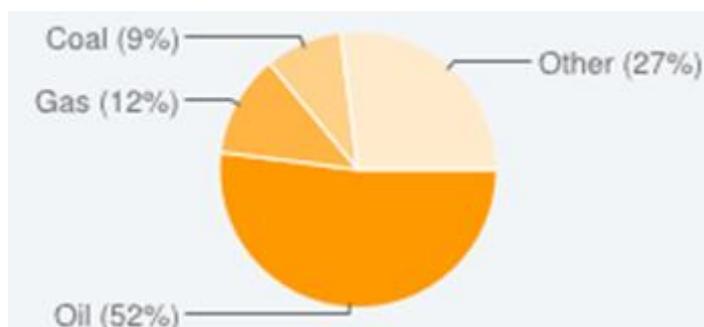
<http://www.bulgartransgaz.bg/en/index.php?page=13&sid=25>

to the major strategic reconfiguration that it taking place in the Balkans," Minchev said.<sup>101</sup>Therefore, it is important for the country to diversify its supplies as well as its routes of transport.

### 1.5.2 Greece

Geographically, Greece is in an advantageous position because it is easier for the country to import Liquefied Natural Gas (LNG) via tankers and increase its supplies, while decreasing its dependence on pipeline imports especially from Russia. Greece's dependence on Russian gas is high. But unlike its Balkan neighbors, Greece has several LNG import facilities which increase its supply security. 54 percent of its gas imports come from Russia and 20 percent come from Algeria as LNG.<sup>102</sup> Greece has virtually no production and high dependence on imports; moreover its storage facilities are limited. It has no storage capacity for natural gas and has around 1 bcm of LNG storage capacity.<sup>103</sup>

Figure 1.10: Total primary energy consumption of Greece (2010)



Source: Energy Delta Institute<sup>104</sup>

Greece consumed 4.5 bcm of natural gas in 2011.<sup>105</sup>The dependence on the pipeline or LNG imports is likely to increase. Greece imported 3.3 bcm of natural gas, 2.6 bcm of which came from Russia as of 2011.<sup>106</sup> Oil consumption is very high in Greece which constitutes

<sup>101</sup> Brunwasser and Dempsey, *op. cit.*

<sup>102</sup> Eurogas, 2011.

<sup>103</sup> Energy Delta Institute, Energy Business School, "Greece".

<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/greece>  
Eurogas, 2011.

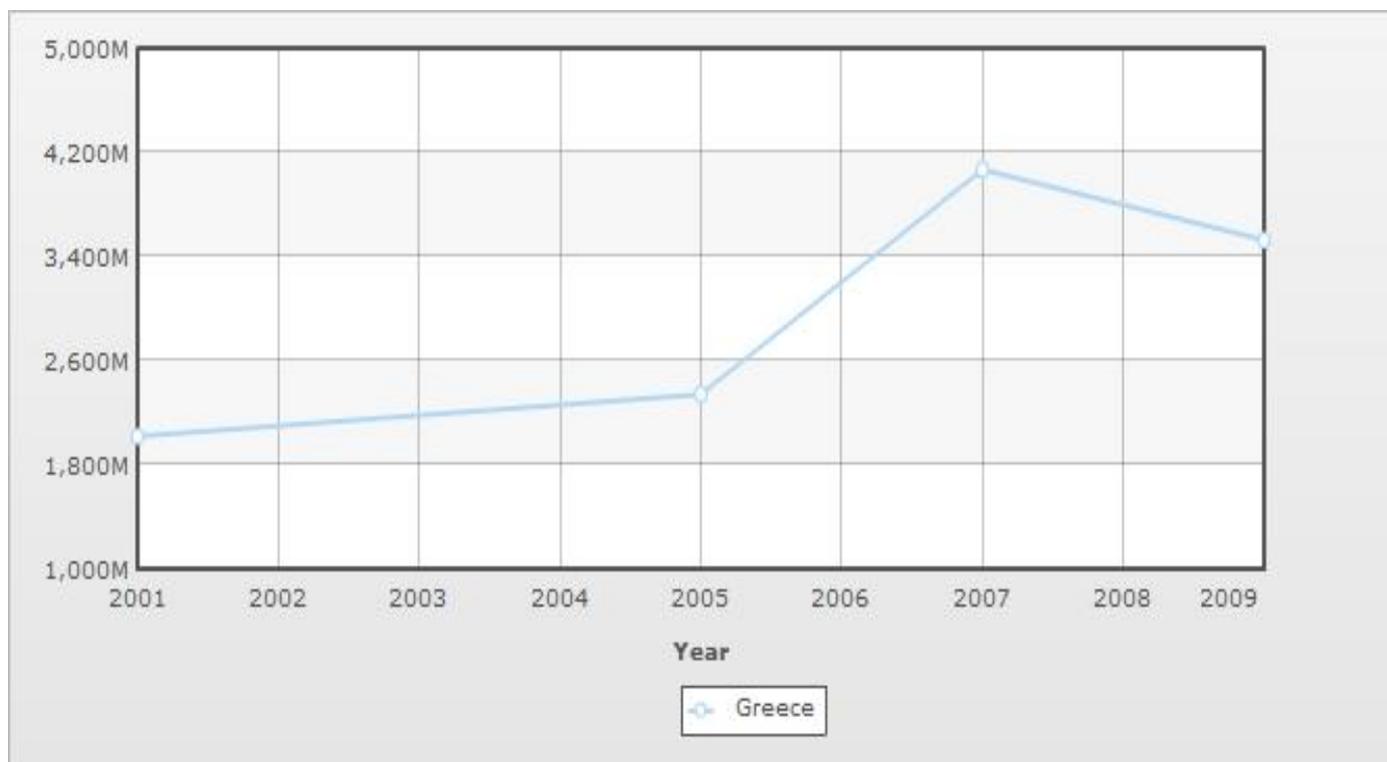
<sup>104</sup> Delta Institute, Energy Business School, "Greece".

<sup>105</sup> BP, 2012.

<sup>106</sup> *Ibid.*

nearly 52 percent of all primary energy consumption.<sup>107</sup> Considering the latest initiatives of the European Union, Greece is more likely to switch to natural gas a more environment-friendly hydrocarbon, to abandon oil consumption in order to comply with the EU acquis. Compared to other EU states, Greece has one of the highest rates of CO<sub>2</sub> emission per capita which is 10.20 tonne per year. Per capita emission in Turkey is 3.52 tonne/y. Hungary, 6.4 tonne/y and France 6.34 tonne/y of CO<sub>2</sub>.<sup>108</sup> High consumption of oil and coal having 52 percent and 9 percent share respectively, in the total energy demand, also causes high levels CO<sub>2</sub> emission.

Figure 1.11: Natural gas consumption pattern of Greece



Source: Index Mundi<sup>109</sup>

Greece has very small volumes of gas reserves which are not even worth extracting. It has 1 bcm of natural gas reserves and does not export gas to any other country outside its territory.<sup>110</sup> The country imported gas from non-EU supplies mostly from Russia, via

<sup>107</sup> Energy Delta Institute, Energy Business School, "Greece".

<sup>108</sup> Breathing Earth. Website.

<http://www.breathingearth.net/>

<sup>109</sup> Index Mundi, Website, "Economy-Natural gas consumption of Greece by year chart".

<http://www.indexmundi.com/g/g.aspx?c=gr&v=137>

<sup>110</sup> OECD/IEA, "Natural Gas Information", 2011.

pipelines, and LNG mostly from Algeria but also from Qatar, Egypt, and Trinidad and Tobago. LNG imports have a significant share in the overall gas supplies to Greece accounting 30 percent.

There are storage facilities available in Greece, however, South Kavala storage facility is projected to be built with a capacity of 0,3 bcm. There are LNG storage facilities with a capacity of 0,8 bcm of LNG capacity.<sup>111</sup> It will be logical for Greece to construct new storage facilities in order to advance its supply security. However, current economic situation of Greece is not available for initiating new plans and projects.

Moreover, it is a matter of question whether the country could afford its natural gas consumption or not.<sup>112</sup> The natural gas outlook of Greece is blurred, the consumption of the country is expected to rise in the future; however, due to financial collapse, and its energy consumption might be stabilized for some time.

### **1.5.3 Romania:**

Romania is the ninth largest country and seventh most populous country in the European Union.<sup>113</sup> It has borders with Serbia and Hungary. Compared to its neighbors as well as to other EU countries, Romania is lucky. Its reliance on foreign supplies, particularly for gas, is much lower than the EU average due to its own reserves.<sup>114</sup> It has the largest oil and gas reserves in the SEE and Central Eastern Europe (CEE) region. The first gas was discovered in the early 20<sup>th</sup> century and has been extracted since.<sup>115</sup>

Figure 1.12: Total primary energy consumption of Romania (2010)

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<sup>111</sup> Eurogas, 2011.

Energy Delta Institute, Energy Business School, "Greece".

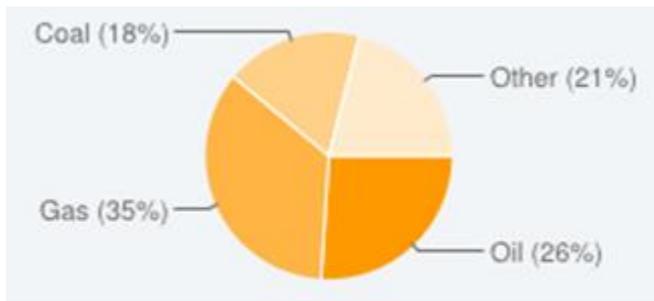
<sup>112</sup> Ladka Bauerova and Natalie Weeks, "Greek Blackouts Risked As Power Companies' Cash Runs Out: Energy", Bloomberg, 11 Jun 2012.

<http://www.bloomberg.com/news/2012-06-10/greek-blackouts-risked-as-power-companies-cash-runs-out-energy.html>

<sup>113</sup> Breathing Earth.

<sup>114</sup> Global trade, "Oil and Gas Market Overview-An Expert's View about Energy in Romania", 24 Oct 2011. <http://www.globaltrade.net/f/market-research/text/Romania/Energy-Coke-Oil-Gas-Electricity-Oil-and-Gas-Market-Overview.html>

<sup>115</sup> Transgaz, "Milestones in the Romanian natural gas industry". <http://www.transgaz.ro/en/istoric.php>



Source: Energy Delta Institute<sup>116</sup>

The country consumed 13.8 bcm of natural gas in 2011.<sup>117</sup> 11 bcm of this amount was indigenous and 2,81 bcm was imported from Russia in 2011.<sup>118</sup> The consumption pattern of the country is increasing, considering the huge reserves and the availability of the supplies in the country. Natural gas has 35 percent share in the total primary energy consumption, while oil and coal has 26 percent and 18 percent, respectively. In 2035, gas consumption is expected to rise more than 16 bcm according to the IEA, Golden Age of Gas (GAS) ratios.<sup>119</sup>

Figure 1.13: Natural gas consumption pattern of Romania

<sup>116</sup> Energy Delta Institute, Energy Business School, “Romania”.

<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/romania>

<sup>117</sup> BP, 2012.

<sup>118</sup> Gazprom Export, Foreign Partners, “Romania”.

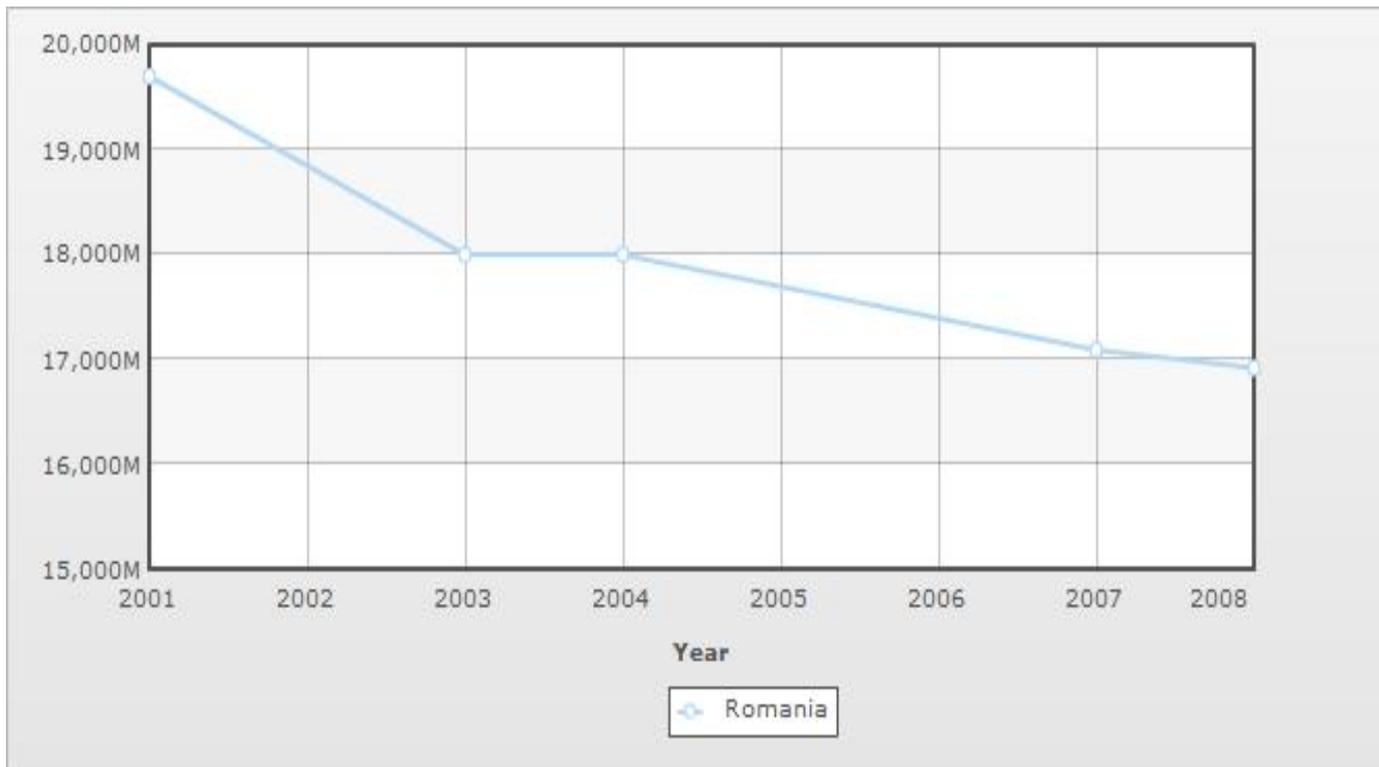
<http://www.gazpromexport.ru/en/partners/romania/>

Liam Lever, “Romania’s gas supply improves but still short in wake of cold snap”, Romania Business, 7 Feb 2012.

<http://www.romania-insider.com/romanias-gas-supply-improves-but-still-short-in-wake-of-cold-snap/48312/>

<sup>119</sup> Annual growth rate is given as 0.7% for the EU according to *GAS 2011*.

Breathing Earth.



Source: Index Mundi<sup>120</sup>

Because Romania produces more than 80 percent of its demand indigenously it has less concern about supply security. Between 2001-2009, Romanian production was between 12-12.5 bcm/y showing a slight decrease from the 2000 volume of 13.5 bcm/y.<sup>121</sup> In 2011, on the other hand, it produced 11 bcm of natural gas domestically.<sup>122</sup> Gas imports to the country flow only from Russia, that is to say, Romania is 15 percent dependent on imported gas but 100 percent dependent on Russia for its gas imports.<sup>123</sup> Gazprom will continue supplying gas to Romania until 2030, according to the long-term contracts.<sup>124</sup> Before 2009, the country was more dependent on imported natural gas but with improved technology, domestic production grew and the import dependency decreased by 50 percent.<sup>125</sup> Although not highly dependent on imports, Romania could benefit from diversifying its supplier countries as the national production is decreasing and more imports will be needed.

<sup>120</sup> Index Mundi, Website, “Economy-Natural gas consumption of Romania by year chart”.

<http://www.indexmundi.com/g/g.aspx?c=ro&v=137>

<sup>121</sup> KMPG Global Energy Institute, *op. cit.*

<sup>122</sup> BP, 2012.

<sup>123</sup> Energy Delta Institute, Energy Business School, “Romania”.

<sup>124</sup> Gazprom Export, Foreign Partners, “Romania”.

<http://www.gazpromexport.ru/en/partners/romania/>

<sup>125</sup> Energy Delta Institute, Energy Business School, “Romania”.

Romania is in a strategic position geographically. Having a shore on the Black Sea coast, it lies between the Balkans and Ukraine, hence is in the transport route of Russian gas to the Balkans and Central Europe. Romania was eager to cooperate in the Southern Gas Projects as it will both enable diversification of its natural gas imports, and provide means for its own gas to the outside markets.

In 2011, Romania has 0,1 tcm of proven natural gas reserves with a considerable decline in the reserves compared to the previous year, 2010, when it was 0,6 bcm.<sup>126</sup> This does not include unconventional resources available in the country.

There are two important basins holding unconventional gas in Romanian territory; the Pannonia-Transylvanian Basin in Hungary and Romania, and the Carpathian-Balkan Basin in Southern Romania and Bulgaria, together amounted to 0.5 tcm.<sup>127</sup> Although the country has a good profile regarding its unconventional gas reserves, due to the lack of investments and inadequate support from national and international authorities, the country is facing a serious challenge. This will result in increased dependence on imported gas supplies since domestic production will decrease.<sup>128</sup> Romania has eight underground storage facilities, with a total capacity of 3.1 bcm of natural gas.<sup>129</sup>

Because of its natural gas resources Romania historically had low dependence on imports, which is most likely to change in the coming years.<sup>130</sup> Although there are adequate supplies to meet the demand in the country, there is a lack of investment and enthusiasm nationally and internationally. On the other hand, there are unconventional gas resources that are attracting attention. If current patterns continue, the import dependence of the country is likely to increase. And in the foreseeable future, shale gas extraction does not appear likely given the EU regulations.

#### **1.5.4 Hungary**

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<sup>126</sup> BP, 2011.

BP, 2012.

<sup>127</sup> KMPG Global Energy Institute, *op. cit.*

<sup>128</sup> "For lack of investments, Romania's dependence on oil and gas will increase", Act Media, 10 May 2012. <http://actmedia.eu/energy-and-environment/for-lack-of-investments-romania-s-dependence-on-oil-and-gas-imports-will-increase/39915>

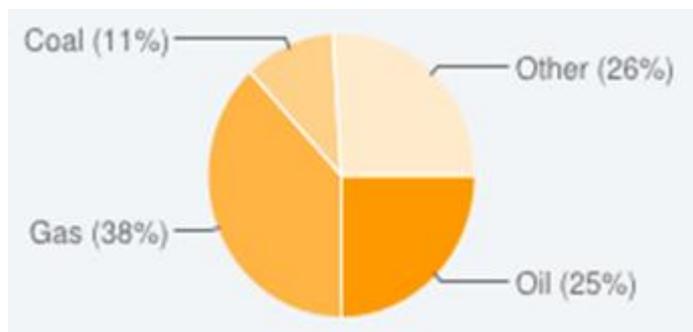
<sup>129</sup> Eurogas, 2011.

KMPG Global Energy Institute, *op. cit.*

<sup>130</sup> *Ibid.*

Hungary is located at the heart of Europe having borders with several countries including Romania, Austria, and Ukraine. The country has a population 10 million and a relatively high consumption of natural gas. While Hungary has the fourth largest share of natural gas in the total primary energy consumption after the UK, Netherlands, and Italy, it imports more than 70 percent of its gas from Russia. There is a continuous decline in the indigenous production resulting in growing dependency. Therefore, it is essential for Hungary to diversify its sources of supply as it is highly dependent on Russian supplies and its domestic production is vanishing slowly.<sup>131</sup>

Figure 1.14: Total primary energy consumption of Hungary (2010)



Source: Energy Delta Institute<sup>132</sup>

Natural gas plays an important role for the Hungarian energy market, accounting 38 percent of the primary energy consumption followed by 25 percent oil and 11 percent of coal. The consumption in Hungary was 10.2 bcm in 2011 showing a slight decrease from 10.9 bcm in 2010.<sup>133</sup> But, overall, the energy consumption in the country is in decline since 2009, due to the gas crises, consequently there is a decline in the gas consumption. However, the share of gas consumption in the total primary energy consumption is increasing while that of oil and coal is decreasing.<sup>134</sup>

The high share of gas consumption in total energy mix, the fourth biggest share among EU states, enables low degrees of CO<sub>2</sub> emission. It is 6.4 t/person in Hungary and in

<sup>131</sup> Energy Delta Institute, Energy Business School, “Hungary”.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/hungary>

<sup>132</sup> Energy Delta Institute, Energy Business School, “Hungary”.

<sup>133</sup> BP, 2012.

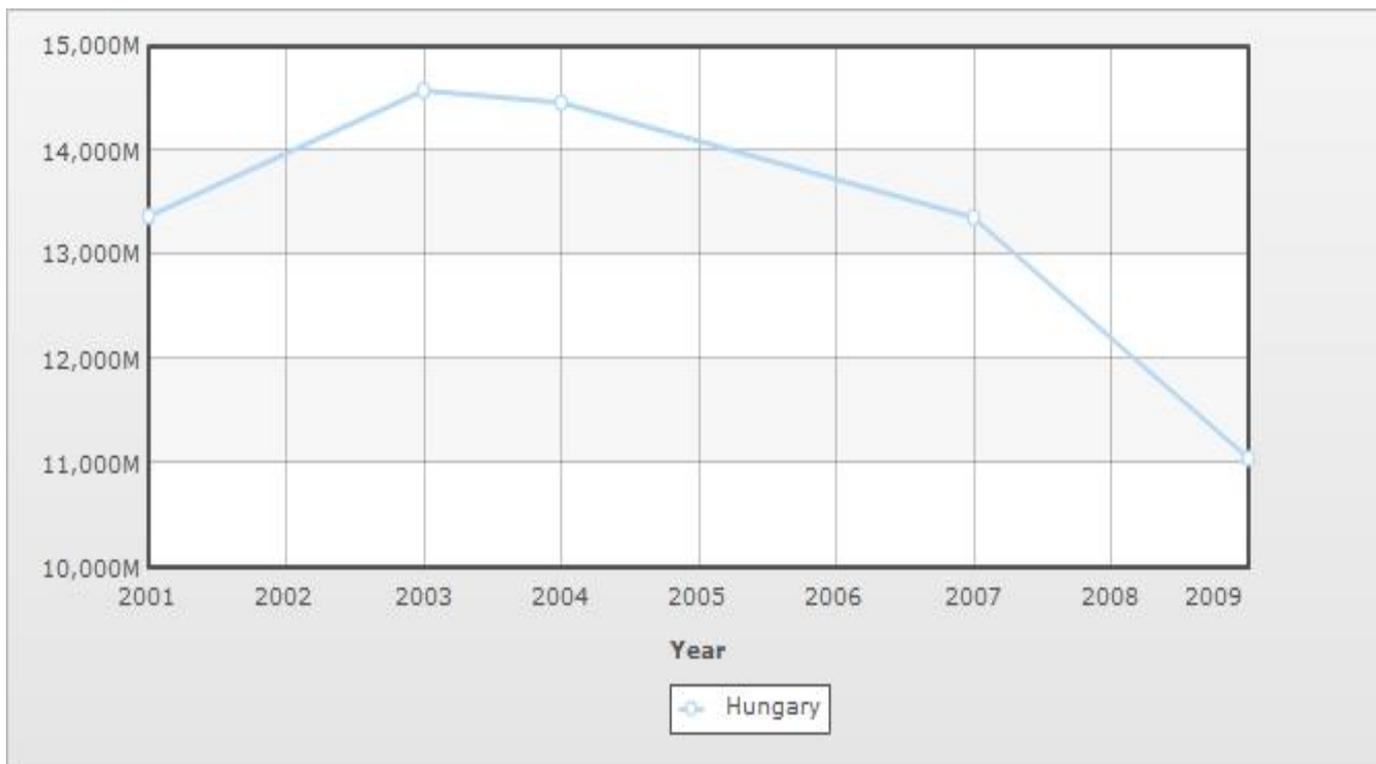
BP, 2011.

<sup>134</sup> Energy Delta Institute, Energy Business School, “Hungary”.

some of the levels its neighborhood are as follows: 9.41 t/person in Austria, 5.6 t/person in Romania, 7.59 t/person in Ukraine, 7.31 t/person in Slovakia. Considering the population and industrial activities, the emission in Hungary is on average, especially compared to the bigger states such as Germany 10.70 t/person, Italy 8.40 t/person.<sup>135</sup> Regarding other countries in its region, Hungary can be regarded as the most EU acquis compliant country when it comes to the energy and environmental regulations as well as 20-20-20 Strategies.

According to the *Hungarian National Energy Strategy 2030*, the country is expected to consume around 17 bcm of natural gas by the year 2030.<sup>136</sup> At the moment, the country can produce 24 percent of its consumption and the domestic production is in decline.<sup>137</sup> Hungary is highly dependent on gas imports from Russia; it will have to meet the additional 6 bcm from imported sources.

Figure 1.15: Natural gas consumption pattern of Hungary



Source: Index Mundi<sup>138</sup>

<sup>135</sup> Breathing Earth.

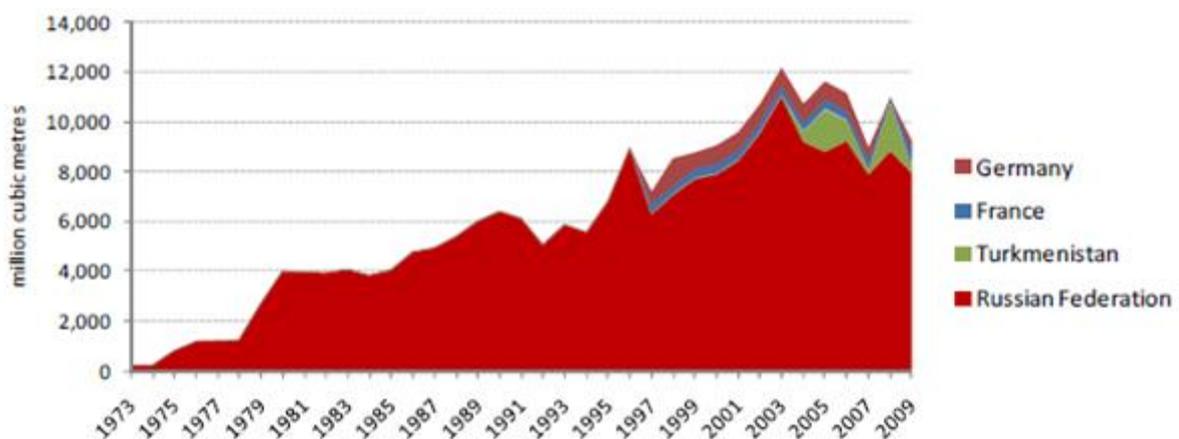
<sup>136</sup> KMPG Global Energy Institute, *op. cit.*

<sup>137</sup> Eurogas, “Natural Gas Demand and Supply, Long-term outlook to 2030”.

<sup>138</sup> Index Mundi, Website, “Economy-Natural gas consumption of Hungary by year chart”.  
<http://www.indexmundi.com/g/g.aspx?c=ro&v=137>

Hungary produced 2.8 bcm of natural gas as of 2010 and consumed 10.9 bcm. The indigenous production carried by MOL, national oil company, is in decline and likely to remain as such.<sup>139</sup> Since 1990, there has been 41 percent of decline in natural gas production.<sup>140</sup> The country supplied 70 percent of its gas imports from Russia.<sup>141</sup> In 2010, 7 bcm of gas entered into Hungarian natural gas market from Gazprom.<sup>142</sup> Gazprom is supplying to the country since 1994, and as of 1 January 2011, 200 bcm of natural gas has been supplied to Hungary by Russia.<sup>143</sup> Hungary also buys natural gas within the EU, particularly from Germany and France, though at a negligible volume.<sup>144</sup>

Figure 1.16: Natural gas imports of Hungary



Source: IEA, 2010.

Hungary has 0,095 tcm of proven gas reserves as of 2011.<sup>145</sup> In addition, it has considerable amounts of unconventional resources, nearly 3 tcm. The Hungarian government is eager to extract these resources, however, necessary pre-cautions and regulations must be initiated beforehand.<sup>146</sup> Currently, these sources cannot be utilized, hence are not counted as

<sup>139</sup> IEA, “Oil and Gas Security: Emergency Response of IEA Countries- Hungary”, 2012.

[http://www.iea.org/papers/security/hungary\\_2012.pdf](http://www.iea.org/papers/security/hungary_2012.pdf)

<sup>140</sup> OECD/IEA, “Natural Gas Information”, 2011.

<sup>141</sup> Energy Delta Institute, Energy Business School, “Hungary”.

<sup>142</sup> Eurogas, 2011.

<sup>143</sup> Gazprom Export, Foreign Partners, “Hungary”.

<http://www.gazpromexport.ru/en/partners/hungary/>

<sup>144</sup> Eurogas, 2011.

Energy Delta Institute, Energy Business School, “Romania”.

<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/romania>

<sup>145</sup> IEA, “Oil and Gas Security: Emergency Response of IEA Countries- Hungary”.

<sup>146</sup> KMPG Global Energy Institute, *op. cit.*

proven reserves. The consumption of unconventional resources do not seem possible before 2030, hence Hungary is dependency is likely to increase.

Gas storage is important for Hungary because the country has a high share of gas consumption, and, moreover, electricity is produced mainly by gas-fired plants.<sup>147</sup> Hungary has 5 gas storage facilities with a total capacity of 5.4 bcm of natural gas.<sup>148</sup> And a new capacity with a volume of 1.2 bcm is being installed in Szöreg.<sup>149</sup>

Hungary is in a strategic position in its region having borders with the Central European and Balkan countries. There are three interconnectors in the country, Romanian, Croatian and Slovakian. These transmit 2.3 bcm/y, 7.0 bcm/y and 2.3 bcm/y, respectively. Thanks to these interconnectors, Hungary plays a significant role in the transportation of natural gas through its territory.<sup>150</sup>

Hungary is in a strategic position for the Southern Gas Corridor project of the European Union. As well as Romania, Hungary also pays significant attention to the development of the Southern Gas Corridor and transportation of the natural gas from the Caspian basin, and the Middle East. In this regard, the country signed the initial documents with Gazprom for the South Stream pipeline, which will carry Russian gas to the SEE markets.

To conclude, Hungary is a significant natural gas consuming country among the EU states. Its natural gas consumption is one the highest in its neighborhood and the consumption trend is likely to increase. On the other hand, as it is the case for most of the EU and SEE states, the domestic production is in decline. The only possible solution to increase indigenous production is unconventional resources which, however, cannot be utilized at the moment. Dependent on imports particularly from Russia, Hungary wants to diversify its sources and supports projects that will supply additional gas to the SEE region. If the projects could be realized and its unconventional resources utilized, Hungary might find relief in the long term.

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<sup>147</sup> IEA, “Oil and Gas Security: Emergency Response of IEA Countries- Hungary”.

<sup>148</sup> Eurogas, 2011.

<sup>149</sup> *Ibid.*

<sup>150</sup> Tamas Korosi, “Natural Gas System in Hungary”, United Nations, 18-19 Jan 2011.

[http://www.unece.org/fileadmin/DAM/energy/se/pp/wpgas/21wpg\\_2011/19Jan2010/Hun\\_Korosi.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pp/wpgas/21wpg_2011/19Jan2010/Hun_Korosi.pdf)

## **1.6 Conclusion**

Natural gas as an energy resource means much to the EU, especially for the countries in the South East European region. The EU's natural gas consumption is increasing rapidly. On the other hand, its natural gas production is decreasing and the proven natural gas reserves in the EU are diminishing steadily. In order to meet the growing demand, the EU is subject to import natural gas from outside sources, and it is currently importing significant amounts from Russia. Its import dependence is rising, endangering the EU's energy security.

The issue of energy security became important during the 1973 and 1979 OPEC oil crises and emphasized once more in 2006 and 2009 Russian gas crises. After both shocks, the EU initiated several policy objectives in order to regulate its energy market and form a coherent energy policy. The success and the outcomes of the policies have not yet been felt.

Since 1999, the EU has initiated policy objectives in order to cope with the problem of energy security. The issue has become ever more important after the 2004 Eastern enlargement. The countries then acceding to the EU were heavily reliant on the natural gas imports, and Russian domination in their gas markets are easy to be realized. This uneasy situation led the EU to consider EU-wide energy security.

After Russian gas crises, the danger of high dependence of the EU on Russian sources became evident. In order to ensure energy security, and the supply security; the diversification of supplies and the supply routes became even more important. In this respect, the Southern Gas Corridor project gained broad support among the EU member states. The aim of the project is to carry Caspian, potential Middle Eastern and North African gas to Europe. Considering Russian dependence on the EU market, the most important rationale behind the Southern Gas Corridor was 'to bring gas from non-Russian supplies via non-Russian territories'. At this point, the transportation routes for the alternative gas supplies gain particular importance.

In this respect, four different countries and their consumption-production, import-export patterns, and attitudes toward new sources of supply and new agreements especially relating the Southern Gas Corridor initiatives are analyzed, and it is understood that, all of these countries representing their respective regions, are supporting the Southern Gas Corridor project. Moreover, those countries are being heavily involved in the initiation of the

South Stream Pipeline a project launched by Russia, which threatens the EU's aim to diversify its sources of supply.

Apart from Romania, and to an extent Hungary, there are no significant reserves of natural gas in the SEE region, and the current reserves are being depleted.<sup>151</sup> The countries in this region, being more than 50 percent dependent on Russian gas and nearly 100 percent dependent on natural gas imports, have adopted diversification policies. It is very important for this region to have supplies of natural gas other than from Russia, because in crisis situations, it is those countries that suffer more than the others in the EU. During the gas crises of 2006 and 2009, the peoples in the SEE region froze from cold when the Western countries did not experience similar hardship either because of their individual contracts with Russia or because they are not dependent on Russian gas imports.<sup>152</sup>

The member states in the EU have individual interests and individual contracts of natural gas with different supplier countries. Overall, the dependence on Russian gas is high and especially in the Central Eastern and South East European countries this dependence may reach 100 percent. The political initiatives in the EU aim to reach alternative suppliers and diversify the supplies as much as possible. The world's most important natural gas reserves are located around Europe and the next chapter focuses on these reserves.

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<sup>151</sup> European Parliament, "Parliamentarian Questions".  
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+E-2005-2475+0+DOC+XML+V0//EN>

<sup>152</sup> Alexandar Kovacevic, "The Impact of the Russia-Ukraine Gas Crises in South Eastern Europe", Oxford Institute for Energy Studies, March 2009.  
<http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG29-TheImpactoftheRussiaUkrainianCrisisinSouthEasternEurope-AleksandarKovacevic-2009.pdf>

## CHAPTER TWO

Europe faces several challenges regarding its energy security. As noted in the previous chapter, for the EU the most important and the urgent aspect is supply security. This chapter focuses on the diversification of supplies and the next chapter will explore the new supply routes and transportation options.

In respect to supply security, Europe has to cope with several challenges. Some of them can be listed as follows: (a) competition with the major emerging economies notably China and India; (b) volatility in energy resource producing countries such as the Middle East; (c) a fragmented European energy market, lack of a coherent energy policy, and divergent interests among EU member states which makes it hard to take decisions related to energy at the EU level; and (d) increasing shift from other fossil fuels to natural gas in order to “address the climate change policy.”<sup>153</sup> These factors are all important for the EU to achieve the supply security.

As noted, the European Union is becoming ever more dependent on imported natural gas. Currently, Russia supplies 34 percent of all EU natural gas imports, and if production trend continues to decline, its dependence on outside sources is likely to grow.<sup>154</sup> While some countries in the EU do not have problems regarding Russian dependence, some of them are more vulnerable to potential risks hence giving more importance towards diversification of the supplies.

In order to avoid dependence on a single supplier, the EU sought to take steps to ensure its energy security through diversification of the supplies and the creation of a unique and coherent internal energy market. The complete EU-wide energy market could only be achieved with a coherent policy where every member state is obliged to cooperate. The diverging interests among the member states and the intergovernmental structure of the EU prevent achieving a common energy policy serving for one aim for all. To be successful in having a single energy market, the EU first needs to revise its policy objectives and eliminate the individual preferences among the members.

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<sup>153</sup>Ratner et al., *op. cit.*

<sup>154</sup>Eurogas, 2011.

The bigger EU countries, such as Germany, France, the UK, Italy, and Spain, and in addition, the Netherlands, Belgium, Portugal have no problems with dependence on Russia, while the smaller countries such as Hungary, Bulgaria, Romania, Greece, Croatia, Slovakia, Slovenia, Poland, Czech Republic and many others are for dependent on the gas coming from Russia.<sup>155</sup> There are several reasons why these countries do not have problems with their dependency on Russia. For example, Germany has its own direct pipeline connection from Russia, the Nord Stream, with a capacity of 27.5 bcm of natural gas flowing since November 2011. The second connection from Russia to Germany, Nord Stream II, is being build which is expected to become operational at the end of 2012 with the same capacity of 27.5 bcm of natural gas.<sup>156</sup> The UK and the Netherlands produce a considerable amount hence are self-sufficient in domestic consumption, while Italy and Spain relies on LNG imports.<sup>157</sup> On the other hand, France is heavily reliant on nuclear energy; gas accounts for 16 percent of its total consumption. France imports LNG from Algeria, Qatar, Egypt and significant amount of gas is imported from Norway.<sup>158</sup> Norway is a European country although not an EU member, and a reliable supplier for most of the states in the EU.<sup>159</sup> Nevertheless, in order to achieve a Union-wide energy security, the concept of diversification is highly important in the EU, especially for the SEE region.

As noted, the most important project proposed by the EU and supported strongly by the U.S. itself to diversify its natural gas suppliers in particular to the SEE region, is the Southern Corridor Project. This project aims to reach the gas reserves in the Caspian basin. In addition, there are projects aiming to carry Middle Eastern Gulf and Egyptian sources. The Southern Corridor initiatives and its flagship project Nabucco, remain suspended as further steps cannot be taken due to number of reasons. First of all, as it was the case in Nabucco project, the suppliers are unknown, what is known is that there is an extractable amount of gas in Azerbaijan. However, the maximum amount of gas that could be transported to the EU from the Caspian region, Azerbaijan, at the moment is 10 bcm which is not significant for Western Europe but means a great deal for the smaller countries in South East Europe. Other

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<sup>155</sup> *Ibid.*

<sup>156</sup> Nord Stream, Website, "The Pipeline".

<http://www.nord-stream.com/pipeline/>

<sup>157</sup> Eurogas, 2011.

<sup>158</sup> *Ibid.*

Energy Delta Institute, Energy Bussiness School, "France".

<http://www.energydelta.org/mainmenu/energy-knowledge/interactive-world-gas-map/europe/france>

<sup>159</sup> Statoil, Website, "A reliable gas supplier".

[http://www.statoil.com/en/OurOperations/pipelines/Downloads/Natural\\_gas\\_pdf.pdf](http://www.statoil.com/en/OurOperations/pipelines/Downloads/Natural_gas_pdf.pdf)

than Azerbaijan there are no supply alternatives which can be utilized immediately. However, as it is quite clear from the policies of the EU as well as initiatives by the national governments in the EU that, the need to diversify Russian supplies is high on the agendas. Therefore, in the medium to long term, what can be done to supply the EU market with non-Russian resource coming from non-Russian territories in LNG or in gas form will be discussed in this chapter.

It is assumed that there are sufficient reserves of natural gas situated at a favorable distance from Europe. Of the 208.4 tcm recoverable natural gas reserves in the world, 75 percent are located in Europe's neighborhood; capable of being transmitted by pipeline.<sup>160</sup> These countries include Russia, and the countries in the Caspian, North African, West African, and Middle Eastern and Gulf region.<sup>161</sup> These supply markets will be analyzed as well as other routes and suppliers will be discussed. In this chapter, not only the regions which are geographically close to Europe but also other relevant countries are examined.

The closest and the biggest natural gas market in Europe's neighborhood is Russia. However, EU officials are increasingly concerned against on Russian gas. The highest volumes of Russian gas flows into the EU via Ukraine or Belarus which makes market unstable. Any dispute between Moscow and Kyiv or Minsk may result in interruptions in the gas flow, as was experienced in 2006 and 2009. In particular, the South East European countries are highly vulnerable to these fluctuations as their markets are highly dependent on Russian gas imports.

Russia strongly opposes any initiative regarding the diversification of the suppliers to the EU, particularly Southern Gas Corridor project, as it will undermine its importance in the EU.<sup>162</sup> Russia proposes its own plans in order to tie the European market to Russian exports. In this respect, the Nord Stream pipeline, forming a direct link between Russia and Germany and the South Stream pipeline project connecting Russia, Bulgaria and Hungary have been initiated by Russia. Russia has demonstrated that it is unwilling to leave the European market to other suppliers, and wishes to increase the EU's dependence on Gazprom. In this respect, it is the purpose of this study to examine non-Russian potential suppliers to the EU such as the

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<sup>160</sup> BP, 2012.

<sup>161</sup> Eurogas, "Natural Gas Demand and Supply, Long-term outlook to 2030".

<sup>162</sup> "The Next Stage of Russia's Resurgence: The Caucasus States", *Stratfor*, 14 Feb 2012.  
<http://www.eurasianet.org/node/65000>

Middle East, North Africa, and Caspian regions where 70 percent of the global gas is produced (by Qatar, Russia and the Caspian Sea combined)<sup>163</sup> and assess the possibility of these resources to be transported to the Union.

## **2.1 Background Information: The formations of natural gas**

Before analyzing the potential natural gas supply markets for the EU, an overall assessment about natural gas, its forms and types according to the extraction process will be made in order to better comprehend the natural gas market dynamics of the countries.

According to the drilling methods, the natural gas is classified into two: conventional or unconventional resources. The conventional resources are extracted and produced with the current technology and the know-how are known and the proven reserves of the conventional resources are already made. They can be found in different geological settings and over a wide range of depths temperature and pressures.<sup>164</sup> The conventional gas production accounts 85 percent of total gas production today. Unconventional gas resources can be found in three different formations; coal bed methane, shale gas and tight gas and gas hydrates. They are difficult to extract. Currently in some places like Canada, and the U.S., shale gas discoveries are made and the technology to develop these resources is improved, leading to the extraction of these resources in those regions. However, it is not viable in all countries, as it is expensive, harmful to the environment and needs a good cost-benefit analysis before the extraction.

### **2.1.1 Unconventional resources**

Unconventional gas resources are classified into three; tight gas, shale gas and coalbed methane (CBM). Tight gas formations are “generally defined as having permeability” which makes it harder to extract. The gas from tight sands has been produced in the U.S. for over 40 years and new technologies are introduced in order to increase the productivity.<sup>165</sup>

Shale gas, on the other hand, is found commonly in rock formations in rich organic matter. It is known for over 200 years but not considered to be economic since it requires high investment to extract. What is achieved after extraction is relatively insignificant. New

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<sup>163</sup> OECD/ IEA, *WEO 2011*, pp. 69.

<sup>164</sup> OECD/IEA, *GAS 2011*, pp. 50.

<sup>165</sup> *Ibid.*

technologies such as multi stage hydraulic fracturing and horizontal drilling are used together in order to achieve economically viable production rates. The maximum amount of shale gas volumes are estimates as 204 tcm, coal bed methane as 118 tcm and tight gas as 84 tcm.

CBM is the name given to natural gas to be found in coal beds, trapped in fractures in the surface of the coal. Since 1980s it is commercially produced. Before that, it has been “undertaken to make mines safer.”<sup>166</sup> Today, Canada, China and Australia produce CBMs which will increase during the Outlook period.

According to IEA, there is 400 tcm of recoverable unconventional gas reserves in the world and it is equal to 120 years of current production. When unconventional and conventional recoverable sources are combined, it is equal to 250 years of current production.

Table 2.1: Remaining recoverable resources of gas and indicative production costs by type and region, January 2010.

	Conventional		Tight Gas		Shale Gas		CBM	
	tcm	\$/MBtu	tcm	\$/MBtu	tcm	\$/MBtu	tcm	\$/MBtu
E. Europe & Eurasia	136	2-6	11	3-7			83	3-6
Middle East	116	2-7	9	4-8	14			
Asia/Pacific	33	4-8	20	4-8	51		12	3-8
OECD North America	45	3-9	16	3-7	55	3-7	21	3-8
Latin America	23	3-8	15	3-7	35			
Africa	28	3-7	9		29			
OECD Europe	22	4-9			16			
<b>World</b>	<b>404</b>	<b>2-9</b>	<b>84</b>	<b>3-8</b>	<b>204</b>	<b>3-7</b>	<b>118</b>	<b>3-8</b>

Source: *GAS 2011*.

Western Europe has 29 tcm of unconventional out of which 10 tcm is tight gas, 4 tcm is coal bed methane and 14 tcm is shale gas which is equal to 25 years of consumption for the EU if the current consumption pattern is conveyed.<sup>167</sup>

Majority of unconventional supplies are in Australia, China, and North America, accounting to 40 percent of the global unconventional reserves. The substantial developments

<sup>166</sup> *Ibid.*, pp. 51.

<sup>167</sup> Christie, *op. cit.*

in unconventional resource extraction and production are expected to gain momentum after 2020s.<sup>168</sup>

Unconventional resources also exist in the European territory as an alternative energy resource. The shale and the tight gas resources are being developed and extracted in several parts of the world such as the North America, Canada, the U.S. and China. On the other hand, while the EU countries such as Romania, Hungary, and Poland have unconventional gas reserves they cannot utilize it at the moment. The extraction of unconventional gas is considered too seriously to harm the environment, therefore, in contradiction with the EU targets to achieve a sustainable environment and reducing the CO<sub>2</sub> emissions.<sup>169</sup>

### **2.1.2 Environmental issues**

The basic argument for the damage caused to the environment by unconventional resource production is that hydraulic manufacturing, in order to extract unconventional reserves, requires large volumes of water to “fracture the rock and on the potential contamination of fresh water aquifers by the fluid injected into shale gas formations.”<sup>170</sup> This process releases more CH<sub>4</sub> than the conventional gas process. Nevertheless, the difference is thought to affect the total emissions not that much, only slightly increases compared to conventional gas.<sup>171</sup>

The concerns regarding the effects of unconventional gas on the environment are not yet regulated because of the uncertainties regarding the evaluation. Further research and analysis needed before initiating a legislative framework. In response to the public concern some states in the U.S. and Canada have placed moratoriums on shale gas exploration and the French Parliament voted to ban hydraulic fracturing in May 2010. The regulatory issues are rapidly evolving though not yet fully articulated. It is expected for most of the countries to form a framework for legislative regulations by 2020, and the developments are expected to gain speed afterwards.

## **2.2 Liquefied Natural Gas (LNG)**

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<sup>168</sup> OECD/IEA, *GAS 2011*, pp. 26.

<sup>169</sup> Ryan W. Lijdsman, “Unconventional Gas in Ukraine: Boom or Bust,” US-Ukraine Foundation. <http://www.usukraine.org/bizlinks/Reports/UnconventionalGasinUkraineBoomorBust.pdf>

<sup>170</sup> OECD/IEA, *GAS 2011*, pp. 61-62.

<sup>171</sup> *Ibid.*, pp. 61-62.

After the extraction process, natural gas can be transported in two different forms; it is either in natural gas form which is transmitted via pipelines, or in Liquefied Natural Gas (LNG) form, which is transported via tankers. In order to convert a source into LNG form, the natural gas is first liquefied and then filled into special tankers at a very low temperature of - 162 °C.<sup>172</sup>

### 2.2.1. LNG in the world

LNG trade is gaining importance globally and already grew by 9.4 percent growth in 2011 compared to 2010.<sup>173</sup> In 2011, 240.8 mtoe of LNG has been imported, the biggest market being Asia with 63 percent share in the global energy demand. The global rise of LNG trade and its increasing significance is due to three major factors: first of all the Fukushima disaster encouraged Japan to fulfill its energy deficit from imported natural gas in LNG forms. Japan is currently the leading country in importing LNG. Together with Japan, Korea and Taiwan(JKT), account for the 52 percent of the global, 84 percent of Asia-Pacific LNG trade.<sup>174</sup> Secondly, European demand for imported gas has increased. The reason for that is because gas supplies in the North Sea have shrunk and, also, following the Fukushima disaster, Germany, the highest energy consuming country in the EU, has announced that it will cease proclaiming nuclear energy. Thirdly, the hunger of major emerging economies like India and China for energy has been growing steadily and fast, and in order to meet the demand they look forward to LNG imports as well as other emerging economies in Latin America and the Middle East and South East Asia. It is expected that by 2030, together with India, China will represent 32 percent of Asian LNG trade. In 2010, India imported 63 bcm of LNG and this figure is expected to rise to 88 bcm in 2016 and 170 bcm for 2030.<sup>175</sup>

Japan has been by far the most unstable LNG consumer especially, after the nuclear crises of 2011. According to the base case scenario of the Eurasia Group, even if the nuclear

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<sup>172</sup>Mitsubishi Heavy Industries Ltd, Website.

<http://www.mhi.co.jp/en/index.html>

<sup>173</sup> Jean-Yves Robin and Vincent Demoury, “The LNG Industry”, International Group of Liquefied Natural Gas Importers, 2011.

[http://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/gnl\\_2011\\_giignl.pdf](http://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/gnl_2011_giignl.pdf)

<sup>174</sup>“LNG: Security of Gas Supply Will Matter in 2012”, Natural Gas for Europe, 17 May 2012.

<http://www.naturalgaseurope.com/lng-security-of-gas-supply>

<sup>175</sup>*Ibid.*

Guy Chazan, “LNG demand set to double over the next decade”, *Financial Times*, 12 Mar 2012.

[http://www.ft.com/intl/cms/s/3f445f34-6c58-11e1-8c9d-00144feab49a,Authorised=false.html?\\_i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F3f445f34-6c58-11e1-8c9d-00144feab49a.html&\\_i\\_referer=#axzz1wKcq95u](http://www.ft.com/intl/cms/s/3f445f34-6c58-11e1-8c9d-00144feab49a,Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F3f445f34-6c58-11e1-8c9d-00144feab49a.html&_i_referer=#axzz1wKcq95u)

reactors will be online gradually, the demand for LNG will remain high through 2012 and beyond. LNG imports are expected to be higher than the 2011 levels and reach a record 87 mtoe as the country will favor buying at large quantities in case no reactor will restart. If restart occurs in nuclear energy, which is unlikely in the near future, then LNG markets may be reshaped in the short-term and the surplus of LNG that was used to be imported by Japan will be directed to other markets or bought and resold by Japan itself.<sup>176</sup>

In addition to these factors, another important factor for the increasing significance of the global LNG trade is its getting cheaper after the extraction of unconventional gas resources in the U.S. which resulted in a glut of gas supplies. Formerly, the U.S. was importing LNG from other markets at considerable amounts. With this development, these LNG shipments are redirected to the other parts of the world. Moreover, the U.S. started LNG export from its terminal called “Sabine Pass” to “take advantage of cheap natural gas from the boom in US shale” which was originally built in order to import LNG in 2005.<sup>177</sup> Thanks to this surplus of gas supplies in the U.S., prices fell dramatically. Especially at the U.S. terminal, Sabine Pass, it is possible to buy the gas at \$2 per mmbtu. This price is nearly 9 times higher in European markets. Besides, there is another great opportunity for the consumers; contrary to long-term take-or-pay contracts, LNG from Sabine Pass can be purchased at cheaper spot prices. The consumers can buy as much as they need and pay accordingly.<sup>178</sup> Charif Souki, the chief executive of Cheniere Energy which has been developing the Sabine Pass project, has said that “... this is the beginning. It is the dawn of the global significance of North America as a gas exporter.”<sup>179</sup> Both Korea and India have already secured their LNG purchases from Sabine Pass.<sup>180</sup>

Apart from relatively fresh LNG from the U.S., there is a growing demand for Russian gas by Asian consumers. Moscow still pursues its policy of long-term contracts with China, but other Asian consumers beckon as well. The new project, Vladivostok LNG being built; it will have an import capacity of 10 mtoe/y. The first shipment from this terminal is

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<sup>176</sup> “LNG: Security of Gas Supply Will Matter in 2012”. *op. cit.*

<sup>177</sup> Ed Crooks<sup>a</sup>, “LNG plant to be the first in U.S. for 40 years”, *FinancialTimes*, 17 Apr 2012.

[http://www.ft.com/intl/cms/s/714be024-88a0-11e1-9b8d-00144feab49a.Authorised=false.html?\\_i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F714be024-88a0-11e1-9b8d-00144feab49a.html&\\_i\\_referer=#axzz1wKcq95u](http://www.ft.com/intl/cms/s/714be024-88a0-11e1-9b8d-00144feab49a.Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F714be024-88a0-11e1-9b8d-00144feab49a.html&_i_referer=#axzz1wKcq95u)

<sup>178</sup> *Ibid.*

<sup>179</sup> *Ibid.*

<sup>180</sup> “LNG: Security of Gas Supply Will Matter in 2012”, *op. cit.*

expected to be online in 2017.<sup>181</sup> With this current development, Russia turns its face more to the East than West and reduces its dependence on European market. Unlike the U.S., Russia is in favor of a long-term contract policy; therefore, it is most likely that with the Asian customers it will also enter into long-term agreements. This can enable price discounts for the EU; but Europe has to find other supplies of natural gas in order to keep the bargaining chip and the power to stake with Gazprom.

Contrary to the claims of cheap natural gas, according to a recent survey published in *Natural Gas for Europe*, LNG prices are likely to rise in the second half of 2012 because of the decrease in the volumes of fresh LNG sources coming into the market. According to this survey, if the nuclear crises in Japan cannot be solved, it will be in need of extra LNG sources. On the other hand, IEA expects a growth in LNG suppliers in the medium term with the introduction of Australia and China into LNG market.<sup>182</sup> Secondly, the trend in the Arab countries, that is the Arab Spring, may affect Algerian and Egyptian LNG supplies. Thirdly, if Iran continues to insist on blockading the Strait of Hormuz, it would have a downwards effect on the 30 percent of global LNG trade. Lastly, the attacks and sabotage have increased on Yemen's natural gas infrastructure which suggests that 6.7 mtoe/y of LNG may become barely reliable.<sup>183</sup>

### 2.2.2 LNG in Europe

LNG is important for the EU as it contributes to the EU policies of diversification, and competition as stated in *Green Paper 2002* document that “geographical diversification of the suppliers would appear desirable ... particularly in LNG.”<sup>184</sup> Currently, 24 percent of the natural gas supplies are in LNG form and it is expected to increase up to 50 percent after the current developments of shale gas and the U.S. gas glut.<sup>185</sup> Some countries in the EU are building or expanding their LNG import terminals and increase their capacities for import and storage.<sup>186</sup> The developing LNG terminals will also contribute to the natural gas supply security of the countries in the Western Balkans such as Croatia and Greece and some Central

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<sup>181</sup> *Ibid.*

<sup>182</sup> OECD/IEA, *GAS 2011*.

<sup>183</sup> “LNG: Security of Gas Supply Will Matter in 2012”, *op. cit.*

<sup>184</sup> John Roberts, “The Turkish Gate: Energy Transit and Security Issues”, EU-Turkey Working Papers, CEPS, No: 11, Oct 2004.

[http://aei.pitt.edu/6768/1/1166\\_11.pdf](http://aei.pitt.edu/6768/1/1166_11.pdf)

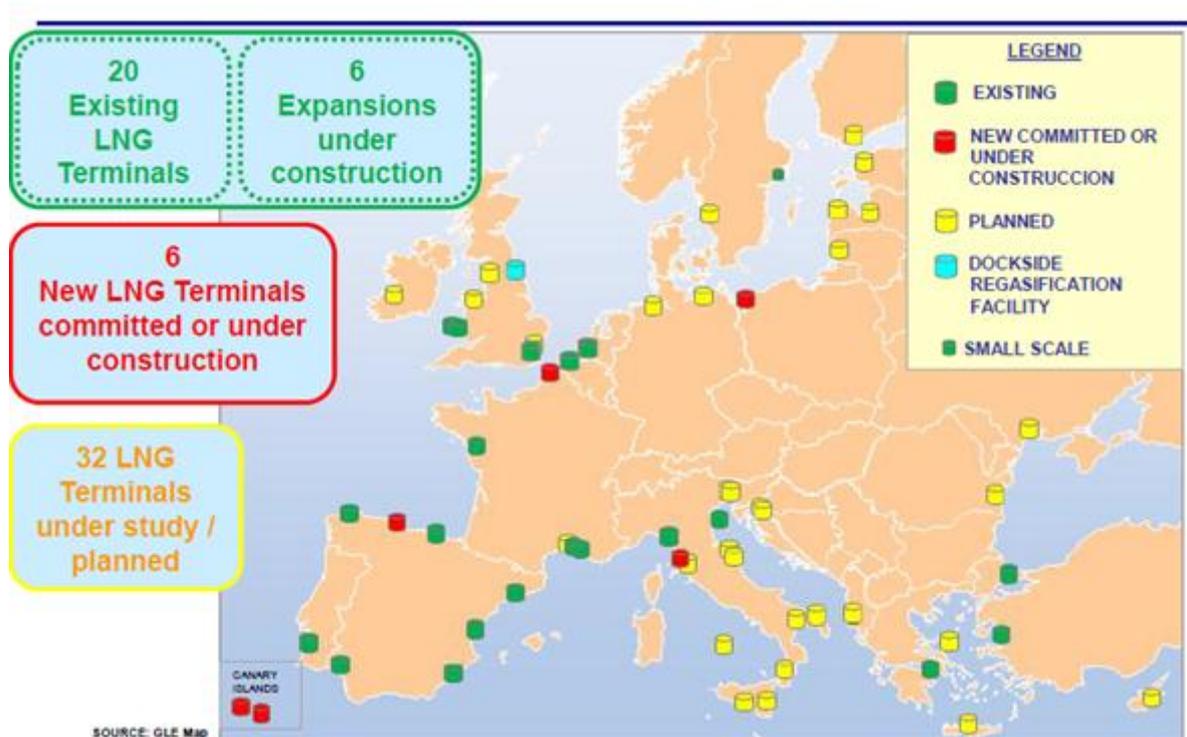
<sup>185</sup> Crooks<sup>a</sup>, *op. cit.*

<sup>186</sup> Ratner et al., *op. cit.*

Eastern countries such as Romania.<sup>187</sup> Currently there are 20 LNG terminals that are operating in the EU. Six terminals are under expansion activities, while there are six more under construction. Apart from these, there are 32 LNG terminals under plan and/or study.

The leading country for LNG imports in the EU is Spain followed by Portugal and France. As mentioned above, the interconnector between France and Spain is small and not fully functioning. Therefore, although large amounts of LNG are imported in the southern region, it has no benefit for the rest of the countries in Europe.

Map 2.1: LNG terminals in Europe



Source: GLE.<sup>188</sup>

Currently EU supplies of LNG come from Algeria, Egypt, Oman and Qatar. The recent developments in shale gas also affected LNG trade in the U.S. There are various LNG projects and, if they are all utilized, the U.S. can be the second largest LNG exporter after

<sup>187</sup>“First CEER workshop on access to European LNG terminals”, GIE, 6 Sept 2011. [http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat\\_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals](http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals)

<sup>188</sup> Gas LNG Europe (GLE), “LNG Terminals in Europe”. [http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat\\_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals](http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals)

Qatar.<sup>189</sup> Whether or not the EU can benefit from that is a mystery; however, if it does, then it would mean a significant increase in natural gas supplies to the EU.

For the EU, not only the volumes but also the prices of the U.S.'s LNG exports are important. Normally, the price of the natural gas is indexed to oil price and sold with long-term contracts. The U.S.'s LNG supplies are sold at spot prices, and delinked with oil price, therefore, much cheaper than the global price. As mentioned, LNG could be obtained from the U.S. at \$7-8 mmbtu at the border, which is originally \$2 at Sabine Pass, but the price increases when it comes to export. Normally, countries buy LNG at minimum cost of \$13.<sup>190</sup>

### 2.3 The Global Outlook for Natural Gas Consumption

The demand for natural gas in the world will increase by 54 percent and reach 4.750 bcm (4.7 tcm) in 2035.<sup>191</sup> In order to meet this growth in demand, the current production should be increased by 1.8 tcm, which is equal to three times what Russia produces today.<sup>192</sup> Energy Information Administration's Golden Age of Gas Scenario (GAS) reveals that the global demand for natural gas will be met comfortably by 2035 as the world production will increase from 3.3 tcm to 5.1 tcm by 2035, which is more than the double of the volume in 2000. This considerable increase in the global production will be mainly thanks to the extraction of the unconventional gas production, which will increase from 12 percent to 25 percent by 2035.<sup>193</sup>

Table 2.2: Natural gas production by region according to the GAS (bcm)

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<sup>189</sup>Ratner et al., *op. cit.*, pp. 26.

<sup>190</sup> Ed Crooks<sup>b</sup>, "Exports of US energy wins final approval", *Financial Times*, 17 Apr 2012.

[http://www.ft.com/intl/cms/s/d3411cca-8816-11e1-8a47-00144feab49a.Authorised=false.html?\\_i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd3411cca-8816-11e1-8a47-00144feab49a.html&\\_i\\_referer=#axzz1wKcqx95u](http://www.ft.com/intl/cms/s/d3411cca-8816-11e1-8a47-00144feab49a.Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd3411cca-8816-11e1-8a47-00144feab49a.html&_i_referer=#axzz1wKcqx95u)

<sup>191</sup>OECD/ IEA, *WEO* 2011, pp. 156.

<sup>192</sup>OECD/IEA, *GAS 2011*, pp. 13.

<sup>193</sup>*Ibid.*, pp. 25.

	2008	2015	2020	2025	2030	2035	2008-2035*	Change vs. NPS 2035**
<b>OECD</b>	<b>1 157</b>	<b>1 175</b>	<b>1 237</b>	<b>1 280</b>	<b>1 343</b>	<b>1 404</b>	<b>0.7%</b>	<b>216</b>
North America	797	805	837	891	961	1 035	1.0%	189
<i>Canada</i>	175	149	166	184	189	192	0.3%	18
<i>United States</i>	575	608	618	647	709	779	1.1%	173
Europe	307	281	270	250	232	213	-1.4%	6
<i>Norway</i>	102	106	114	123	128	127	0.8%	5
Pacific	53	90	130	139	149	156	4.1%	21
<i>Australia</i>	45	84	126	136	147	155	4.7%	21
<b>Non-OECD</b>	<b>2 010</b>	<b>2 509</b>	<b>2 782</b>	<b>3 104</b>	<b>3 435</b>	<b>3 728</b>	<b>2.3%</b>	<b>381</b>
E. Europe / Eurasia	886	967	1 019	1 136	1 203	1 257	1.3%	80
<i>Russia</i>	662	706	720	801	842	881	1.1%	67
<i>Turkmenistan</i>	71	83	104	116	127	136	2.4%	8
Asia	376	512	604	673	748	823	2.9%	170
<i>China</i>	80	137	185	222	264	303	5.0%	119
<i>India</i>	32	67	88	102	119	135	5.5%	34
<i>Indonesia</i>	74	87	95	102	109	119	1.8%	9
Middle East	393	550	594	657	793	917	3.2%	116
<i>Iran</i>	130	143	154	179	226	279	2.9%	44
<i>Qatar</i>	78	166	182	197	238	260	4.5%	35
<i>Saudi Arabia</i>	74	95	100	107	125	139	2.3%	15
Africa	207	288	331	386	415	438	2.8%	3
<i>Algeria</i>	82	121	136	156	163	168	2.7%	6
<i>Nigeria</i>	32	42	57	79	102	119	5.0%	6
Latin America	148	193	233	253	276	292	2.6%	12
<b>World</b>	<b>3 167</b>	<b>3 685</b>	<b>4 019</b>	<b>4 384</b>	<b>4 778</b>	<b>5 132</b>	<b>1.8%</b>	<b>597</b>
<i>European Union</i>	<i>216</i>	<i>185</i>	<i>165</i>	<i>136</i>	<i>113</i>	<i>93</i>	<i>-3.1%</i>	<i>0</i>

\*Compound average annual growth rate.

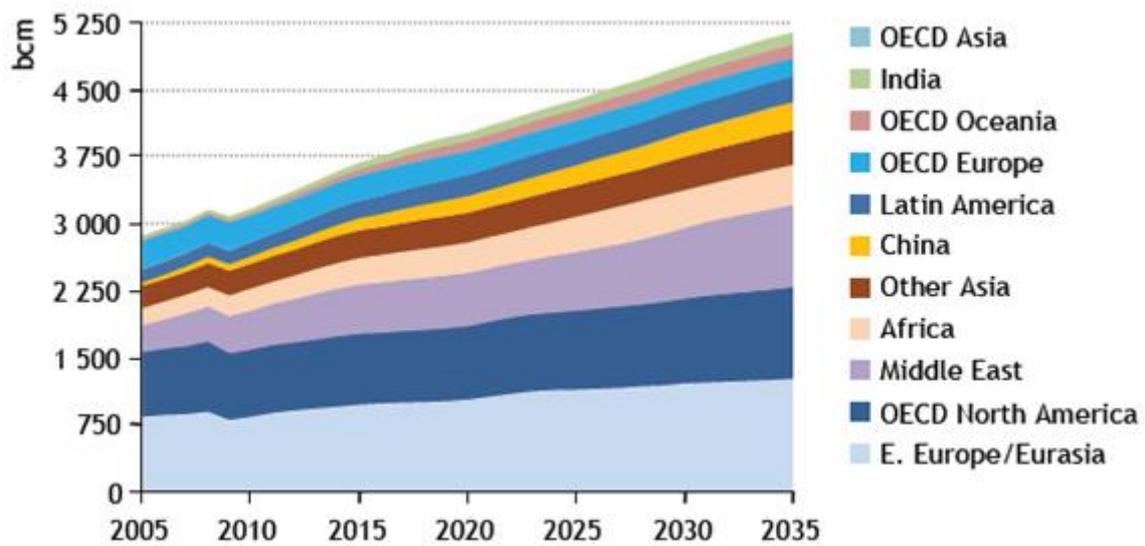
\*\*NPS is New Policies Scenario

Source: GAS 2011.

A global outlook for the future of the energy markets given by the GAS foresees the natural gas trade to raise around 620 bcm accounting 1.5 times of 2010 and split evenly between LNG and pipeline infrastructures. The leading emerging economies such as China and India will take their places at the heart of the natural gas trade. Although China will be among the major producers of unconventional gas, it will not be adequate to meet the growing demand, and hence the country will keep on exporting more natural gas via pipelines

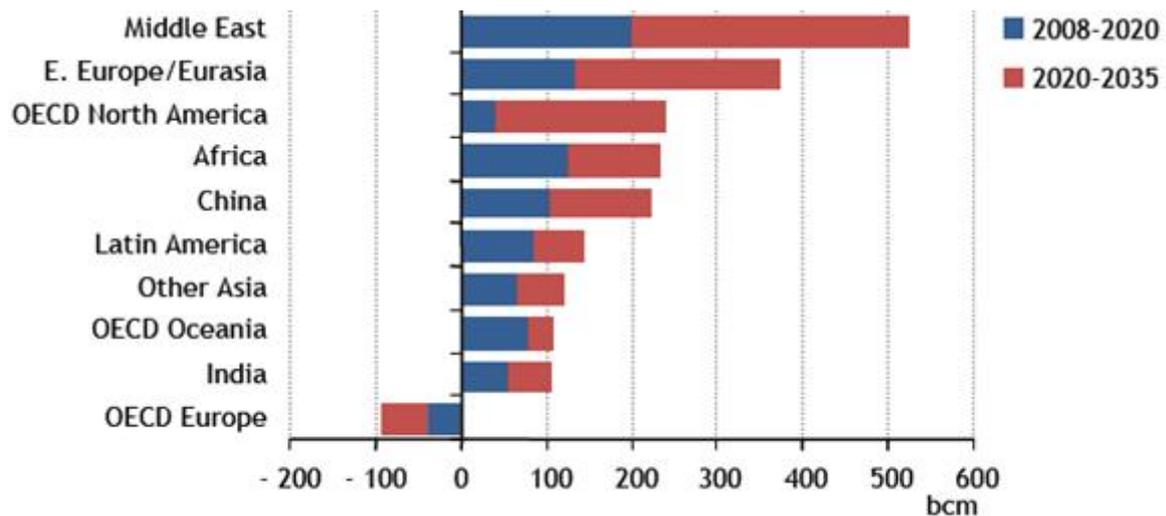
and LNG.<sup>194</sup> Consequently, Caspian states and Russia will increase their exports to the East. North America, on the other hand, will remain largely self-sufficient and stay isolated from the global trade.<sup>195</sup> To sum up, the inter-regional trade will certainly increase, but the question is where the natural gas will come from and where will it be directed to.

Figure 2.1: Natural gas production by region in GAS



Source: *GAS 2011*.

Figure 2.2: Change in natural gas production by region in the GAS

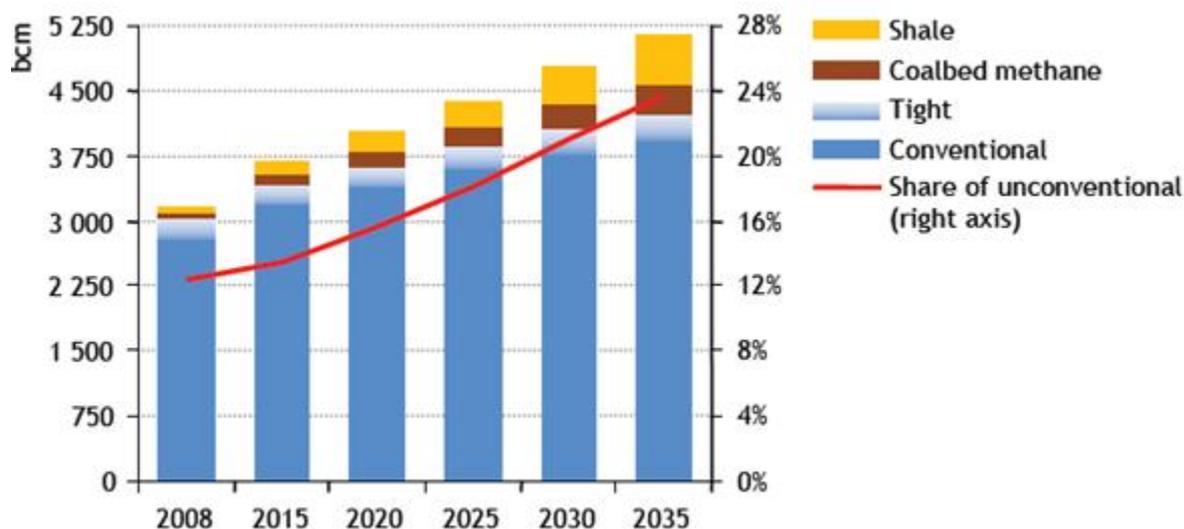


Source: *GAS 2011*.

<sup>194</sup>*Ibid.*, pp. 13.

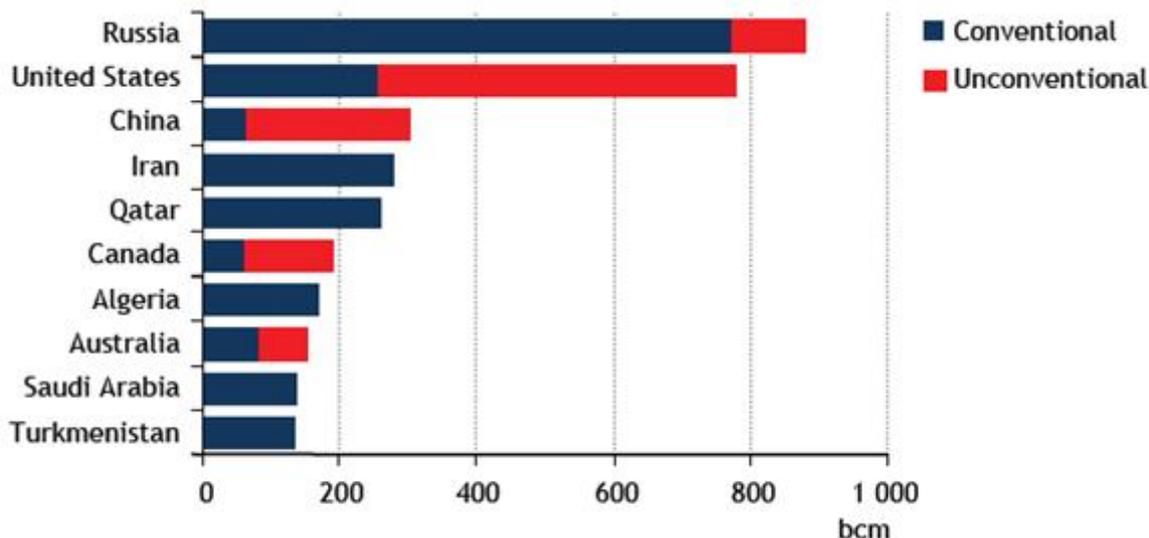
<sup>195</sup>*Ibid.*, pp. 8.

Figure 2.3: Natural gas production by type in the GAS



Source: *GAS 2011*.

Figure 2.4: Largest gas producers by type in the GAS, 2035



Source: *GAS 2011*.

The supplier countries choose their markets considering their economic benefits. They generally go for the economically profitable choices, minimizing the transportation costs by selecting the markets closer to their geographical location.<sup>196</sup> In this respect it is first logical to evaluate the markets in the proximity the EU, as it is more likely that the gas would

<sup>196</sup>OECD/IEA, *GAS 2011*, pp. 47.

initially come from these sources. On the other hand, more distant markets will also be considered, for all markets, however far, are ultimately interconnected.

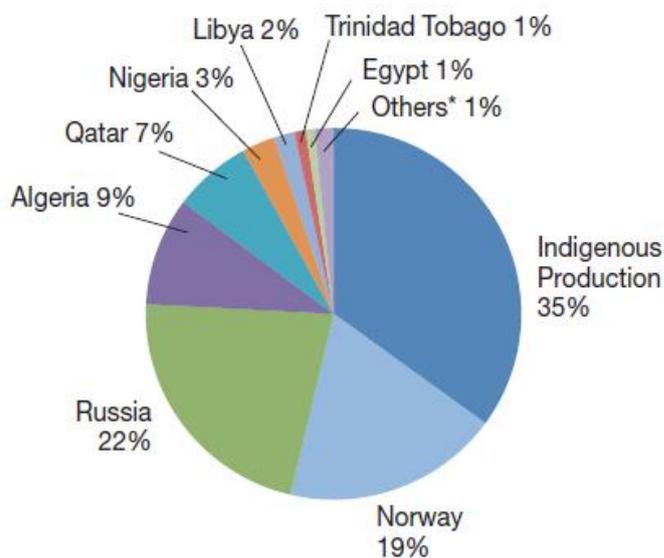
## 2.4 Potential Sources and Alternative Suppliers

The high import dependence of the European Union for natural gas has already been mentioned above. Russia is the leading country in terms of natural gas exports to the EU. In order to diversify the sources, the EU is looking for alternative supplies which will be listed and examined below.

### 2.4.1 Russia

Having the largest natural gas reserves in the world, 44.6 tcm as of 2011 and accounting 21.4 percent of the total world reserves, Russia is the major exporter of the natural gas to Europe accounting for 34 percent of Europe's imports.<sup>197</sup> Among the total supplies entering the EU<sup>198</sup>, Russia has a 22 percent share.<sup>199</sup> Therefore, it is one of the most important players in the natural gas sector in the EU.

Figure 2.5: Natural gas supplies to the EU, 2011



\*Including supplies from sources which can not be identified.

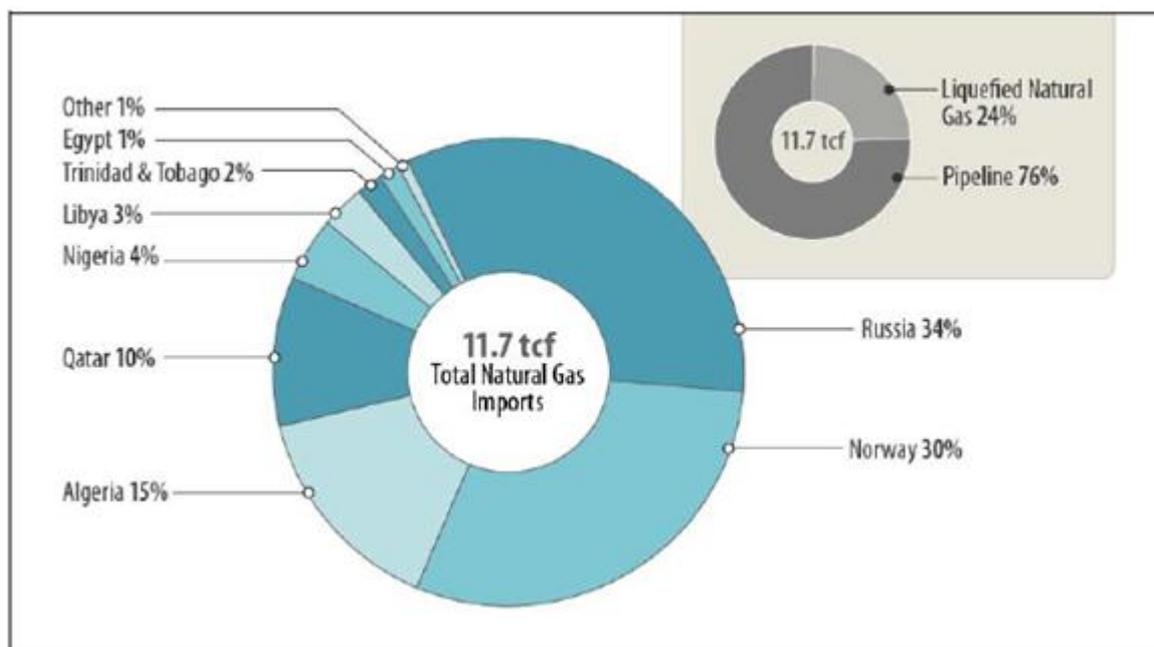
<sup>197</sup>Ratner et al., *op. cit.*, pp. 15.

<sup>198</sup>Including the domestic production by 35 percent.

<sup>199</sup>Eurogas, 2011.

Source: Eurogas, 2011.

Figure 2.6: The natural gas import shares of the EU (tcf)\*



\*1bcm=35.3bcf

Source: BP 2011 and Congressional Research Service (CRS)<sup>200</sup>.

Europe and Russia are highly interdependent on each other. While Russian dependence in Europe is high as a supplier, European dependence in Russia is also valuable as a consumer. While for Europe it is important to ensure supply security, Russia is seeking demand security. In order to guarantee its ability to sell its natural gas, Gazprom makes long-term bilateral supply contracts with the EU states such as Germany, Hungary, and Bulgaria. Moreover, the company “buys stakes in European energy distribution network and storage facilities.”<sup>201</sup> While this contributes to Russian demand security, it harms the EU supply security objectives by raising the dependence on Russia.

This increased dependence makes the importing countries more vulnerable to cut offs and interruptions. Before the opening of the Nord Stream Pipeline, 80 percent of the Gazprom exports were entering the EU via Ukraine. The gas crises of 2006 and 2009 hit the

<sup>200</sup> Ratner et al., *op. cit.*

<sup>201</sup> *Ibid.*, pp. 16-17.

EU countries and affected them more than expected. Apart from that, in 2010 and 2011 the dispute between Russia and Belarus over different issues, including the issue of the energy prices, led to a reduction of Russian supplies to Belarus and to the neighboring countries. Although the second one did not have such a tremendous impact as the preceding two, still it shows how fragile the markets can be.

In order to prevent this, direct pipelines from Russia to the EU are planned. One of them is the Nord Stream, as mentioned in page 58, and the other project proposed by Moscow is the South Stream Pipeline project. This pipeline is proposed to run under the Black Sea, reaching initially to the Bulgarian and Hungarian markets. This project raised tensions as Russia needed to get Turkey's permission as it will also cross its Exclusive Economic Zone (EEZ). Nevertheless, the EU and Turkey have other plans regarding the Southern Gas Corridor project. Therefore, initially the South Stream project was neither backed by the EU nor by the Turkish officials.<sup>202</sup> However, on 25 December 2011, Turkey granted permission to build the South Stream pipeline which connects to the same markets as the Southern Gas Corridor is supposed to<sup>203</sup> The construction was said to start in 2012 and the project was expected to become operational in 2015, but so far no initiatives has been taken place. The project is expected to carry 63 bcm/y of natural gas to Europe by two different legs.<sup>204</sup> The first one is Russia to Bulgaria, Serbia, Hungary, Slovenia, Austria, and Italy, and the second one is to Croatia, Macedonia, Greece, and Turkey.<sup>205</sup>

The South Stream pipeline shows how important the European market is for Russia, and how strategic are the SEE countries for ensuring energy security in the EU. Russia sees the Southern Gas Corridor projects as a threat to its own plans; therefore, Gazprom tries its best to prevent other suppliers from reaching Europe, such as the Caspian and Central Asian suppliers. In order to achieve this aim, Moscow needs to sign long-term contracts with the gas producing states such as Azerbaijan, Turkmenistan in order to lock their supplies and

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<sup>202</sup> "Turkey caught between Nabucco and South Stream", EurActive, 15 Apr 2011.

<http://www.eurasiareview.com/15042011-turkey-caught-between-nabucco-and-south-stream/>

<sup>203</sup> Eric Watkins, "Russia to build south Stream gas pipeline via Turkey", *Oil and Gas Journal*, Los Angeles, 30 Dec 2011.

<http://www.ogj.com/articles/2011/12/russia-to-build-south-stream-gas-pipeline-via-turkey.html>

"South Stream pipeline gets Turkey green light", BBC, 28 Dec 2011.

<http://www.bbc.co.uk/news/business16348360>

<sup>204</sup> Gazprom, Website, "South Stream".

<http://www.gazprom.com/about/production/projects/pipelines/south-stream/>

<sup>205</sup> Watkins, *op. cit.*

prevent them from reaching other markets. Also Russia uses intra regional conflicts, such as the legal status of the Caspian Sea, as a weapon to prevent Central Asian gas to reach the markets in the west. The Trans-Caspian Pipeline project which aims to carry Central Asian, particularly Turkmen gas to the Azeri grid to be exported to the West, is expected to be the key link between the Central Asian states and Europe.<sup>206</sup> Nevertheless, this connection, as mentioned, is opposed by Russia.

Figure 2.7: Russian gas infrastructure and projects to Europe



Source: OME<sup>207</sup>

<sup>206</sup> Ratner et al., *op. cit.* pp. 17.

<sup>207</sup> Manfred Hafner, Sohbet Karpuz, Benoit Esnault, Habib el-Andaloussi, "Long-term natural gas supply to Europe: Import potential, infrastructure needs and investment promotion", Observatoire Mediterrenean de l'Energie (OME), pp. 9.

<http://www.worldenergy.org/documents/p000963.pdf>

Russia's aim is clearly stated in Russian *National Security Strategy to 2020*, released in May 2009, as "the resource potential of Russia ... expanded the possibilities of Russian Federation to strengthen its influence in the world arena."<sup>208</sup> To gain a worldwide impact, Russia plays well with it and uses its natural gas potential as a bargaining chip and as a weapon. The saying once uttered by Heydar Aliyev well explains Russian attitude, "oil is about money, gas is about politics."<sup>209</sup>

In the light of this information, it is not surprising to see Russia sending exports to other strategic markets in order to establish a presence in many places as possible. Russian exports amounted to 221.4 bcm in 2011, LNG and piped gas combined, and 65 percent of this volume was exported to Europe including Turkey.<sup>210</sup> Apart from the exports to the EU, Russian natural gas is exported to Belarus, Ukraine, and other Former Soviet Union States (30 percent) and the rest of the volumes are exported to Asian countries.<sup>211</sup>

Russia aims to increase its influence in Asia, particularly in Chinese, Korean and Japanese markets. The 2011 Russian imports to Asia accounted for 7 percent supplied via LNG, and this is prospected to reach 19-20 percent share in total Russian exports by 2030.<sup>212</sup> Russia and China were for a long time involved in hopes to build a pipeline running from Russia to China; however, this prospect could not be realized because of disagreements on the pricing.<sup>213</sup> In September 2010, a binding supply document was signed between Moscow and Beijing in order to deliver the gas coming from Western Siberia to Eastern Siberia, Russia's Far East and Sakhalin.<sup>214</sup> However, this deal was denounced by Russia as it is claimed by the officials that China rejects to pay European prices for Russian gas.<sup>215</sup> This development creates the question of whether Russia will turn more to European markets after this disagreement or continue to search for alternatives in the Asian region. It is barely

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<sup>208</sup>The text of the National Security Strategy can be found at the website of Russian National Security Council at <http://www.scrf.gov.ru/documents/99.html>.

<sup>209</sup>qtd in. Amanda Paul and Borut Grgic, "Entering the end game: the race for Caspian gas", European Policy Center, 27 Oct 2010.

[http://www.epc.eu/documents/uploads/pub\\_1162\\_caspian\\_gas.pdf](http://www.epc.eu/documents/uploads/pub_1162_caspian_gas.pdf)

<sup>210</sup> Russia exported 28.5 bcm of natural gas to Turkey in 2011 via pipelines.

<sup>211</sup>BP, 2012.

<sup>212</sup>Ratner et al., *op. cit.*, pp. 16.

<sup>213</sup>Aaron Back, "China, Russia Fail to Finalize Gas Deal", *Wall Street Journal*, 16 June 2011.

<http://online.wsj.com/article/SB10001424052702304186404576389652520716210.html>

<sup>214</sup>"Gazprom ready to lay gas pipeline to China", *Ria Novosti*, Moscow, 30 June 2011.

<http://en.rian.ru/russia/20110630/164936135.html>

<sup>215</sup>Ratner et al., *op. cit.*, pp. 16.

thinkable that Russian supplies will not reach Chinese market, as demand in China is growing really fast, and will not be satiable by the current supplies to the country. Additional supplies will certainly be needed in the immediate future by the Asian markets.

As the largest natural gas reserve holder, Moscow is in search for developing new fields to meet the growing global demand and increasing its influence in several parts of the world. One option for extracting new sources of supply is the Yamal peninsula. In the Nadym-Pur-Taz field, gas extraction continues to decline while in the Yamal peninsula gains importance because of its huge albeit costly reserves. Russia also seeks LNG connections to the Far East from the Sakhalin field, which is likely to be developed further. Also the Kovyta field is ready for development with 2 tcm of gas; moreover, Russia can reach future expansion of its sources by developing the fields in Eastern Siberia. Although it is costly because of its geopolitical situation, China is willing to pay higher prices than it did in the past in order to buy the imported gas from that field.

In conclusion, it is an undeniable fact that Russia has an interdependent relation with the EU. Gazprom, its major supplier providing 34 percent of the EU's total natural gas imports. Considering the infrastructure that has already been built, and new projects that are going to be built within a short period, it is likely that the dependence on Russia will continue. Nevertheless, both the EU and Russia consider other ways to diversify their energy needs and supplies in order to decrease their dependence on each other. The EU is searching for new alternatives such as the Caspian Sea and the North African reserves, which will be discussed in the following pages of this chapter. Russia is also willing to direct its supplies to Asian markets. The future plans include the extension in LNG exports to Asia and Far East as well as the pursuit of the historical interest in European markets. In order to meet the demand of these markets, Russia is ready to begin production from different fields and initiate new projects for Europe and Asian markets.

#### **2.4.2 Alternatives to Russian natural gas**

Considering the dependence of the EU on Russian natural gas supplies and its will to diversify the resources, here some of the potential alternatives for Russian gas are listed. Besides Russia, other regions such as the Caspian, North Africa, Middle East and Gulf are also important suppliers. Apart from them, there are also resources in the Eastern Mediterranean, in West Africa and in Arctic region which may be utilized in the near future.

The region is particularly important for the EU because it is the primary region to supply the Southern Gas Corridor. Azerbaijan, Turkmenistan, Kazakhstan, and Uzbekistan are the promising markets in this region regarding their natural gas production. The first country which is likely to enter the EU market soon is Azerbaijan with its gas being developed in Shah Deniz I and II fields. The other countries in the region such as Turkmenistan and Kazakhstan can only reach European markets via Russian territories and involvement.<sup>216</sup>

The second region is North Africa. Particularly the Southern European countries are buying significant volumes of natural gas in LNG form from North African supplies particularly from Algeria, Egypt, and Libya. That is to say, the North African supplies are a formidable competitor to Russian supplies. However, the countries in this region have fragile relations and volatile political status. In Libya and in Egypt, the “Arab Spring” as a civil movement created a “potential opportunity to increase natural gas production and export from these countries.”<sup>217</sup> Both countries have huge natural gas reserves; however, the export and the production are prevented by national policies. Algeria is the largest exporter of natural gas in the North African region and the third largest supplier to Europe after Russia and Norway. Besides its proven natural gas reserves, the country also has considerable amounts of unconventional resources.

The third region is the Middle East and Gulf region which is notorious because of political unrest and unreliable pipeline security, especially the Iraqi connections. Several attacks have been recently made. Iran has the world’s second largest reserves and is highly significant for the region as well as for Europe. Nevertheless, gas exports to the Western markets have not been utilized so far. The most important country in this region for the EU is Qatar, sending LNG to Europe at considerable amounts and accounting for 10 percent in total imports to the EU. There are several other important countries deserving attention in the region and they will also be examined.

Other regions include West Africa where the most attractive country is Nigeria with its large reserves and exports. The Eastern Mediterranean region includes Cyprus and Israel

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<sup>216</sup>Ratner et al., *op. cit.*, pp. 3.

<sup>217</sup>*Ibid.*

where natural gas developments have recently started, yielding encouraging results. The Arctic region, on the other hand, is not a new source for the EU. Norway and Russia are the two leading natural gas producers in the Arctic in which the developments are still going on.

### **2.4.3 The Caspian Region**

The access to Caspian resources has become possible with the collapse of the Soviet Union. The countries in this region, Azerbaijan, Turkmenistan, Kazakhstan, and Uzbekistan are rich in terms of natural gas and oil resources. When combined, the proven natural gas reserves of these countries amount to 29.1 tcm.<sup>218</sup> The largest share belongs to Turkmenistan; however, currently the EU is able to benefit from Azeri gas only. The main reason is that after becoming independent in 1991, Azerbaijan took more independent decisions and did not permit the interference from Moscow. The other states in the region are still under Russian control. Consequently, Azerbaijan became the most significant Caspian resource supplier for the Western energy companies.<sup>219</sup>

Having the most promising reserves, Turkmenistan exports most of its gas to Russia and China. In order to carry the resources from the Turkmen fields to the West, as noted a Trans-Caspian network is needed, which is not supported but opposed by Russia and Iran.<sup>220</sup> Another reason why these markets remained underdeveloped is because of their geographical situation. They are isolated from world markets, excluding the emerging markets in Central Asia, and Moscow's presence is overwhelming for those countries. Therefore, it is even harder for them to build the pipelines towards the markets in the West.

The current pipeline connections from the Central Asian countries are towards the East rather than West. Turkmenistan has a pipeline connection to China and Kazakhstan is about to build one. The Kazakh section of the Kazakh-China pipeline was opened in December 2009, and the whole pipeline is expected to become operational by 2013.<sup>221</sup> Besides, Turkmenistan also considers sending gas to Afghanistan and Pakistan and more importantly to India, an important emerging economy. If this can be accomplished, it can bring high revenues to Turkmenistan as well as to Afghanistan and Pakistan. And this aim of

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<sup>218</sup>BP, 2012.

<sup>219</sup>Evin, *op. cit.*, pp. 94.

<sup>220</sup>Ratner et al., *op. cit.*, pp. 19.

<sup>221</sup>“China's President Hu Jintao opens Kazakh gas pipeline”, BBC, 13 Dec 2009.  
<http://news.bbc.co.uk/2/hi/8410369.stm>

Turkmenistan also benefits Russia, as the country will stay away from the European market.<sup>222</sup>

Russia already secured supplies from Kazakhstan, Turkmenistan and Uzbekistan a few years ago and on June 29, Moscow signed a treaty to buy 1000 m<sup>3</sup> of gas from Azerbaijan and this is so far the highest price Russia pays for gas. It is even higher than this year's price Russia gets from selling gas to Europe. This short-term and uneconomic measure has significant geo-strategic implications. Azerbaijan was so far seen as the most pro-European state in the region. President Aliyev until recently publicly supported the Nabucco project. Moreover, Azerbaijani gas, unlike that of Turkmen or Kazakh gas is directly available to be exported to Europe.<sup>223</sup>

Table 2.3: The Caspian region natural gas reserves, production, consumption and exports to the EU, 2011

Country	Reserve (tcm)	Production (bcm)	Consumption (bcm)	Export to the EU(bcm)
Azerbaijan	1.3	14.8	8.2	0*
Kazakhstan	1.9	19.3	9.2	0
Turkmenistan	24.3	59.5	25.0	0
Uzbekistan	1.6	57.0	49.1	0

\*Azerbaijan exports natural gas to Turkey some of which is exported to Greece (0.7 bcm/y)<sup>224</sup> and Azerbaijan is supposed to supply 10 bcm of natural gas to the EU by 2017.

### 2.4.3.1 Azerbaijan

Azerbaijan is the most promising state to send supplies to the EU in the near future hence contributing the energy and the supply security objectives of the EU. Azeri natural gas will help supply diversification immediately after the realization of the Southern Gas Corridor project. Azerbaijan is the essential part of this project because currently the only available gas

<sup>222</sup> "Turkmenistan-Pakistan- Afghanistan-India Gas Pipeline: South Asia's key project", *Petromin pipeliner*, Apr-June 2011.

<http://www.pm-pipeliner.safan.com/mag/pp10411/r06.pdf>

<sup>223</sup> "Nabucco or South Stream?", *Global-Politics*. <http://www.global-politics.co.uk/issue9/matus/>

<sup>224</sup> "Azerbaijan to sell Gas Direct to Greece". [http://www.energia.gr/article\\_en.asp?art\\_id=23780](http://www.energia.gr/article_en.asp?art_id=23780)

lies in Azerbaijan. Other gas resources in the region could not be utilized and carried to Europe because of a number of reasons some of which were listed above.

Azerbaijan has 1.3 tcm of natural gas reserves, which is the lowest volume in the region. The production of the country reached 14.8 bcm as of 2011 and this entire amount is used in exports and domestic consumption. Currently, one of the supply directions of Azerbaijan is Turkey, which imports Azeri gas via the Baku-Tbilisi-Erzurum gas pipeline with a working capacity of 8.8 bcm.<sup>225</sup> The construction of this connection was supported by the U.S. as it prevented Russia from becoming more effective in the region and isolating the Newly Independent States (NIS). The EU also supported this cooperation between Azerbaijan and Turkey because in the medium term, it would serve its aim to establish the Southern Gas Corridor project and reach Caspian gas.

The Southern Gas Corridor project first came into consideration in Europe in 2002, as a strategic connection between the Caspian gas and Europe.<sup>226</sup> The flagship initiative of the Southern Corridor was the Nabucco supplying Azeri gas produced from Shah Deniz II field to Europe. There was the possibility of additional supply volumes from Iran, Iraq, and Egypt, moreover, if Trans-Caspian pipeline could be built, also from Turkmenistan.<sup>227</sup> There were six stakeholders in Nabucco project: BOTA (Turkish state-owned), Bulgarian Energy Holding (Bulgarian state-owned), the Hungarian company MOL, the Austrian company OMV Gas & Power, the German company RWE, and Transgaz (Romanian state-owned). After the initial agreements were made and the necessary steps were taken, the Nabucco project seems to yield no results and has come to an end. There are several factors for this.

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<sup>225</sup> “Energy: Why ‘TANAP’ is changing the Eurasian pipeline competition”, Geopolitical Information Service (GIS), 27 Mar 2012.

[http://www.acus.org/files/EnergyEnvironment/032712\\_Umbach\\_EurasianPipelineCompetition\\_PartII.pdf](http://www.acus.org/files/EnergyEnvironment/032712_Umbach_EurasianPipelineCompetition_PartII.pdf)

<sup>226</sup> Sijbren de Jong, “Europe’s Southern Gas Corridor: Central Asia and the EU’s Drive Towards Energy Diversification”, EU Grasp Policy Brief, 8 Mar 2011.

<http://www.eugrasp.eu/wp-content/uploads/2012/03/Europes-Southern-Gas-Corridor-Central-Asia-and-the-EUs-Drive-Towards-Energy-Diversification.pdf>

<sup>227</sup> European Dialogue, “Political situation in Turkey and the economic power of Russia can negatively affect Nabucco project accomplishment”.

<http://eurodialogue.org/Political-Situation-Turkey-Economic-Power-Russia-Can-Negatively-Affect-Nabucco-Project>

“Nabucco consortium ditches Iranian supply plans”, *ICIS*, 24 Aug 2010.

<http://www.icis.com/heren/articles/2010/08/24/9387934/gas/esgm/nabucco-consortium-ditches-iranian-supply-plans.html>

First of all, in December 2011, the rival project of the Nabucco, the South Stream, financed and supplied by Russia was given permission by the Turkish officials and the construction is supposed to start at the end of 2012.<sup>228</sup> Until that time, these two projects are considered as rival projects targeting the same markets, the SEE and Central European countries. The most important fact was that the South Stream would carry Russian gas while the Nabucco would be supplied from various suppliers.

Secondly, Azerbaijan has been impatient to supply to Europe, and the extraction of gas developments in the Shah Deniz Phase II has already begun. From this field, 17 bcm/y of gas is expected to be extracted. What Baku wants is to make its gas available by 2017, and it will be exported to Europe no matter via which pipeline. It is, therefore, the slowness of Nabucco, and the growing question marks every day related to its viability that troubled Baku and finally Azerbaijan decided to build its own pipeline, finance, and fill it with its own gas without the support of third parties. The new pipeline project of Azerbaijan is called the Trans-Anatolian Project (TANAP), which will carry 16 bcm of natural gas, of which 6 bcm will be imported by Turkey and the rest 10 bcm will flow to Europe. SOCAR holds 80 percent share in TANAP, the rest (20 percent) is held by Turkish Petroleum and Turkish Pipeline Company BOTAS.<sup>229</sup> The first Azeri gas is expected to flow from TANAP in 2018. Although the pipeline will work at 10 bcm initial capacity, it will be scalable and in 2023 it is foreseen that the volume will increase to 23 bcm and to 31 bcm in 2026. It is designed to reach 60 bcm maximum. Nonetheless, this capacity increase is dependent on natural gas supplies coming from Turkmenistan or other Central Asian states. That is to say, Azerbaijan's proven reserves will not be enough to supply this volume for a long period of time. Middle Eastern gas can also be filled into TANAP; nevertheless, it is preferred neither by Europeans nor by Azerbaijan at this stage, because the region is highly volatile and the gas supplies coming from that region will be vulnerable to any disruptions. On the other hand, the more stakes given to national governments/companies, the harder it gets to make decisions. As it was the case in the Nabucco project, the TANAP might also become a project where each country pursues its individual interests.

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<sup>228</sup>Pyotr Iskanderov, "Construction of South Stream to begin before the end of 2012," *The Voice of Russia*, 4 June 2012. [http://english.ruvr.ru/2012\\_06\\_04/77038801/](http://english.ruvr.ru/2012_06_04/77038801/)

<sup>229</sup>Vladimir Socor, "Aliyev, Erdogan Sign Inter-Governmental Agreement on Trans-Anatolia Gas Pipeline to Europe", *Jamestown Foundation*, 27 Jun 2012.

Thirdly and most importantly, the countries such as Germany (RWE), Hungary (MOL) and the UK (BP), which used to be stakeholders in Nabucco project, are dropping their stakes and retreating from the project.<sup>230</sup>

The European Union is eager for Azeri gas. Even though initially the 10 bcm of gas will not make a difference for the big countries in the Union, the South East Europe will be grateful for that amount as their dependence is higher and consumption is much lower than the “Biggies.” Apart from that, the EU made its aims clear: “Our main goal is to reach the Southern basin ... we will achieve the same goal: access the Caspian.”<sup>231</sup>

Among the Caspian and the Central Asian states, Azerbaijan is the most promising one to provide gas, Both in political and in economic terms, Baku has close relations with Brussels. Also, Baku also has good relations with Ankara that is supposed to transmit gas from Azerbaijan to Europe. Azerbaijan will certainly continue to be a partner in energy relations for Europe, and will remain as the first diversification option at least until the other supplies can be utilized.

#### **2.4.3.2 Turkmenistan**

Turkmenistan possesses the fourth largest natural gas reserves in the world and the largest reserves in the Caspian and Central Asian region. As noted above, it has 24.3 tcm of proven natural gas reserves. The country produces 59 bcm/y and consumes 25 bcm as of 2011. The remaining volumes are already tied with long-term supply agreements to Russia (10.1 bcm/y), Iran (10.2 bcm), and China (14.3 bcm).

Turkmen gas is highly promising and attractive for the European market yet as noted, in order for Turkmen gas to reach western markets, a Trans-Caspian link is needed. The legal status of the Caspian Sea does not permit this link at the moment. In September 2011, Azerbaijan and Turkmenistan agreed on building a Trans-Caspian link and this initiative is

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<sup>230</sup> Jan Hromadko et al., “RWE May Reconsider Nabucco Pipeline”, *Wall Street Journal*, 18 Jan 2012.

<http://online.wsj.com/article/SB10001424052970204468004577166273792137122.html>

“BP drops out of Nabucco pipeline”, TASS, 25 May 2012. [http://english.ruvr.ru/2012\\_05\\_25/75963790/](http://english.ruvr.ru/2012_05_25/75963790/)

“Hungary’s MOL Won’t Fund Nabucco Pipeline”, *Wall Street Journal*, 24 Apr 2012.

<http://online.wsj.com/article/SB10001424052702303592404577364232277881786.html>

<sup>231</sup>Judy Dempsey, “European Pipeline Project Faces Formidable Obstacles”, *NY times*, 7 Mar 2011.

[http://www.nytimes.com/2011/03/08/business/global/08nabucco.html?\\_r=2&pagewanted=all](http://www.nytimes.com/2011/03/08/business/global/08nabucco.html?_r=2&pagewanted=all)

approved by the Council of the EU.<sup>232</sup> Nevertheless, Russia and Iran are likely to continue their opposition and prevent the realization of this connection. They claim that the status of the Caspian Sea and any project on this territory should be approved by all the littoral states,<sup>233</sup> not only by Turkmenistan and/or Azerbaijan. The main reason behind the opposition is that if Turkmen gas reaches western markets, it will create a tough competition for Russia and Iran. Therefore, Russia is using every single opportunity in order to stop Turkmen gas reaching Europe without the control of Moscow. Currently, the only way for Turkmen gas to reach western markets is via Russia. Russia buys the gas from Turkmenistan at a lower cost and sells it to Europe at a much higher cost, with the EU paying the highest price for gas in the world. By precluding the Trans-Caspian link between Ashgabat and Baku, Russia will remain as the dominant supplier to the EU.

Turkmenistan has been taking steps to export its gas eastwards. Transporting the gas to Europe through Russia is one alternative for Turkmenistan, increasing its dependence on Russia for transport and export. Since December 1997, two pipelines are opened to supply Iran with Turkmen gas, which has doubled Ashgabat's export capacity by 20 bcm. China and Turkmenistan signed a framework agreement enabling the Chinese investments in Turkmenistan to develop the natural gas fields and this agreement foresaw the construction of a pipeline from Turkmenistan through Uzbekistan and Kazakhstan finally leading to China being operational at the moment. The current proposal to build a natural gas pipeline through Afghanistan to Pakistan and India, *Turkmenistan-Afghanistan-Pakistan and India Pipeline (TAPI)*, is under review and its construction is delayed from 2010 to an uncertain date because security issues in Afghanistan and tribal areas in Pakistan remain as problematic.<sup>234</sup>

Map 2.2: Turkmenistan natural gas export options and routes

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<sup>232</sup>Vladimir Socor, "European Union Officially Endorses Trans-Caspian Pipeline to Link Up With Nabucco", Jamestown Foundation, *Eurasia Daily Monitor*, 20 Sep 2011.

[http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=38425](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=38425)

<sup>233</sup>The Littoral states are: Azerbaijan, Kazakhstan, Turkmenistan, Russia and Iran.

<sup>234</sup>John Foster, "Afghanistan, the TAPI Pipeline and Energy Geopolitics", *Journal of Energy Security*, 23 March 2010.

[http://www.ensec.org/index.php?option=com\\_content&view=article&id=233:afghanistan-the-tapi-pipeline-and-energy-geopolitics&catid=103:energysecurityissuecontent&Itemid=358](http://www.ensec.org/index.php?option=com_content&view=article&id=233:afghanistan-the-tapi-pipeline-and-energy-geopolitics&catid=103:energysecurityissuecontent&Itemid=358)



option. The consumption in the country is 9.2 bcm/y while the production is 19.9 bcm/y. the rest of the gas is exported to Russia and other markets in Central Asia.

Until 2009 Kazakhstan could not become a net exporter apart from nearly 12 bcm of natural gas exported to Russia. Russia uses Kazakh gas for its domestic consumption, unlike Turkmen gas which is supplied to the European market via Russia.<sup>237</sup> It was in December 2007 that the three countries, Russia, Turkmenistan and Kazakhstan signed an agreement in order to build a new pipeline that is supposed to be called *Caspian Coastal Pipeline* in order to supply natural gas to Russia. This agreement was delayed, as Turkmenistan stepped back with an aim to reduce its dependence on Russia in terms of export, and the country wanted to diversify its export options.

Apart from its neighboring countries, Kazakhstan also directs its supplies to China. As the countries in Central Asia are highly important for supplying natural gas to China, Beijing does not hesitate to contribute the market development activities in those countries. In Kazakhstan, as well as in Turkmenistan, China plays an active role with FDIs with a contribution of \$13 billion of investments in 2009. Besides China, the U.S. also invests in the country and the total investments accounted \$29 billion between the years 1993-2009.<sup>238</sup>

Kazakhstan also signed an agreement with China in 2008 to build a pipeline from Beyneu, North Aral Sea, to Shymkent and from there it is expected to connect to *The Central Asia-China Gas Pipeline* and will become operational in 2015. The initial capacity of the pipeline is 5 bcm of natural gas flowing to China.<sup>239</sup>

As for supplying the European market, Kazakhstan does not seem as eager as the other states in the region. The most important reason for this is that the proven Kazakh natural gas reserves are not very rich. Kazakh production seems adequate with 19.3 bcm as the consumption is 9.2 bcm, and the extra gas has already been contracted by Russia and China. In order for Kazakh supplies to reach the Southern Gas Corridor projects, Kazakh production

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<sup>237</sup> USAK, "Exporting gas to Europe: What does Turkmenistan want?", International Strategic Research Organization, 27 July 2012.

<http://www.usak.org.tr/EN/myazdir.asp?id=1108>

<sup>238</sup> Jim Nichol, "Central Asia: Regional Developments and Implications for U.S. Interests," Congressional Research Service, 12 Jan 2011, pp. 48.

<http://www.fas.org/sgp/crs/row/RL33458.pdf>

<sup>239</sup> *Ibid.*, pp. 43.

has to improve considerably, which seems unlikely for the time being, and even if it exceeds these expectations, the legal status of the Caspian Sea creates another obstacle for the country.<sup>240</sup>

#### **2.4.3.4 Uzbekistan**

Uzbekistan's proven reserves accounts 1.6 tcm and in 2011, the country produced 57.0 bcm of natural gas.<sup>241</sup> The consumption of the country is 49.1 bcm, therefore, indigenously produced gas is mostly used in domestic consumption; hence, the country is self-sufficient in terms of its gas supplies. The extra gas, approximately 7 bcm, is exported to Russia, via the Soviet era pipeline connections and also to other Central Asian states such as Kazakhstan, Kyrgyzstan, and Tajikistan.

Uzbekistan can provide an opportunity to supply Europe; however, it is unlikely that this could become possible in the near future. The first reason is that there is Turkmen gas which is higher in volume and both Turkmen and Kazakh gas are more convenient for transportation regarding their geographical proximity to the Caspian Sea. Secondly, as it is the case with other Central Asian states, the necessary political environment as well as the technical infrastructure is not ready for transporting the gas to the western market. Thirdly, Uzbekistan recently opened its market to investments; hence, it has a long way to go before it is developed financially. As of 2010-2011, the largest investments came from Russian Gazprom and Lukoil to invest and develop natural gas infrastructure for production and transmission. With the inclusion of Russian companies in Uzbek energy market, it became even more difficult for the country to look forward to western markets. A fourth reason, which is also a common issue in other neighboring states of Uzbekistan, is that those states are willing to supply Chinese market. In 2005, Uzbek state owned natural gas firm Uzbekneftegaz and *Central Asia-China Pipeline (CNPC)* declared that they could "form a joint venture to develop oil and natural gas resources."<sup>242</sup> The agreement was signed in 2007 and the construction and operation of the joint venture between CNPC, Asia Trans Gas, and Uzbekneftegaz began in 2008. Uzbekistan also signed an agreement guaranteeing 10 bcm of natural gas supplies from the country to China through CNPC.<sup>243</sup>

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<sup>240</sup>Ratner et al., *op. cit.*, pp. 20.

<sup>241</sup>BP, 2012.

<sup>242</sup>Ratner et al., *op. cit.*, pp. 12.

<sup>243</sup>*Ibid.*

The future plans of Uzbekistan towards the Asian markets reveal Uzbekistan's doubtful European orientation. Further developments of new fields in Uzbekistan are conducted by Russian Lukoil, Korean National Oil Cooperation and Chinese CNPC in Aral Sea. Even if more gas resources are found and produced, without a Trans-Caspian link, the volumes can only be carried via Russia to the European markets. Moreover, the extracted gas will first be used by the shareholders and most probably directed either to Asia or to Russia or both.

In the long term, Uzbekistan's production is expected to increase well as its consumption. If more gas could not be produced from the reserves, future exports may be endangered. On the other hand, the country is said to have unconventional shale gas and oil, though the exact amount is unknown, and as the Uzbek government announced, these fields are open to investment and \$850 million foreign investment is expected by 2015.<sup>244</sup> Considering the factors and underdeveloped infrastructure, political status in the Caspian Sea, the availability of the reserves and production vs. consumption pattern of the country, as well as its export routes, it is also not likely in the foreseeable future for Uzbekistan to supply the European markets.

#### **2.4.3.5 Conclusion**

The states in the Caspian region have considerable volumes of natural gas in their territories. They also produce and utilize the necessary amounts of their reserves; however, there are strong restrictions regarding their export directions except Azerbaijan.

First of all there is Russian factor. As Russia would not prefer to give away its invaluable European customers, it would try to take every single opportunity in order to stop those states from selling their gas to European and/or western markets. Moscow finds several ways to address this problem; one of them is investing in the country. Russian oil and gas firms invest in the countries for production and transportation, and the building of the necessary infrastructure. After that the increased exports of the country cannot be directed to western markets as Russia had already gained control over them. Another way is to bind those states' gas with long-term supply contracts to Russia. Russia imports gas from all the

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<sup>244</sup>“Uzbekistan To Tap Massive Shale Oil Reserves”, UG Center, 14 Mar 2011.  
[http://www.ugcenter.com/International-Shales/Uzbekistan-Tap-Massive-Shale-Oil-Reserves\\_78873](http://www.ugcenter.com/International-Shales/Uzbekistan-Tap-Massive-Shale-Oil-Reserves_78873)

Caspian states mentioned above and it either uses those gas imports in its domestic consumption or sells it to Europe at a higher price.

Secondly, Russia and Iran obstruct the construction of the Trans-Caspian pipeline which will enable gas of the Central Asian states to reach western markets. They claim that it is against international law for the states to decide individually on the future of the Caspian Sea, so all the littoral states should come together and vote for a unanimous decision. The prospect of the Trans-Caspian pipeline neither suits the interest of Iran nor of Russia, making it impossible at this stage to build this significant connection from Central Asia to Europe.

Lastly, as mentioned above, the current and the recent agreements of natural gas exports of the Central Asian states are made with Asian states mainly China. These agreements are long-term supply contracts, already blocking the future productions of the countries leaving no additional supply volumes for Europe.

In conclusion, in the foreseeable future, the only country in the region for exporting gas to the EU is Azerbaijan with its own project financed by itself, TANAP, which is not likely to operate before 2017. The other states in the region are not likely to export in the near future as it is neither politically nor economically viable nor possible for these states.

#### **2.4.4 The North African Region**

In the North African region the most notable suppliers of gas are Algeria, Egypt and Libya. They already supply large volumes of gas to Europe via pipelines and LNG. These countries hold tremendous natural gas reserves which are needed to be developed. Algeria has the highest share in supplying the European market.<sup>245</sup> The country is ready to export 79 bcm by 2030 and, considering its highly developed infrastructure, it is the most promising state among the North African countries.

The production in Libya and Egypt is expected to increase after the regime changes following the Arab Spring. Libya's infrastructure can supply a maximum volume of 12.5 bcm/y to the EU countries. New projects and developments are certainly needed in order to meet the 40 bcm target of Libya by 2030. Egypt supplies LNG to the EU at the moment; if

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<sup>245</sup>Eurogas, 2011.

the *Arab Gas pipeline (AGP)* could reach Turkish border and work at full capacity, Egyptian gas supplies can also enter the EU from this connection.<sup>246</sup> New export routes and infrastructures are also needed for Egypt to supply the EU market.

Table 2.4: North African selected countries proven reserves, production, consumption, and exports to the EU

<b>Countries</b>	<b>Reserves</b>	<b>Production</b>	<b>Consumption</b>	<b>Exports to EU</b>
<b>Algeria</b>	4.5 tcm	78.0 bcm	28.0 bcm	50.6 bcm
<b>Egypt</b>	2.2 tcm	61.3 bcm	49.6 bcm	4.3 bcm
<b>Libya</b>	1.5 tcm	4.1 bcm	n/a	2.4 bcm
<b>Total</b>	8.2 tcm	143.4 bcm	77.6 bcm	57.3 bcm

Source: BP, 2012; Eurogas, 2011 and CRS.

Table 2.5: Selected North African region detailed export analysis

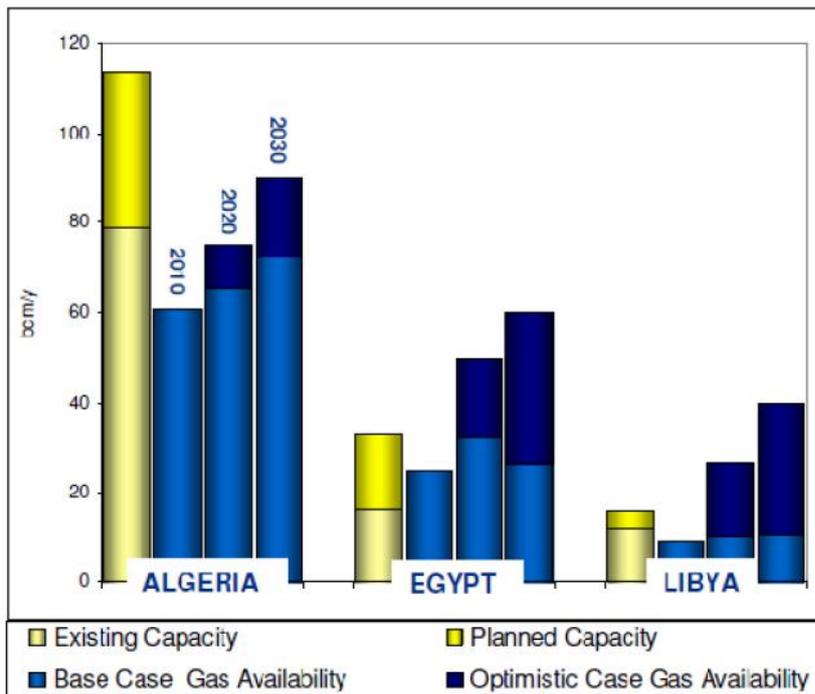
<b>Countries</b>	<b>Pipeline Exports (bcm)</b>	<b>To Europe (bcm)</b>	<b>LNG Exports (bcm)</b>	<b>To Europe (bcm)</b>	<b>Total Exports (bcm)</b>	<b>Total Europe Exports (bcm)</b>
<b>Algeria</b>	34.4	32.8	17.1	16.8*	51.5	46.9
<b>Libya</b>	2.3	2.3	0.1	0.1	2.4	2.4
<b>Egypt</b>	0	0	8.6	4.3*	8.6	4.3

\*to Europe and Eurasia

Source: BP, 2012.

Figure 2.8: The existing and planned infrastructural developments in Algeria, Egypt and Libya which are the potential countries for additional supplies to the EU

<sup>246</sup> Mott MacDonald (MMD), "Supplying the EU natural gas market", November 2010. [http://ec.europa.eu/energy/international/studies/doc/2010\\_11\\_supplying\\_eu\\_gas\\_market.pdf](http://ec.europa.eu/energy/international/studies/doc/2010_11_supplying_eu_gas_market.pdf)



Source: MMD.

#### 2.4.4.1 Algeria

Algeria exports the highest amount of gas among the Southern Mediterranean countries and also among the African countries.<sup>247</sup> Algeria seems like the best partner for the EU gas supplies as sources are available immediately without additional EU public investment to direct supplies to the European grid.<sup>248</sup> It has the eighth largest natural gas reserves in the world and it is the third largest gas exporter to Europe.<sup>249</sup> Algeria supplies 34.4 bcm/y of gas via pipelines and 17.1/y bcm of LNG to the EU.<sup>250</sup> After Nigeria, Algeria has the largest reserves in African region.<sup>251</sup>

Figure 2.9: Algeria’s total natural gas production and consumption, 1990-2010

<sup>247</sup> Delegation of the EU to Egypt, “Exports to EU”.

[http://eeas.europa.eu/delegations/egypt/eu\\_egypt/trade\\_relation/export\\_to\\_eu/index\\_en.htm](http://eeas.europa.eu/delegations/egypt/eu_egypt/trade_relation/export_to_eu/index_en.htm)

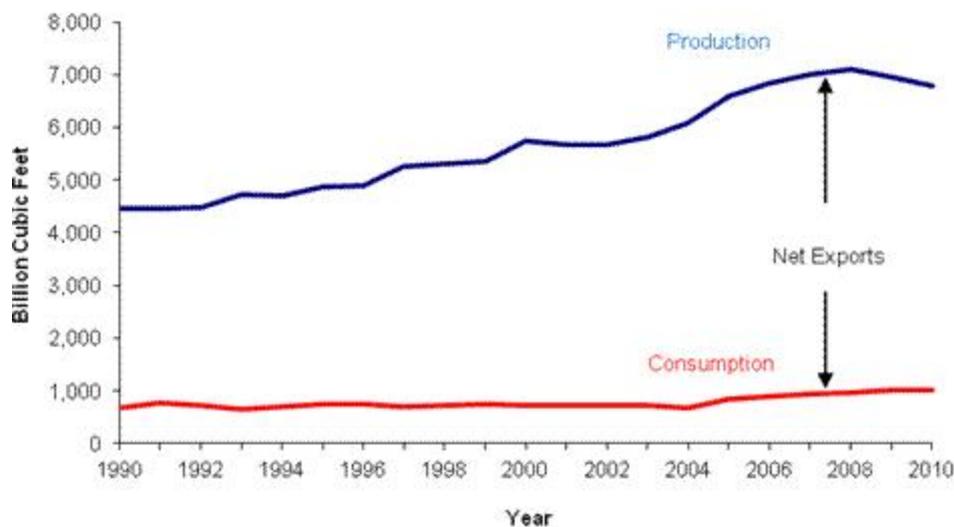
<sup>248</sup> MMD, *op. cit.*

<sup>249</sup> U.S. Energy Information Administration (EIA), “Algeria”, 8 Mar 2012.

<http://205.254.135.7/countries/cab.cfm?fips=AG>

<sup>250</sup> Eurogas, 2011.

<sup>251</sup> BP, 2012.



Source: EIA, 2011.

In 2011, Algeria produced 78 bcm of natural gas, 58 bcm of which was exported, and of this export volume, 50 bcm was sent to the EU. It was seven years ago, in 2005, that the Algerian energy minister announced their ambitious plans to increase the production up to 113 bcm/y and export capacity to 99.5 bcm/y by 2015.

Algeria has an obvious will to supply the EU markets and developing itself accordingly. The country is expanding and developing its connections with Europe. In 2011, the *Medgaz* natural gas pipeline was opened, linking Beni Saf port of Algeria to Perdidal Beach, Almeria in Spain with an initial capacity of 8 bcm/y.<sup>252</sup> Nearly 65 percent of the Algerian natural gas exports travel via pipelines and the rest 35 percent is via LNG tankers.<sup>253</sup> Although Algeria mainly exports to Spain and Italy, these exports do not have much to do with Europe, especially with the Balkans and the SEE States, as the interconnector connections are very limited especially at the Spanish border. However, according to the studies of EIA, the interconnectors are being developed between the borders of France-Spain which will contribute to the supply security of the EU by transmitting the surplus of Spanish imported gas supplies. These interconnectors are thought to become operational by 2013.<sup>254</sup> Apart from this new connection, 11.5 bcm of natural gas is exported to Europe annually by the *Maghreb-Europe Gas Pipeline (MEG or Pedro Duran Farell)*, which was commissioned in

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<sup>252</sup>EIA, "Algeria", *op. cit.*  
Ratner et al., *op. cit.*, pp. 3.  
<sup>253</sup> EIA, "Algeria", *op. cit.*  
<sup>254</sup>*Ibid.*

1994. It reaches Spanish and Portuguese natural gas networks, also supplying Morocco. The *Trans-Mediterranean (Transmed and/or Enrico Mattei)* pipeline supplies 24 bcm/y of natural gas to Italy crossing Tunisia and Sicily with an extension to Slovenia. This link was one of the oldest links completed in 1983 the capacity of which was doubled in 1994. Currently a third pipeline to this connection is being built, and its capacity is expanded to 24 bcm/y.<sup>255</sup> Another connection which is at the planning stage, the *Galsi* natural gas pipeline, with an aim to connect Annaba, Algeria to Piombino, Italy via Sardinia which is expected to carry 8 bcm/y and expected to operate in 2014.<sup>256</sup> Apart from these pipeline connections, the country has ambitions to develop also LNG facilities in order to increase LNG exports to Europe.<sup>257</sup> There are four LNG plants in the country; Arzew, Skikda, Bethioua and Gassi Touil with a combined capacity of 26 bcm /y of LNG.<sup>258</sup>

Algeria is the seventh largest exporter of LNG in the world, accounting for about 7 percent of global LNG exports. The initially targeted markets are France, Spain, Italy, and the UK. In 1964, with the completion of the Arzew LNG plant, Algeria became the first LNG producer in the world. New plants are to be opened by 2013 increasing the country's capacity of export.<sup>259</sup>

There are two major projects led mainly by the European companies operating in Algeria. The first one is the *Southwest Gas Project*, including 3 different projects under its title. The first one is the Repsol-led project aiming to produce 2.8 bcm of natural gas from Reggane Nord field. The second one is led by Total, prospecting to produce 1.6 bcm of natural gas from Timimoun. The last one is GDF Suez's Touat project with 4.5 bcm of natural gas production. The most promising one among them is the first one, Repsol's project, which has been initiated in November 2011. The stakeholders include European firms such as the German RWE 19.5 percent, Italian Edison 11.25 percent, Spanish Repsol holding 29.25 percent, and Algerian Sonatrach holding 40 percent of the stakes. The project which was initially planned to 2014 is expected to be finished by 2016. The Timimou project

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<sup>255</sup> *Ibid.*

<sup>256</sup> *Ibid.*

<sup>257</sup> Ratner et al., *op. cit.*, pp. 3.

<sup>258</sup> MMD, *op. cit.*, pp. 9, 29.

<sup>259</sup> EIA, "Algeria", *op. cit.*

is likely to become operational in 2014 while the Touat project is expected to be happening soon.<sup>260</sup>

The second major project is the Italian Eni-led *Menzel Ledjmet East (MLE)*, having a goal of producing 3.3 bcm of natural gas by mid 2012. However, this looks like an unrealistic aim, because there is a recent decline in upstream licensing activities and the development of the southwest fields gained "... greater importance for Algeria's capacity to meet contracted gas exports and increasing domestic demand in the medium term."<sup>261</sup>

In addition to the proven conventional reserves of the country, the EIA claims that the country also holds enormous shale gas reserves, even more than its current proven conventional reserves.<sup>262</sup> If the necessary technology and know-how could be developed, the production capacity of the country will grow tremendously helping Algeria to become an even more important supplier for the consumers. Not only the technical developments, but also the necessary legislative environment should be set in Algeria as well as in other countries, especially in the EU. Therefore, it is not fully correct to conclude that unconventional resources will increase Algeria's production and it will become a leading gas exporter country to Europe. The utilization of unconventional resources, globally, is tied to and interdependent with several other factors. It is a slowly developing sector and a costly one. In order for any country to produce gas from shale, or coal bed methane, or tight; a lot of preliminary conditions need to be set.

In short, even without the development of unconventional gas reserves and the new fields, Algeria can supply sufficient amounts to the European market. If further supplies are needed, the country could also increase its production accordingly. There are several pipeline and LNG extension plans and two major projects implemented mainly by European companies which will increase the export potential of Algeria at a considerable amount.

#### **2.4.4.2 Egypt**

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<sup>260</sup>*Ibid.*

<sup>261</sup>*Ibid.*

<sup>262</sup>*Ibid.*

Egypt is the second most important gas exporter in the North African region<sup>263</sup> and the EU is the main trade partner of Egypt and more than 30 percent of the Egyptian exports are sent to the EU. Among them the main destinations of Egyptian exports are Italy, Spain, France, the UK and Germany.<sup>264</sup>

Hydrocarbon reserves hold an important place in Egyptian economy; however, Egypt is not only important for its oil and gas production but also important for its transport routes such as the *Suez-Mediterranean Pipeline* (SUMED) and the Suez Canal which contributes to the national economy by the transportation fees. Egypt exports 70 percent of its natural gas via LNG and 30 percent via pipelines.<sup>265</sup>

Egypt has 2.2 tcm of proven natural gas reserves and, of this volume, annually 61.3 bcm is produced. As of 2011, Egyptian gas production was 49.6 bcm. Although it seems like 12 bcm of extra gas, the consumption is also increasing gradually, absorbing the extra amount.<sup>266</sup> The majority of the gas volumes are produced in the Mediterranean and the Nile Delta, yet the exploration and production activities are also conveyed in all hydrocarbon rich areas including the Western Desert.

Currently natural gas accounts 50 percent of total primary energy consumption in the country. What is more, the remaining reserves in the country are in places that are difficult to access and extract. In order to attract foreign investment; the Egyptian government is giving subsidies and attractive offers to maintain the development of Egypt's resources.<sup>267</sup>

The effects of the Arab Spring can be observed in the country both in positive and negative terms. On the one hand, the change in the government created a more liberal economy and environment so the country became more independent in exporting and producing its resources. On the other hand, after the resignation of Hosni Mubarak in February 2011, the natural gas infrastructure of Egypt "in the Sinai Peninsula has been attacked ten times by either disaffected Bedouin Arabs living in the Sinai or terrorist groups

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<sup>263</sup>MMD, *op. cit.*

<sup>264</sup> Delegation of the EU to Egypt, *op. cit.*

<sup>265</sup>U.S. Energy Information Administration (EIA), "Egypt", Feb 2011.  
<http://205.254.135.7/countries/country-data.cfm?fips=EG&trk=c>

<sup>266</sup> Ratner et al., *op. cit.*, pp. 3.

<sup>267</sup> Ratner et al., *op. cit.*, pp. 24.

with camps in the peninsula. These attacks have disrupted gas shipments via two separate pipelines converging at El Arish to both Israel and Jordan.”<sup>268</sup>

Israel and Jordan are highly dependent on Egyptian gas, Jordan by 80 percent and Israel by 43 percent, and the gas is mainly used in power production. The AGP carries 3.7 bcm of Egyptian gas to Jordan, Israel and Syria.<sup>269</sup> Another pipeline connection from Egypt to Israel was the Arish-Ashkelon pipeline which became operational in 2008.<sup>270</sup>

Apart from Israel and Jordan, Egypt exports to Europe, not via pipelines but in LNG forms which were decreased by 35 percent in 2010.<sup>271</sup> The LNG connections, on the other hand, are situated in *Damietta* and *Idku* named as *ELNG* and *SEGAS* respectively. When combined, the country has a LNG capacity of 16.4 bcm/y.<sup>272</sup> The Damietta train sends supplies to Spain, the UK, and the U.S., Idku to France and the U.S. The capacities of these two plants are planned to be expanded; there are also projects to build new plants. The largest volume of exports (35 percent) used to be directed to the U.S. After the recent developments in unconventional resources, LNG imported from Egypt by the U.S. is expected to be redirected to Europe or domestically consumed. Other LNG destinations are Spain, France and smaller volumes go to Canada, Mexico, and Asia.

Egypt is also important for the Turkish market because of the projected extension of the *Arab Gas Pipeline (AGP)*, which is currently running from Egypt to Syria, Israel, Lebanon and Jordan. A final link was expected to be built from Syria to the Turkish city of Kilis. With this pipeline, Egypt began to export natural gas in the mid-2000s.<sup>273</sup> The most important rationale behind this attempt was to supply Europe with Egyptian gas via Turkey. However, given the current political and economic situation of both Egypt and Europe, it is not possible to build an additional link to Turkey and then tie it to the Southern Gas Corridor project at the moment.

In an overall analysis, the production in Egypt is in decline while the consumption rises every day, LNG export volumes are directed to Europe and supplies to other countries

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<sup>268</sup>*Ibid.*

<sup>269</sup>MMD, *op. cit.*, pp. 10.

<sup>270</sup>EIA, “Egypt”, *op. cit.*

<sup>271</sup>Ratner et al., *op. cit.*, pp. 24.

<sup>272</sup>MMD, *op. cit.*, pp. 30.

<sup>273</sup>EIA, “Egypt”, *op. cit.*

such as Israel and Jordan are important for Egypt because of political connotations and for the consumer countries. The new government, nonetheless, is capable of reversing the current situation if it encourages western initiatives by subsidies and open the natural gas sector to the foreign investments.

#### **2.4.4.3 Libya**

Compared to Egypt and Algeria, the export capacity of Libya remains low and smaller in volumes. All Libyan natural gas exports are directed to Europe, in particular to Italy and Spain.<sup>274</sup> Libya is already very popular for its oil reserves; therefore, natural gas comes later. However, still there is a potential of 1.5 tcm that deserves attention.<sup>275</sup> New discoveries and exploration activities are expected to raise Libya's potential of natural gas. As the natural gas sector is mostly state-run, it is subject to influences resulting from regime changes. The bigger companies in Europe such as BP, Exxon Mobil and Shell have been engaged with exploration and extraction activities of natural gas.<sup>276</sup>

Libya is reliant more on oil than gas, as it has plentiful of oil reserves. The national oil company, NOC, announced that one of its intentions is to increase the natural gas production in the country by building new infrastructure and expanding the existing ones. Nevertheless, as it is the case for other countries, it is important to have the necessary support both nationally and internationally. Another key factor is political stability. There are two main factors restraining natural gas development in the country, the first one is the bigger share and importance of the oil industry and the second is the UN sanctions on LNG trade in the country. Both factors seem to be losing their significance; however, still they curtail the development in the natural gas sector. In the next 20 years, Libya is expected to increase its natural gas production and correspondingly its export capacity.

Although natural gas production in the country was almost entirely shut down for some time in 2011, currently it is recovered and the natural gas production in Libya is

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<sup>274</sup>PetroStrategies Inc., "Libya", 22 July 2012.  
[http://www.petrostrategies.org/Learning\\_Center/libya.htm#Natural Gas](http://www.petrostrategies.org/Learning_Center/libya.htm#Natural_Gas)

<sup>275</sup>BP, 2012.

<sup>276</sup>U.S. Energy Information Administration (EIA), "Libya", June 2012.  
<http://205.254.135.7/countries/cab.cfm?fips=LY>

growing substantially.<sup>277</sup> Libya produced 4.1 bcm of natural gas in 2011 which is 75 percent below the levels of 2010.

Most of the exports to Europe were transported via pipeline but there are also small volumes of LNG exports. In 2010, EIA gave the figures of Libyan natural gas exports as being 10 bcm LNG and natural gas combined. Libya comes after Algeria in terms of LNG exports. There is one LNG plant in the country, built in 1960s with a capacity of 3.5 bcm/y, and it has been offline since February 2011 because of a damage caused by the civil war.<sup>278</sup> Nonetheless, because of the lack of technical structures and equipments, LNG sector could not be evolved in the country. Libyan LNG exports used to be exported to Spain under long-term contracts. Because of lack of connections from Spain to other European countries, as noted, Libya cannot contribute significantly to the energy security of European continent, and moreover, the SEE countries have no chance of benefiting from Libyan LNG. Although there are plans to build additional LNG terminals possibly to Mellitah by 2015, they remain highly uncertain.

According to some analysts, Libya has the potential to be a big contributor to the EU once its gas production is under the authority of a stable government. Italy receives 97 percent of the Libyan pipeline imports while Spain receives all LNG imports of the country.<sup>279</sup> Italy receives the Libyan gas via *Green Stream Pipeline* being the longest underwater pipeline, 520 km, working nearly at full capacity, 11.5 bcm/y.<sup>280</sup> In 2011, because of the conflict, the pipeline exports were interrupted, and started again in the autumn of the same year.<sup>281</sup> Since then, exports are steadily increasing.<sup>282</sup> An additional line could be constructed to the Green Stream if Libya produces sufficient amounts which will be enough both for domestic consumption and exports. The domestic consumption in Libya also

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<sup>277</sup>*Ibid.*

<sup>278</sup>*Ibid.*

MMD, *op. cit.*, pp. 31.

<sup>279</sup>BP, 2012.

<sup>280</sup>“Green Stream”, Website, ENI.

[http://www.eni.com/en\\_IT/innovation-technology/eni-projects/greenstream/greenstream-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/greenstream/greenstream-project.shtml)

ENI, Website, “Western Libyan Gas Project”.

[http://www.eni.com/en\\_IT/innovation-technology/eni-projects/western-libyan-gas-project/western-libyan-gas-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/western-libyan-gas-project/western-libyan-gas-project.shtml)

<sup>281</sup> EIA, “Libya”, *op. cit.*

<sup>282</sup>Energy Delta Institute, Energy Business School, “Bulgaria”.

<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/bulgaria>

increases, and the country also relies on natural gas as the 40 percent of the power production is fired by natural gas.<sup>283</sup>

There are two ongoing projects in Libya. One is to build a pipeline from Libya to Tunisia, connecting it to the Transmed pipeline. However, instead, a direct link could be also set from Libya to Italy.<sup>284</sup> Another project is the *Western Libya Gas Project (WLGP)* operated by Italian Eni and Libyan NOC through the joint venture with Mellitah Oil & Gas supplying most of the Libyan gas production growth since 2003.<sup>285</sup> Most of the gas produced from WLGP is exported via the *Green Stream* to Italy.

Although this analysis shows that Libya could bring a new dimension for the European market, it is not likely to supply large volumes at the moment. After the civil unrest in 2011, it is now slowly recovering and developing itself. The LNG infrastructure needs to be repaired and if possible expanded along with the expansion in the pipeline infrastructures. If the production of Libyan gas remains stable and the domestic use of natural gas increases as projected by EIA, then the volumes for exports are likely to remain at the current level.

#### **2.4.5 The West African Region**

In the West African Region, gas exploration and production activities were slowed down in early 2012 because of the ongoing political unrest and “widespread violence ... resulted in a decreased risk appetite among foreign investors.”<sup>286</sup> Thus, the commercial production of gas in West Africa has just recovered. There were three main obstructions regarding the gas utilization in the region: (a) lack of necessary regulatory environment, (b) inability to reach the local, regional and international gas markets, and (c) financial burden that the gas flaring activities cause particularly in Nigeria.<sup>287</sup>

The interest of the European as well as the Asian and American countries to African gas increased natural gas production and development activities in this region. The internal

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<sup>283</sup>EIA, “Libya”, *op. cit.*

<sup>284</sup>MMD, *op. cit.*, pp. 13.

<sup>285</sup>EIA, “Libya”, *op. cit.*

<sup>286</sup>“Natural Gas in West Africa”, Investing News, 27 Mar 2012.

<http://www.thestreet.com/story/11475780/1/natural-gas-in-west-africa.html>

<sup>287</sup>“Oil and Gas in Western Africa”, West Africa Resource Watch, pp. 4-5.

[http://www.google.com.tr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=0CG8QFjAH&url=http%3A%2F%2Fwww.osiwa.org%2Fattachment%2F22%2Foil%2520and%2520gas.pdf&ei=SGweUMz7PNHPsgbapoDoDg&usq=AFQjCNGFRGMWQwn0DWbbw\\_bOr4MwepIb0Q](http://www.google.com.tr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=0CG8QFjAH&url=http%3A%2F%2Fwww.osiwa.org%2Fattachment%2F22%2Foil%2520and%2520gas.pdf&ei=SGweUMz7PNHPsgbapoDoDg&usq=AFQjCNGFRGMWQwn0DWbbw_bOr4MwepIb0Q)

factors that helped the boom of natural gas production in the region are, (a) the end of the civil wars in Angola, (b) African markets' being closer to other regions such as North America and Europe, and (c) significant increase in the regional consumption. The demand in the region for natural gas is expected quadruple today's demand.<sup>288</sup>

#### 2.4.5.1 Nigeria

In 2011 the proven natural gas reserves in Nigeria amounted to 5.1 tcm.<sup>289</sup> The exploration activities are ongoing in the region, so this amount is expected to triple in the future.<sup>290</sup> The country produced 39.9 bcm/y of LNG and exported 25.9 bcm as of 2011 15.7 bcm of which is directed to Europe and Eurasian customers. The most frequent directions for Nigerian natural gas are Spain, France and Portugal.<sup>291</sup> Additionally, Nigeria sends LNG supplies all over the world; 7.6 bcm goes to the Asian market, 0.9 bcm to the Middle East and 1.7 bcm has been directed to continental America as of 2011.<sup>292</sup>

There are seven LNG facilities in Nigeria, the seventh one to be opened in late 2012. The current LNG facilities have the capacity of 34 bcm/y each. The additional three LNG projects were to come online in 2012, however, delayed due to technical problems and will be available only beyond 2016. By 2030, LNG export capacity of Nigeria is expected to reach 86 bcm/y and the consumption is expected to climb up to 40 bcm/y. So according to the estimates, the country would be available for sending additional supplies to the world markets including Europe by 2030.<sup>293</sup>

The pipeline connections are also available in Nigeria. The *West African Pipeline (WAGP)* transports gas from Nigeria to Ghana via Togo and Benin. Another pipeline project which is more strategic, is the *Trans-Saharan Gas Pipeline (TSGP)* with a capacity of 18 to 25 bcm/y travelling from Nigeria to Algeria. Apart from the African companies several other energy giants showed their interests in this project including Total and Gazprom.

In an overall look, Nigeria looks promising for the EU with its large gas reserves and even more promising with its higher potential of unproved reserves. There are major projects

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<sup>288</sup>*Ibid.*

<sup>289</sup>BP, 2012.

<sup>290</sup>Hafner et al., *op. cit.*

<sup>291</sup>BP, 2012.

<sup>292</sup>*Ibid.*

<sup>293</sup>Hafner et al., *op. cit.*

going on in the country, both to connect African countries among themselves and to increase the export options towards Europe. Considering the expected increase both in Africa and in Europe, Nigeria is expected to play a major role, especially after the necessary infrastructural developments are established.

#### **2.4.5.2 Angola**

After Nigeria, Angola is the largest oil producer in sub-Saharan Africa; however, the figures of natural gas reserves are highly uncertain. Some estimates that Angola possesses nearly 700 bcm of proven gas reserves, while others insist on lower figures such as 45 bcm.<sup>294</sup> Most of the gas, nearly 70 percent is either flared or vented, only 7 percent is ready for consumption. The government tries to decrease the amount that is flared.<sup>295</sup> The rest is injected in order to extract oil.<sup>296</sup>

LNG sector in Angola is mostly dominated by foreign companies, having 81.4 percent share in the sector.<sup>297</sup> LNG exports have just started, although not in large amounts and the first shipments are directed to Europe and Asia.<sup>298</sup> Initially around 6 bcm of gas will be shipped.<sup>299</sup>

#### **2.4.6 The Middle East and the Gulf Region**

The Middle East and the Gulf region are highly popular with its huge hydrocarbon reserves and notorious with its unstable political atmosphere. Located in the south east of Turkey, the region is very significant for Ankara both in economic and political terms. The huge natural gas reserves, 80 tcm and accounting 38.4 percent share in total, are very much desired by the European and Turkish natural gas markets. Nevertheless, political unrest, lack of political will for export, and continuous attacks in the region make it difficult to utilize and

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<sup>294</sup> Offshore, Website, "Deepwater gas gathering scheme to end flaring offshore Angola".

<http://www.offshore-mag.com/articles/print/volume-60/issue-8/news/deepwater-gas-gathering-scheme-to-end-flaring-offshore-angola.html>

<sup>295</sup> Hafner et al., *op. cit.*

<sup>296</sup> U.S. Energy Information Administration (EIA), "Angola", August 2011.

<http://www.eia.gov/countries/cab.cfm?fips=AO>

<sup>297</sup> "European Commission Clears Angola LNG Sale", Natural Gas for Europe, 16 May 2012.

<http://www.naturalgaseurope.com/european-commission-clears-angola-sale-6402>

<sup>298</sup> Shrikesh Laxmidas, "Angola LNG to start exports June, eyes Europe, Asia", *Reuters*, 24 Apr 2012.

<http://af.reuters.com/article/topNews/idAFJ0E83N0AT20120424>

<sup>299</sup> "First Angola LNG Supplies Imminent; Europe, Asia Market Targeted –Chevron", *Wall Street Journal*, 6 June 2012.

<http://online.wsj.com/article/BT-CO-20120606-702147.html>

benefit these resources. Below, the countries which are most likely to export to the EU are explained.

#### 2.4.6.1 Iran

Iran has the largest natural gas reserves in the world after Russia with 33.1 tcm. The country has produced 151.8 bcm and consumed 153.3 bcm of natural gas as of 2011. Apart from this, Iran exported 8.4 bcm to Turkey and 0.4 bcm to other Former Soviet Union, in total 9.1 bcm in the same year. In order to meet the balance between production and consumption/export, Iran imported 10.2 bcm from Turkmenistan and 0.4 bcm from other Former Soviet Union states.<sup>300</sup>

The reason for low production in Iran is mostly due to the fact that 60 percent of the resources are located in non-associated fields and cannot be easily developed. The political unrest in the region also affects the country a great deal preventing stable production of natural gas. In terms of imports, Iran could not send agreed volumes of gas, for example, to Turkey; the connection from Iran has a capacity of 10 bcm but never worked at full capacity. The greatest volume supplied from this connection to Turkey was 8.4 bcm in 2011. Recently, in 28 June 2012, an explosion took place in the Turkey-Iran pipeline in the Turkish section between Hıdırlı and Kalender villages had interruptions in deliveries. This is not the first time that an attack took place on this pipeline.<sup>301</sup> Because of such attacks, the supplies from Iran are unreliable both for Turkey and for the European Union.

This year, the U.S. increased sanctions on Iran, starting from June 28, 2012 and the EU also decided to put sanctions to be effective from July 2012 that restricted the foreign trade with the country.<sup>302</sup> The EU also “put a freeze on the assets of Iran’s central bank in the EU.”<sup>303</sup> A joint statement by the British Prime Minister David Cameron, ex French President Nicholas Sarkozy and German Chancellor Angela Merkel stated that Iran had “failed to restore international confidence in the exclusively peaceful nature of its nuclear

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<sup>300</sup>BP, 2012.

<sup>301</sup>“Iran suspends Natural Gas Flow to Turkey”, *TurkishNY*, 28 June 2012.

<http://www.turkishny.com/english-news/5-english-news/93330-iran-suspends-natural-gas-flow-to-turkey>

<sup>302</sup> “US, EU sanctions on Iran alter oil supply picture”, *Platts*, 29 June 2012.

<http://www.platts.com/newsfeature/2012/iran/index>

<sup>303</sup> “EU Iran sanctions: Ministers adopt Iran oil imports ban”, BBC UK, 23 Jan 2012.

<http://www.bbc.co.uk/news/world-europe-16674660>

programme.”<sup>304</sup> Iran, as a response to those countries, threatened to close the Strait of Hormuz through which 20 percent of global oil exports pass through this Strait. The effects of these sanctions on the natural market are to be seen in the future.

Being the second largest natural gas holder in the world, Iran is highly important for the energy markets particularly for Europe. However, there are two restrictions related to Iranian gas, (a) the potential to export in Iran is relatively low due to the high domestic consumption rates and (b) the economic sanctions posed by the U.S., the country has problems in making deals with the other parties. That is to say, if the political and economic situation would improve in the future, gas coming from Iran would contribute to the energy security of the EU as well as to the energy strategy and security of Turkey.

#### **2.4.6.2 Iraq**

Being the thirteenth largest oil producer in the world, Iraq’s oil and gas producing facilities have been severely affected by the war of 2003. Although there are large gas reserves, 3.6 tcm, the gas industry is not operating on a large scale. The country produces 1.9 bcm of natural gas and consumes very little of it.<sup>305</sup> The natural gas consumption makes up 4 percent of the total energy consumption and 96 percent of the share belongs to oil. Gas is only enough for domestic use and this amount cannot be exported. As natural gas consumption is relatively low, if the country increases its production, there will be extra gas to be supplied to the EU. However, as Iraq is reliant on oil for domestic consumption, additional infrastructural developments in natural gas are also needed for the export.

Iraq signed a “Strategic Energy Partnership Memorandum of Understanding with the EU” in January 2010 and the areas of cooperation include (a) “the identification of sources and supply routes for gas from Iraq to the EU” and (b) “updated Iraqi gas development program.”<sup>306</sup> The Prime Minister of Iraq, Nouri al-Maliki, said in 2009 that Iraq can export 15 bcm of natural gas to the EU which is half of what was initially planned.<sup>307</sup> Nonetheless,

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<sup>304</sup> “EU Iran sanctions: Ministers adopt Iran oil imports ban”, BBC UK, 23 Jan 2012.

<http://www.bbc.co.uk/news/world-europe-16674660>

<sup>305</sup>BP, 2012.

<sup>306</sup> MMD, *op. cit.*, pp. 15.

<sup>307</sup>Dr. Theodoros Tsakiris, “Nabucco Falling Part I: How U.S. Diplomacy Undermined the EC Sponsored Pipeline Project”, EKEM, 19 Aug 2011.

[http://www.ekem.gr/index.php?option=com\\_content&view=article&id=1370:nabucco-falling-part-i-how-us-diplomacy-undermined-the-ec-sponsored-pipeline-project&catid=168:2011-04-20-15-03-44&Itemid=291](http://www.ekem.gr/index.php?option=com_content&view=article&id=1370:nabucco-falling-part-i-how-us-diplomacy-undermined-the-ec-sponsored-pipeline-project&catid=168:2011-04-20-15-03-44&Itemid=291)

before aiming at the EU market, Iraq has to achieve high production rates as well as necessary projects to transport the gas such as a connection to Turkey. The political disorder and vulnerability of attacks are another issue of discussion which decreases the reliability of the Iraqi supplies.

#### **2.4.6.3 Qatar**

Located in the Gulf region, Qatar has the third largest natural gas reserves, 25 tcm, in the world after Russia and Iran. The country is very promising and active in global natural gas market. It has produced 146.8 bcm of natural gas in 2011 ranking at the fifth place after US, Canada, Russia and Iran. Contrary to its high level of production, the consumption in the country remains low at 23.8 bcm in 2011.<sup>308</sup> The rest of the gas is exported mainly via LNG and via pipeline to different parts of the world. In 2011, LNG exports of Qatar composed 31 percent of global LNG trade.<sup>309</sup> LNG exports accounted 102.6 bcm and the rest of it is exported to the Asia Pacific countries by 48 bcm, and 43.4 bcm is exported to Europe and Eurasia while the rest is directed to the American market in 2011.<sup>310</sup> The piped gas exports, 19.2 bcm, circulated in the Middle East region, the majority of it being directed to the United Arab Emirates (UAE).

Apart from its giant reserves, Qatar also attracts attention with its low export prices and rapid growth and development in its natural gas market. Unlike Oman, the domestic consumption is not likely to increase at a high speed curtailing the export volumes.<sup>311</sup> The production and the exports are expected to rise in the country, leading more supplies for the EU. There are no new projects related to LNG or pipeline connections; however, if more gas is to be exported, LNG facilities will need to be extended. Unlike Iran and Iraq, Qatar is more reliable as a supplier.

#### **2.4.6.4 The United Arab Emirates**

The United Arab Emirates (UAE) is the third largest economy in the region after Saudi Arabia and Iran. The UAE is comprised of seven different states and have significant reserves of both oil and gas ranking at the seventh place in the world in both. The UAE has

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<sup>308</sup>BP, 2012.

<sup>309</sup>Robin and Demoury, *op. cit.*

<sup>310</sup>BP, 2012.

<sup>311</sup>Jonathan Callahan, "Qatar's natural gas exports," *Energy Trends*, 6 Dec 2010.  
<http://mazamascience.com/EnergyTrends/?p=237>

6.1 tcm of proven natural gas resources. The UAE produces 51.7 bcm and consumes 62.9 bcm. The country imports 17.3 bcm of natural gas from Qatar and exports 8 bcm of gas to Asian countries mainly to Japan by 7.7 bcm.<sup>312</sup>

The UAE is expected to continue its projects with the Asian markets, there might be a chance for marginal amounts of natural gas to be exported to Europe; however, not included in the future projects at the moment.<sup>313</sup> Moreover, according to EIA, the current production rate in the country is decreasing while the consumption is increasing. The country will rely more on imports despite its huge natural gas reserves. The possible reason for this could be the cheap price of imported gas compared to the drilling and production facilities that has to be established in the country.<sup>314</sup>

Taking into account the decreasing production, increasing import and consumption the UAE is also not yielding encouraging results for the EU. The current exports of the country are directed to the Asian markets. Even if more gas is to be produced and exported, the current export directions are most likely to be conducted.

#### **2.4.6.5 Yemen**

Yemen has proven natural gas reserves of 0.5 tcm. Although the production of both oil and gas is limited in the country, the geographic location of Yemen makes the country an important supplier in the region. Yemen is situated at the tip of Bab el-Mandab which is one of the most important shipping lines in the world. Yemen first started to produce natural gas in 1993, and in 2011, its production reached 9.4 bcm.<sup>315</sup> LNG exports in Yemen began in 2009 and holding a significant place in the country's economy. In 2011, 8.9 bcm of LNG was exported.<sup>316</sup> The top markets for Yemeni gas are South Korea, the U.S., and China by 38 percent, 20 percent and 13 percent respectively. Only 1.2 bcm of Yemeni gas reaches Belgium, France and the UK in the EU.<sup>317</sup> Despite the insufficient amount, the EU contributes to the financial development of the country particularly by FDIs. The investments

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<sup>312</sup>BP, 2012.

<sup>313</sup>Hafner et al., *op. cit.*

<sup>314</sup>U.S. Energy Information Administration (EIA), "United Arab Emirates", January 2011.

<http://www.eia.gov/countries/cab.cfm?fips=TC>

<sup>315</sup>BP, 2012.

U.S. Energy Information Administration (EIA), "Yemen", 15 February 2012.

<http://www.eia.gov/countries/cab.cfm?fips=YM>

<sup>316</sup>BP, 2012.

<sup>317</sup>*Ibid.*

take place mostly in energy sector; particularly in LNG are led by the European companies with €3.3 billion.<sup>318</sup>

Yemen is a developing country and, in order to profit from revenues, the country exports nearly all natural gas it produces instead of using it in domestic consumption. In the long run, the country will need more energy in order to meet its growing domestic demand. Estimates show that by 2020, the country will need nearly 84 bcm of natural gas which cannot be met at the moment.<sup>319</sup> It is not likely in the foreseeable future that Yemen will send additional supplies to the European market; its reserves are not very promising, the consumption is expected to grow, production will remain low, and the currently produced amounts have already been tied up by long-term agreements.

#### 2.4.6.6 Oman

It was in 1990 that natural gas was found in Oman yet not in large volumes. *The Oil and Gas Journal* revealed the proven natural gas reserves of Oman as 849 bcm.<sup>320</sup> Most of the gas reserves, nearly 765 bcm are located in non-associated fields, therefore, hard to extract. The total production was 26.5 bcm in 2011.<sup>321</sup>

The natural gas supplies of Oman are mainly exported via LNG. In 2011 Oman exported 10.9 bcm of LNG. In LNG projects implemented in the country, 51 percent share is Oman's and 30 percent belongs to Shell, 5.54 belongs to Total and 5 percent to Korea LNG. The rest is comprised of Japanese investors and Partex. LNG is mainly exported to the East, Japan and Korea being the largest markets for Oman. Only a small amount is available for transportation to Europe, in 2011, only 0.2 bcm of LNG has been exported to Spain.<sup>322</sup>

The natural gas consumption in Oman is expected to increase competing with the export volumes and endangering the future exports. The future of gas balance in the country

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<sup>318</sup> Delegation of the European Union to the Republic of Yemen, "Investments".  
[http://eeas.europa.eu/delegations/yemen/eu\\_yemen/trade/investments/index\\_en.htm](http://eeas.europa.eu/delegations/yemen/eu_yemen/trade/investments/index_en.htm)

<sup>319</sup> Jane Nova, "Yemen's Natural Gas: Who Benefits?", *Worldpress*, 4 Aug 2006  
<http://worldpress.org/Mideast/2439.cfm>

<sup>320</sup> U.S. Energy Information Administration (EIA), "Oman", February 2011.  
<http://205.254.135.7/countries/cab.cfm?fips=MU>

<sup>321</sup> BP, 2012.

<sup>322</sup> *Ibid.*

EIA, "Oman", *op. cit.*

Hafner et al., *op. cit.*

is not very promising for the EU. This was also implied by Dr. Brian Buckley, CEO of Oman LNGas “when the choice has to be made [between] selling LNG or using that gas for enhanced oil recovery, at current prices the oil wins every time. Likewise when you talk about power, the one thing the rulers won’t do is switch the lights off. It will always take priority.”<sup>323</sup> In the long run, Oman might export LNG to Europe, nevertheless, in the short term the country will have to meet the domestic demand and supply the contracted Asian markets.

#### **2.4.7 The Arctic region - Norway and Russia**

The Arctic region is located at the north pole of the Earth, consisting of the Arctic Ocean and parts of Russia, Denmark, Norway, Finland, Iceland, Sweden, Canada and the U.S. Among these countries, Norway and Russia, being the major suppliers of natural gas to Europe, are likely to increase their natural gas reserves from the Arctic Ocean. U.S. Geological Survey estimates that “almost 25 percent of globe’s yet-to-be-discovered natural gas resources are located in the Arctic region.”<sup>324</sup> In 2011, Russia and Norway reached an agreement on exploration issues regarding the region.

The Snohvit field of Norway and the Shtockman of Russia promise good volumes of natural gas supplies, and in future they are most likely to be developed. Hence, if these resources can be utilized, the EU is likely to have a growing dependence on Russian supplies. The EU dependence on Norway which is a non-EU supplier is also high. However, Norway is the northern neighbor of the EU located in Europe and secure and a reliable supplier of natural gas to the EU. Norway as a supplier cannot be compared to other volatile markets in the Middle East and Africa plus Russia in terms of reliability.

#### **2.4.8 The Eastern Mediterranean Region**

There are also other distant alternatives, the Eastern Mediterranean supplies being one of them. Exploration activities have started in Israel and Cyprus, and if sufficient amounts could be extracted, they will most likely to be directed to the European markets.

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<sup>323</sup> ICIS, “Oman cuts back its LNG ambitions,” 5 Feb 2010.  
<http://www.icis.com/heren/articles/2010/02/05/9332360/oman-cuts-back-its-lng-ambitions.html>

<sup>324</sup> Ratner et al., *op. cit.*, pp. 27.

The recent developments in Cyprus raise hopes; nevertheless, Cyprus has no consumption of natural gas in its domestic market, hence it has no infrastructure to develop, transport, and exports the natural gas resources to other countries.<sup>325</sup> In Israel, on the other hand, the recent discovery of the Tamar field could enable the country to become self sufficient and even a net exporter of natural gas. The field has 240 bcm of natural gas reserves, which is enough for the country to be self sufficient for the next 20 years.<sup>326</sup> Both Israel and the U.S. energy company Noble Energy, invest in Cyprus, help the drilling facilities, and build infrastructure for domestic use and export. Turkey may also begin the exploration activities in the region, and this may increase the production volumes of natural gas.<sup>327</sup>

## 2.5 Conclusion

There are several alternatives for Europe to diversify its dependence on Russian gas. Nonetheless, it is difficult, costly, and impractical for Europe to abandon Russian supplies and build new infrastructure in order to get new supplies from different parts of the world.

In addition, not all the countries in the EU are willing to cut their dependence on Russian gas, some are in favor of sustaining the status quo, while some make new agreements to buy additional supplies of natural gas. Several bigger energy companies in Europe have huge financial interest in Russian partnerships and willing to invest more. On the other hand, as noted above, the countries in the South East European region are highly vulnerable to Russian supplies as their markets heavily rely on that. It is therefore that the EU needs a coherent energy policy in order to balance the interests of the different member states.

The aim of the EU is to have non-Russian supplies from non-Russian territories, at least one of these aims could be achieved. New agreements can be made and without the need for additional pipeline construction, the existing ones in Russia could be used for transporting gas. The Caspian supplies could transport in this way. The U.S. also backs Europe in its goal of supply diversification to reach the sources in Caspian basin. Because the Southern Gas Corridor project will remove Russian influence and domination both from the Caspian and the Central Asian countries' and the EU's natural gas markets. Regarding this issue, the U.S.

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<sup>325</sup>U.S. Energy Information Administration (EIA), "Cyprus", 30 June 2010.

<http://www.eia.gov/countries/country-data.cfm?fips=CY>

<sup>326</sup>MMD, *op. cit.*, pp. 15.

<sup>327</sup>Ratner et al., *op. cit.*, pp. 27.

President Barack Obama once addressed the situation of Turkey in the region and said that “... the U.S. will continue to support your central role as an East-West corridor for oil and natural gas.”<sup>328</sup> Therefore, the U.S. administration has backed the Southern Gas Corridor projects, the first one of which was the Nabucco project, losing its importance currently but revives in other projects like TANAP. The U.S. Ambassador Richard Morningstar also implied that the U.S. is very optimistic and supportive of the Southern Gas Corridor projects by his words: “We will support any pipeline in the Southern Corridor that meets [the] conditions.”<sup>329</sup>

The sources and the possible new expansions in the North African region are heavily dependent on political environment; transitions in Libya and Egypt particularly have a significant effect upon natural gas developments. In both countries new governments will soon be formed. It is important because the character and the stand of the new government affect the developments in energy sector and the trade patterns of the country a great deal. The EU and the U.S. help these countries to recover politically and socially by reforming their regulatory regimes “governing natural gas development as well as establishing oversight by nongovernmental organizations and their respective parliaments.”<sup>330</sup> In addition, both the EU and the U.S. provide financial aid and invest in the natural gas sector in both countries. In the short run these efforts yield fruits and help the diversification of Europe’s supplies from Russian gas.

The Middle East and the Gulf Region countries are also potentially unstable suppliers, because of the security issues. Other than Qatar, there is no country in the region able to supply the EU. In the future, it is uncertain whether Iran or Iraq could utilize their sources and be a reliable supplier for the EU. In other countries, such as the UAE, Yemen and Oman, several developments regarding the infrastructure and exploration fields should take place. The increasing indigenous consumption in those countries also increases doubts about the future of extra gas available for the EU.

The Arctic region is as promising as it was before. Norway and Russia are the two main additional suppliers of natural gas to the EU, so with the improvement of the fields in

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<sup>328</sup> qtd in Evin, *op. cit.*, pp. 89.

<sup>329</sup> Trend, “U.S. Embassy clarifies Richard Morningstar’s statements made at press conference in Baku,” 17 November 2011.

<http://en.trend.az/news/politics/1958342.html>

<sup>330</sup> Ratner et al., *op. cit.*

the Arctic region, supplies could be enhanced towards the EU. If Russian volumes of export increase, this will be contradictory with the EU's aim to reduce its dependence on Russian gas, nevertheless, Norwegian exports will relieve the EU to a certain extent. The Eastern Mediterranean region countries, Israel and Cyprus, also increase hopes. The U.S. and the EU might also help to develop their resources as both countries are inexperienced and are willing to benefit from technological and financial assistance of the EU and the U.S. in order to implement large scale natural gas projects.

There are plenty of promising fields where natural gas the volumes are high. Nevertheless, the fields of North and West Africa need to be developed. Political obstructions occur in every region, most dominantly felt in the Middle East and the Caspian region. Until the conflicts are unresolved, it is impossible for the resources in these regions to be utilized by the EU. The Arctic and the Eastern Mediterranean regions are also encouraging. In sum, there are six countries which are most likely to send supplies to the EU: Azerbaijan, Egypt, Libya, Algeria, Qatar, and Nigeria. The rest of them either cannot supply to the EU nor need further developments regarding the infrastructure and the natural gas fields.

## CHAPTER THREE

The major natural gas suppliers and the possible future suppliers to the EU are all situated in Turkey's periphery and the additional gas that could be transported to the EU is likely to cross over Turkey's territory. This chapter sets out the current and the potential role of Turkey as a transit state for the EU, with particular attention to the routes towards the South East European countries. In this regard, first Turkey's geographical situation then the supplier regions will be analysed with particular attention to specific countries. The challenges for the EU with respect to the supplier countries will also be examined.

### 3.1 Turkey's Geography

Turkey is not a hydrocarbon resource rich country. It consumes high levels of fossil fuels; however, apart from coal, the conventional hydrocarbon reserves of Turkey is negligible. However, it is situated in between energy producers that are holding significant volumes of natural gas. World's 71.8 percent of proven gas reserves and 72.7 percent of proven oil reserves are located around Turkey.<sup>331</sup> On the other hand, the EU, as one of the biggest energy consumer in the world, particularly of gas, lies in the west. Naturally, Turkey is expected to play the role of an energy transit state and a corridor between the supplier countries and the consumer countries. However, there are political and economic challenges regarding the status of Turkey as a transit country which will later be discussed in this chapter.

As also stated in Turkey's *Strategic Plan for 2010-2014*, the long-term aim of Turkey is to turn the "... country into an energy hub and terminal by using [the] geo-strategic position effectively within the framework of the regional cooperation processes".<sup>332</sup> This aim also serves Turkey's goal of being the "fourth artery" to supply gas to the EU after Russia, the North Sea and North Africa.<sup>333</sup> These ambitions are the main rationale behind Turkey's will to be a transit state of natural gas to Europe. The European countries and the EU also

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<sup>331</sup> Roberts, *op. cit.*

<sup>332</sup> The Republic of Turkey Ministry of Energy and Natural Resources, "Strategic Plan (2010 – 2014)", pp. 29. [http://www.enerji.gov.tr/yayinlar\\_raporlar\\_EN/ETKB\\_2010\\_2014\\_Stratejik\\_Planı\\_EN.pdf](http://www.enerji.gov.tr/yayinlar_raporlar_EN/ETKB_2010_2014_Stratejik_Planı_EN.pdf)

<sup>333</sup> Roberts, *op. cit.*, pp. 114.

supports Turkey's potential role as a bridge and backs the projects under the Southern Gas Corridor initiative.<sup>334</sup>

The strategic importance of Turkey became much more important after the U.S. support for the pipeline developments in the Caspian region in the 1990s. The political and economic development and independence of the post-Soviet states was important for the Washington and still is. Turkey's geopolitical importance and the possibility of being an energy corridor gained significance especially after 1990s.<sup>335</sup> The main rationale behind the attitude of the U.S. was to prevent Russia getting stronger in the region by dominating the economies of the NIS.<sup>336</sup> Therefore, Turkey and Russia had a conflicting status in the region. On the one hand, Turkey acted like a brother to those states, as most of them came from Turkic roots, on the other hand Russia wanted to regain its power on recently independent states.

Today, the relationship between Russia and Turkey over the gas transit issue can be described as a zero-sum game. While Russia provides nearly 70 percent of Turkey's natural gas imports, Turkey can be an alternative route for Russian natural gas deliveries to Europe. Certain amounts of Russian gas could be transported via the pipeline that is to be constructed under the Southern Corridor project, for instance the TANAP. And thereby, Russian gas will continue to supply Europe from a different direction. Instead of the South Stream project, which is more expensive, Russia could send supplies to the European market via Turkish pipeline connections.<sup>337</sup>

Turkey is well-situated for being a transit country between the world's major suppliers and the major consumers of natural gas. The EU and the U.S. support Turkey's aim which is to become the "fourth artery" to the EU. However, there are some challenges regarding its important role which are to be indicated further in this chapter.

### **3.2 Transport options of current, potential and alternative supplies to the EU**

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<sup>334</sup> Tolga Vural, "Turkey as an energy bridge between East and West", Museo Energia.  
<http://www.museoenergia.it/museo.php?stanza=78&ppost=998>

<sup>335</sup> Gareth M. Winrow, "Turkey as an Energy Transit State", at the Conference titled: "Black Sea: Energy and the Environment", Istanbul Bilgi University, 15 May 2003.

<sup>336</sup> The Newly Independent States include Azerbaijan, Georgia, Armenia, Turkmenistan, Uzbekistan and Kazakhstan.

<sup>337</sup> Winrow, *op. cit.*

Table 3.1 explains the reserves, the production, the consumption and the import-export balance of the countries around Turkey's vicinity.

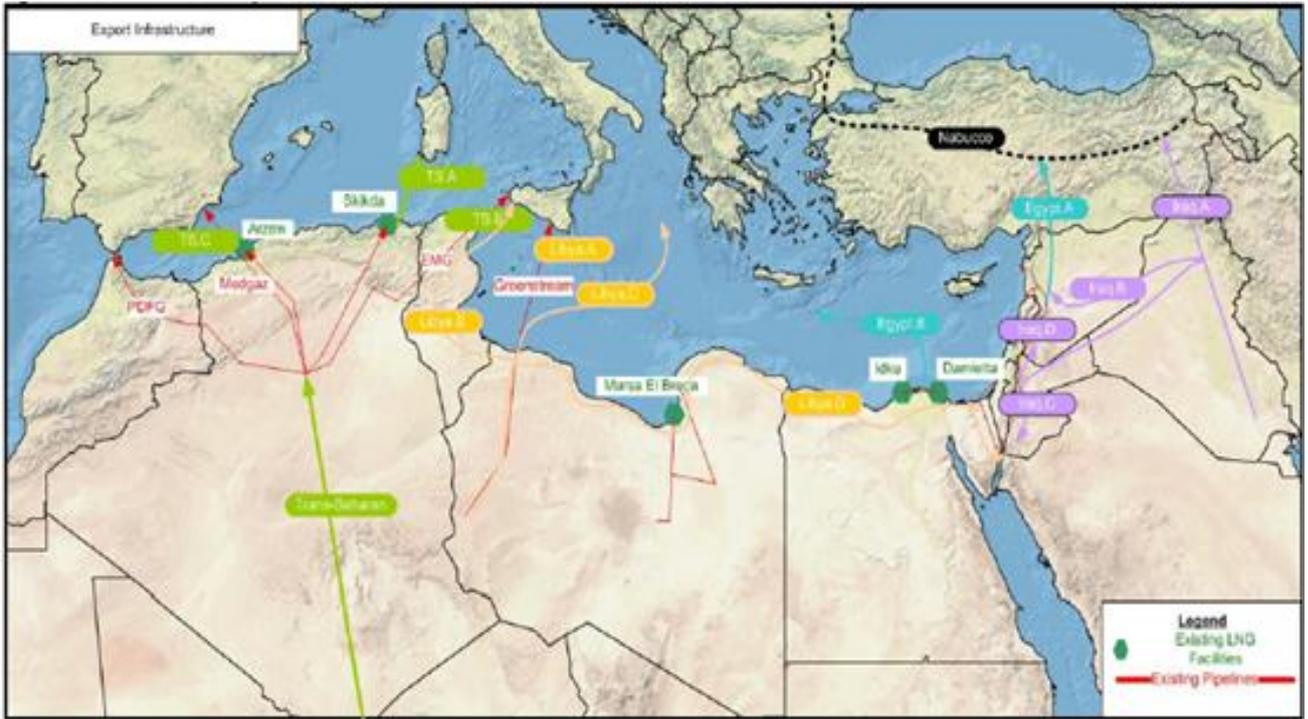
Table 3.1: The natural gas producers in Turkey's neighborhood

<b>Region / Country</b>	<b>Proven reserves (tcm)</b>	<b>Share of total</b>	<b>Production (bcm)</b>	<b>Consumption (bcm)</b>	<b>Imports (bcm)</b>	<b>Exports (bcm)</b>	<b>Extra gas (bcm)</b>
<b>Central Asia/Caspian</b>	29.1	14 %	150.6	91.5	n/a	60.6	-1.5
<b>Azerbaijan</b>	1.3	0.6 %	14.8	8.2	n/a	6.6	0
<b>Turkmenistan</b>	24.3	11.7 %	59.5	25.0	n/a	34.6	-0.1
<b>Uzbekistan</b>	1.6	0.8 %	57.0	49.1	n/a	7.9	0.0
<b>Kazakhstan</b>	1.9	0.9 %	19.3	9.2	n/a	11.5	-1.4
<b>Middle East</b>	70.2	33.3 %	408.0	286.5	10.6	130.9	1.2
<b>Iran</b>	33.1	15.6 %	151.8	153.3	10.6	9.1	0
<b>Iraq</b>	3.6	1.7 %	1.9	1.9*	n/a	n/a	0
<b>Qatar</b>	25.0	12 %	146.8	23.8	n/a	121.8	1.2
<b>Saudi Arabia</b>	8.2	3.9 %	99.2	99.2	n/a	n/a	0
<b>Syria</b>	0.3	0.1 %	8.3	8.3*	n/a	n/a	0
<b>Africa</b>	2.2	1.1 %	61.3	49.6	n/a	8.6	3.1
<b>Egypt</b>	2.2	1.1 %	61.3	49.6	n/a	8.6	3.1
<b>Russia</b>	44.6	21.4 %	607.0	424.6	30.1	221.4	-8.9
<b>Total:</b>	146.1	69,8 %	1226.9	852.2	40.7	421.5	-6.1

Source: BP, 2012.

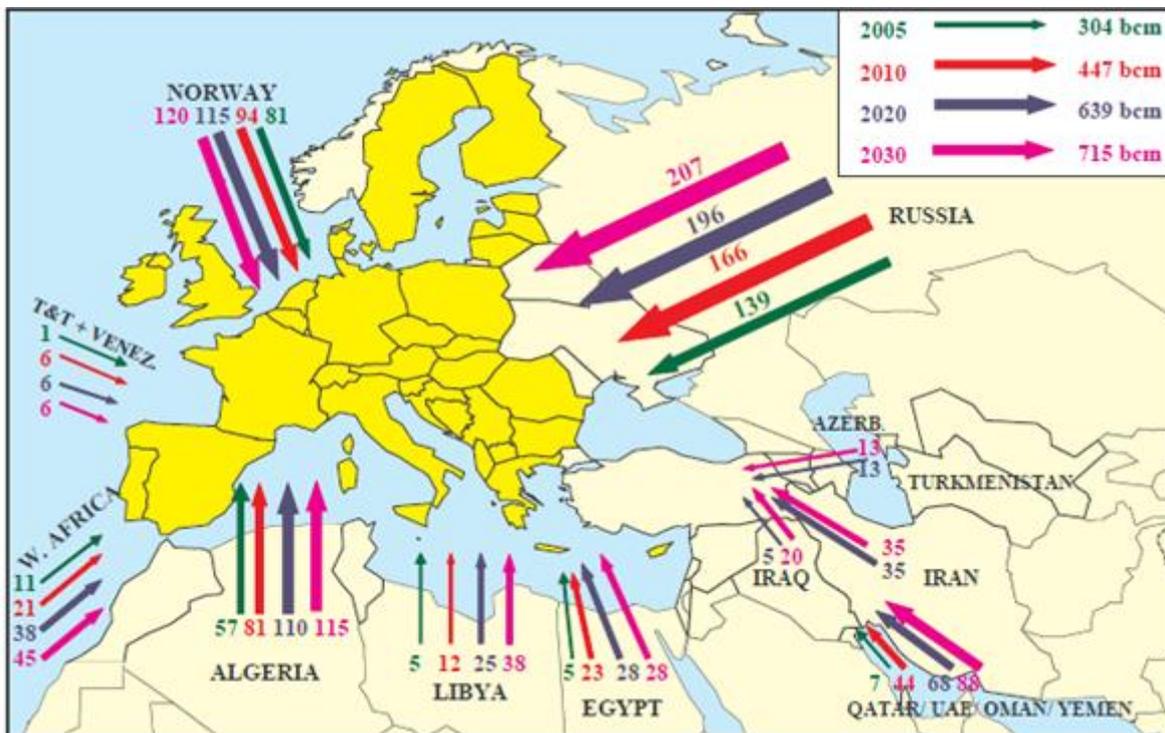
Having referred to the possible suppliers of gas to the EU in the previous chapter, this chapter will set out the possible ways to transport the gas from those supplier countries to the Union. The aim of the chapter is to assess the transport options to Europe and analyze Turkey's position in this sense.

Map 3.1: Transport corridor options summary



Source: MMD.

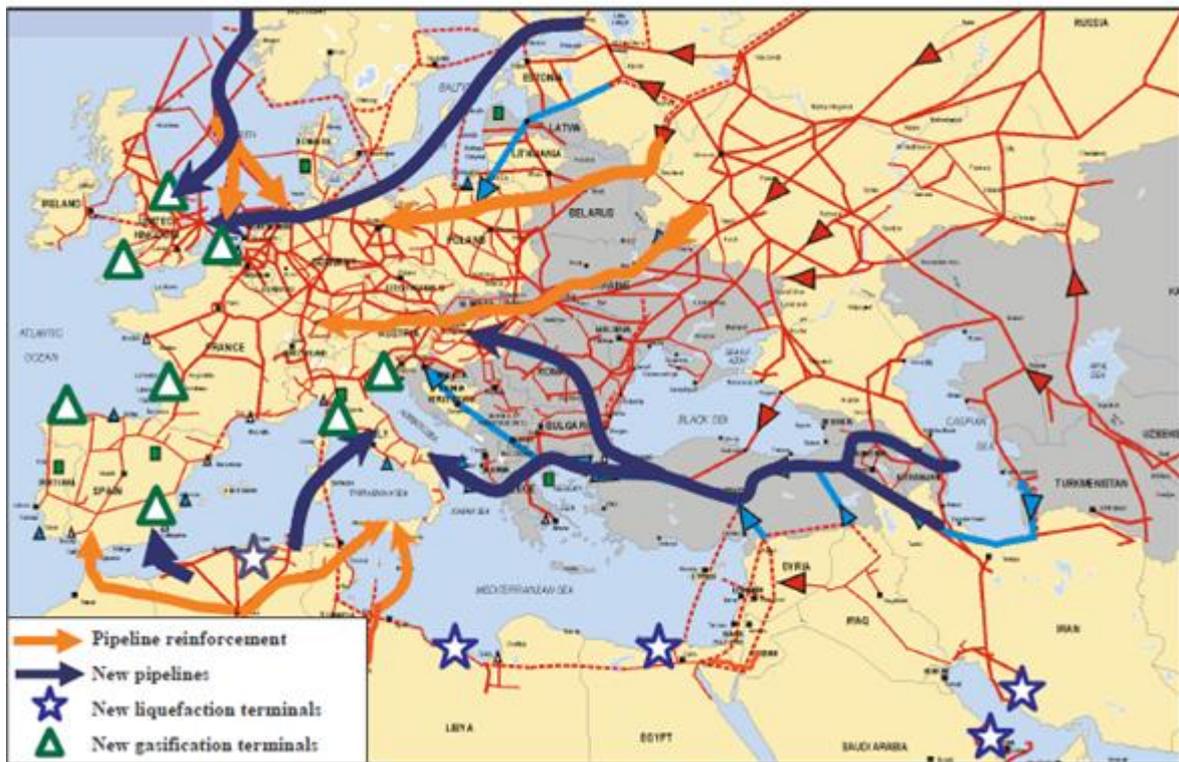
Map 3.2: Gas export potential to Europe



Source: OME<sup>338</sup>

<sup>338</sup> Haffner et al., *op. cit.* pp. 16.

Map 3.3: Ongoing and future gas corridors development to Europe



Source: OME<sup>339</sup>

### 3.2.1 The Caspian Region

Access to Caspian resources has become possible with the collapse of the Soviet Union. The countries in the region, Azerbaijan, Turkmenistan, Kazakhstan, and Uzbekistan are rich in terms of natural gas and oil resources. The total proven reserves natural gas of these countries accounts 29.1 tcm.<sup>340</sup>

As mentioned, most of Turkmen gas is tied by long-term agreements to Russia and China. In order to utilize the resources in Turkmen fields to the West, intra-regional conflicts, such as the status of the Caspian Sea, need to be resolved. That is to say, in order for Turkmen, Kazakh and Uzbek gas to be delivered to Europe, a Trans-Caspian network is essential, but the construction of which is opposed by Russia and Iran.<sup>341</sup>

On the other hand, the majority of the current pipeline connections from these countries are towards the East rather than the West. Turkmenistan has a pipeline connection

<sup>339</sup> *Ibid.*, pp. 17.

<sup>340</sup> BP, 2012.

<sup>341</sup> Ratner et al., *op. cit.*, pp. 19.

to China, and Kazakhstan is on the verge of building one. Besides, Turkmenistan also considers sending gas to Afghanistan and Pakistan and more importantly to India, a major important emerging economy.

Russia already secured supplies from Kazakhstan, Turkmenistan and Uzbekistan a few years ago and on June 29, Moscow signed a treaty to buy 1000 m<sup>3</sup> of gas from Azerbaijan at the highest price Russia ever paid for gas. This short-term uneconomic measure has significant implications. Azeri gas, unlike that is supposed to come from Turkmenistan or Kazakhstan, is directly available to be exported to Europe.<sup>342</sup> Therefore, Moscow is closely interested in the Azeri natural gas market and exports.

With 29.1 tcm of proven gas reserves and having 14 percent share of the world's proven reserves, the Caspian region is very important for the EU. The region is specifically important for Turkey to become an important energy transit country because the possible transportation of Caspian and the Central Asian exports will be through Turkey which also serves the interest of the EU and the U.S.

### **3.2.1.1 Azerbaijan**

Azerbaijan is the most promising state for gas supplies and the first alternative route for Europe in order to diversify the natural gas imports of the Union. Azerbaijan is currently developing the Shah Deniz II field where 16 bcm of natural gas will be extracted and produced by 2017.<sup>343</sup> The Azeri government is ready to export this volume; however, the slow process in the Southern Corridor initiatives left SOCAR and Azeri officials in suspense. Therefore, the country decided to develop its own sources and by its own routes without being dependent on any other national company or country.

After the Nabucco project faded away, the immediate reaction came from Azerbaijan which proposed the TANAP connection instead of Nabucco where Turkey becomes the only partner with 20 percent share. This project is the back-up plan of Azerbaijan because the country is ready to extract additional gas in the Shah Deniz Phase II project. Azerbaijan is

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<sup>342</sup> Global Politics, *op. cit.*

<sup>343</sup> Nicolò Sartori, "The European Commission's Policy Towards the Southern Gas Corridor: Between National Interests and Economic Fundamentals", Istituto Affari Internazionali, 1 Jan 2012.

planning to sell 16 bcm/y that will come from Shah Deniz Phase II. The TANAP, financed, transported and supplied by Azerbaijan is an invaluable project for Baku.

The TANAP project is expected to carry 16 bcm of natural gas from Shah Deniz Phase II, 6 bcm of which will be domestically consumed by Georgia and Turkey, and 10 bcm will be exported to Europe. The pipeline will run directly from Baku to the Bulgarian border. How this gas will be transported to the rest of Europe from the Bulgarian border is not yet decided. There are 3 different options all starting from the Bulgarian border and connecting to either to the Central or to South East Europe.

The first project is the *South East European Pipeline (SEEP)* project which is supported by BP and first announced in September 2011. It will run from Turkey to Hungary with a capacity of 10 bcm/y. The most attractive part of this pipeline is its being cheaper than other projects.<sup>344</sup> The SEEP minimizes the construction costs by using the existing pipeline structures and interconnectors in the Balkans and in the SEE which is an economic advantage for the EU. Considering the recent economic situation in Europe, the cost savings proposed by BP will be highly appealing for the EU. However, there are also doubts about the practicality of the pipeline. First of all, some of the existing structures in the region are old. Although BP proposes to add extra facilities to renovate them and link to each other, there is another major problem. The use of existing pipelines will not permit the expansion of the SEEP's capacity. The pipeline will be unscalable. On the other hand, TANAP will be scalable and is expected to expand its capacity in the future. As far as the long-term supply interest of Azerbaijan and the EU is concerned, the SEEP remains as a narrow and a temporary project.

The second option for the transmission of Azeri gas from Turkey to Austrian Baumgarten station is the *Nabucco-West*. This project is the shortened version of Nabucco pipeline. Originally Nabucco pipeline was to run from Baku to Baumgarten and now with this new project of Azerbaijan, the first section from Baku to Bulgarian border will be called as TANAP with a single supplier, and the rest of the route is proposed to remain as Nabucco-West. This project competes the BP's the SEEP as their targetted markets are nearly the same

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<sup>344</sup> Elnur Soltanov, "The South East Europe Pipeline: Greater Benefit for a Greater Number of Actors", Istituto Affari Internazionali, 2 Jan 2012.  
<http://www.iai.it/pdf/DocIAI/iaiw1202.pdf>

and strategic. Although more expensive, this pipeline is scalable and brand-new unlike the SEEP. This connection already gained the support of the Nabucco consortium countries: Bulgaria, Hungary, Austria and Romania.<sup>345</sup>

The third and the last option to transport Azeri gas to Europe is to construct the *ITGI and TAP* connections and pump the gas from Bulgarian border to Italy and Greece. Neither ITGI nor TAP are scalable and, even worse, both are directed to unstrategic markets. This project, as well as the SEEP, are short-term projects in contradiction to the long supply diversification aim of the EU. The target markets of the ITGI and TAP have long-term contracts with LNG supplying countries, as mentioned in the previous chapter. Both the SEEP and Nabucco-West target the Central and South East European regions, where the dependence on Russian exports are high, unlike Italy and Spain. Italy, for example, has several supply sources from different countries, both in the form of LNG and piped-gas. Therefore in order for any project to be considered as successful in ensuring the energy supply security of the EU, it should first be directed to the highly dependent markets, such as the SEE region. In addition, when the current critical economic situation in Italy and Greece is considered, it is not very likely that those countries could support these projects. Because of the reasons listed above, this option is less lucrative for Azerbaijan and less preferable for the EU.<sup>346</sup>

Within the Southern Gas Corridor projects, the *White Stream* project which was designed to carry 31 bcm/y, and run from Azerbaijan, Georgia to Romania under the Black Sea is proposed in 2005. Although in some sources this project is regarded as a supplementary project for Nabucco, Azerbaijan was not capable of supplying that amount of gas. This project also seems to be shelved for the time being and Azerbaijan focuses on its own proposal, the TANAP project.<sup>347</sup>

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<sup>345</sup> Oleg Vukmanovic and Barbara Lewis, "Shah Deniz partners back Nabucco West pipeline: BP", *Reuters*, 28 Jun 2012.

<http://www.reuters.com/article/2012/06/28/us-caspian-nabucco-idUSBRE85R13220120628>

<sup>346</sup> Vladimir Socor, "The Trans-Anatolia Gas Pipeline and Its Continuation Options to Europe", Jamestown Foundation, *Eurasia Daily Monitor*, Vol: 9/70, 9 Apr 2012.

[http://www.jamestown.org/regions/turkey/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=39243&tx\\_ttnews%5BbackPid%5D=408&cHash=5d8fd34494577afe4cee70562daa8a9d](http://www.jamestown.org/regions/turkey/single/?no_cache=1&tx_ttnews%5Btt_news%5D=39243&tx_ttnews%5BbackPid%5D=408&cHash=5d8fd34494577afe4cee70562daa8a9d)

<sup>347</sup> -, "Southern Corridor, White Stream: the Strategic Rationale", Jamestown Foundation, *Eurasia Daily Monitor*, Vol: 6/200, 30 Oct 2009.

[http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews\[tt\\_news\]=35676&tx\\_ttnews\[backPid\]=7&cHash=6399a84a28](http://www.jamestown.org/single/?no_cache=1&tx_ttnews[tt_news]=35676&tx_ttnews[backPid]=7&cHash=6399a84a28)

White Stream Official, Website, "Diversifying Europe's Gas Imports", 20 Feb 2012.

To conclude, it is possible to argue that the ITGI and TAP connections are the least attractive ones for both the supplier and the consumer market, from all perspectives. The volume of ITGI and TAP will be insignificant considering their destination of Italy and Greece, where it is possible to export high volumes of LNG. The other alternatives, nevertheless, have different pros and cons. The Nabucco-West pipeline seems highly preferable by the EU states as it is scalable and directed to the strategic markets in the Central and South East Europe. Nonetheless, the Nabucco-West inherits the most important problem of the Nabucco project. The construction and the future of Nabucco-West depends on intergovernmental agreements affected by the interests of the national companies which makes it very hard to take decisions and proceed. On the other hand, the SEEP will be decided and operated by a single company, BP, and directed to strategic markets yet in insufficient amounts and old infrastructures.<sup>348</sup>

Although it is not the aim of this thesis to decide on a route, observing the current situation in Europe, the SEEP seems like the most doable scenario. Nevertheless, in a short period of time the EU may revive its economy and prefer Nabucco-West connection which will be expandable. The expansion of the TANAP is subject to the gas supplies from Egypt, Turkmenistan, Iran and Iraq, which do not flow in the short-term. The possible export options for those countries will be listed below. Despite the possibility of the export from those countries to be injected into the TANAP, due to political instability and restrictions, those volumes are not likely to flow to Europe soon.

Map 3.4: The Caspian gas transport options through Southern Corridor

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<http://www.gueu-whitestream.com/main.php?id=1>

<sup>348</sup> Borut Grgic, "Guest post: BP pipeline – late but good", Financial Times, 11 Oct 2011.

<http://blogs.ft.com/beyond-brics/2011/10/11/guest-post-the-bp-pipeline-plan-is-late-but-good/>



### 3.2.1.2 Turkmenistan

Having the fourth largest natural gas reserves in the world, 24.3 tcm, Turkmenistan's gas infrastructure is mainly designed to supply its neighbors: Kazakhstan, Russia and Uzbekistan. Turkmenistan produced 59.5 bcm of natural gas in 2011, and used 25 bcm of this for domestic consumption. The rest is exported to Russia, Iran, and China.<sup>349</sup>

Despite having enough customers to sell its gas, Turkmenistan wants to diversify its transport routes. Russia and Iran are objecting to the construction of the Trans-Caspian link to then carry Turkmen supplies to Azerbaijan and from there continue to Europe via TANAP or another link. Although they claim that the reason for their objection is international law and agreements, the underlying rationale behind their objections is the high possibility of Turkmen gas to compete with Russian and Iranian gas. Apart from the legal status and the impossibility of building the Trans-Caspian link at the moment, Turkmenistan seems to have other export directions in mind. The diversification routes of Turkmenistan is likely to be further south to Afghanistan, Pakistan and India supported by the plans to build a TAPI connection between these countries in order to supply India.

Although obtaining huge reserves of natural gas, the production of Turkmenistan hardly meets the consumption and the current exports. Even if the production is increased, the

<sup>349</sup> Sergey Guneev, "Turkmenistan set to continue strategic energy cooperation with Russia", Ria Novosti, 9 Sep 2010. <http://en.rian.ru/world/20100930/160776513.html>

current political status in the Caspian Sea will not let Turkmenistan to supply the European markets. More importantly, located in a strategic position, Turkmenistan is geographically close to both China and India which are two top growing markets in the world. The natural gas demands of those countries are expected to rise tremendously, more than four times of what they consume today by 2035.<sup>350</sup> Taking these facts into consideration, it is economically and politically preferable and viable for Turkmenistan to cooperate with the Eastern and Southern neighbors than struggling to reach western markets.

### **3.2.1.3 Kazakhstan**

The country produced 19.3 bcm of natural gas in 2011 and consumed 9.3 bcm.<sup>351</sup> The rest was exported to Russia and China. The agreement to construct a Kazakh connection to the Central Asia-China pipeline was signed in 2008 and expected to become operational in 2015. As it is also the case in other Central Asian states, the future of the Kazakh exports to Europe is depends on the willingness of Russia and Iran to cooperate. Moreover, the production of Kazakhstan is not as high as the other states in the region, restricting its surplus gas potential. Although Kazakh consumption is low, it is likely to increase in the medium term and if the production remains low, it will hardly accommodate the possible future exports.

### **3.2.1.4 Uzbekistan**

Producing 57 bcm and consuming 49.1 bcm, Uzbekistan is a self-sufficient country in natural gas.<sup>352</sup> The surplus of gas, nearly 7 bcm, is transported mainly to Russia, Kazakhstan, Kyrgyzstan and Tajikistan. Uzbekistan had European orientations; nevertheless, the amount of gas produced is not enough to export to the West. Uzbekistan cannot be a supplier to the western markets on its own; it can only support other countries which can export to Europe. Like Turkmenistan, Uzbekistan, without a Trans-Caspian link, is not able to export its surplus gas to the West. Uzbekistan would also like to supply China and already supplying Turkmenistan.

### **3.2.1.5 Conclusion**

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<sup>350</sup> OECD/IEA, *GAS 2011*, pp. 8.

<sup>351</sup> *Ibid.*

<sup>352</sup> BP, 2012.

Regarding the current status in the Caspian Sea, the biggest challenge that prevents the shipment of the natural gas exports from the Central Asia to Europe is the inability to construct the Trans-Caspian link. The option of building LNG plants for shipment across the Caspian Sea would be too costly. Secondly, apart from Turkmenistan, the production in Central Asian countries hardly meets the domestic demand, therefore, leaving little gas for export. Thirdly, the future plans of the national governments show that their priority is shifting east to China and south to India.

The other common challenge for these countries is Moscow's interference in their international and domestic affairs particularly in natural gas trade. They meet Russian resistance to enter the lucrative European market. Russia has already signed long-term contracts with all the states in the region to block their exports to Europe.

Azerbaijan, as noted, is the most promising country in the Caspian region in terms of immediate gas exports to Europe with the TANAP project. However, Azeri proven gas reserves are 1.3 tcm, being the lowest in that region. Considering the expected production from Shah Deniz Phase II, 16 bcm/y by 2017, and the current production from Shah Deniz Phase I, 16 bcm/y; the country will be producing 32 bcm of natural gas annually. This reveals the bitter truth; the reserves of Azerbaijan will only be enough to supply Europe for approximately 40 years if the current export agreements remain as such.

Without the Trans-Caspian link, it would be harder for the region and for the western consumers to get sufficient amounts from the Caspian basin. One option can be carrying Caspian gas through Russia, paying transit fees to the country. Nevertheless, it is quite clear that the transportation issues are highly vulnerable to political dynamics between the countries. That is to say, it is certain that before the political status of the Caspian Sea could be resolved, it is hardly possible to transmit gas from the Central Asian countries to the western markets.

### **3.2.2 The North African Region**

In the North African region the most significant gas supplier countries are Algeria, Egypt and Libya. They already supply large volumes of gas to Europe via pipelines and LNG. These countries hold tremendous natural gas reserves which are needed to be developed. The forthcoming North African and Middle Eastern suppliers provide an

optimistic scenario assuming that the AGP's connection from Syria to Turkey is completed and gas fromis connected to the Southern Gas Corridor project disregarding the political situations and disturbance.

### 3.2.2.1 Egypt

Egypt produces 61.3 bcm of natural gas and consumes 49.3 bcm of it. The rest is exported via the AGP pipeline to Jordan, Syria, and Lebanon. The current capacity of the pipeline is 10 bcm; however, only 3.7 bcm was supplied from the AGP in 2010.<sup>353</sup> The capacity of the pipeline is expected to be expanded up to 21 bcm. If Egypt also considers supplying the EU with additional volumes, the current production will not be able to meet both expansions in supply volumes.

If possible, the gas could be transported to Europe via the AGP connection if the planned connection to Turkey is built. From Turkish border, gas will be added to the Southern Gas Corridor, and will be directed to the EU market. Yet, the current infrastructure of AGP connection is not ready for an additional flows: the capacity of the AGP should be expanded or an extra line should be constructed in order to accommodate the additional volumes.

Currently Egypt is supplying 4.3 bcm of LNG to Europe.<sup>354</sup> LNG terminals in Damietta and Idku will be expanded to 28 bcm/y by 2018 in order to accommodate more gas exports.<sup>355</sup> Both the EU and Egypt prefer to trade natural gas in LNG form because the EU has developed its LNG facilities and capacities and has over capacity of regasification facilities. On the other hand, to export gas via pipeline is a less preferable option by Egypt as the transit countries could form a bottleneck on the way. The region is highly volatile and open to political conflicts; therefore, LNG trade is a more reliable and safe option.

In the shorter term; LNG exports to the EU are likely to gain more importance as it is safer and cheaper compared to the unfinished and unscalable connection of the pipeline infrastructures. The completion of AGP pipeline is the key issue for the Egyptian exports to

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<sup>353</sup> MMD, *op. cit.*, pp. 10.

<sup>354</sup> BP, 2012.

<sup>355</sup> MMD, *op. cit.*

Europe via pipeline. If the connection between Turkey and Syria is built, Turkey will have the chance to play an important role. Nevertheless, this does not seem realistic at the moment.

### 3.2.2.2 Algeria

The supplies from Algeria are the least problematic ones and as indicated in many sources, there is no need for additional EU public investments in Algeria's natural gas sector. The aim is to increase the current level of export volumes from 60 bcm to 90 bcm, including both LNG and piped gas.<sup>356</sup> Neither LNG connections nor the pipeline projects in the country will transit Turkey. Therefore, Algerian exports do not contribute to the role that Turkey wishes to play as a transit country.

The possible pipeline export routes to Europe are listed below. An important development for Algeria is the completion of the *Trans Saharan Gas Pipeline (TSGP)* which is agreed between Nigeria, Niger and Algeria to transport Nigerian gas to Algeria and export directly to European market.<sup>357</sup> The project is ready to supply 30 bcm/y. Hence it would be more cost-effective and feasible for Algeria to build additional LNG facilities to Nigeria.<sup>358</sup> The current LNG facilities in Algeria are sufficient but the future scenarios for LNG exports show that Algeria can export at least 100 bcm/y and at most 120 bcm/y.

The *Galsi* pipeline is expected to carry 8 bcm of natural gas to Sardinia and Italy by 2014.<sup>359</sup> The *TransMed* pipeline where there would be a need for additional sub-sea pipeline is directed to Italy, Tunisia, Sicily and Slovenia carrying 7 bcm of natural gas.<sup>360</sup> It is also possible to add an extra pipeline connection running parallel to the *Medgaz* Pipeline running from Algeria to Spain.

Among these three scenarios of pipelines, the most strategic and preferable one the *Transmed* pipeline, as the target markets are more desirable both for the suppliers and the

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<sup>356</sup>*Ibid.*, pp. 7.

<sup>357</sup> Riccardo Fabiani, "Is the Trans-Sahara Gas Pipeline a Viable Project? The Impact of Terrorism Risk", Jamestown Foundation, *Terrorism Monitor*, Vol: 7/25, 13 Aug 2009.  
[http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=35412](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=35412)

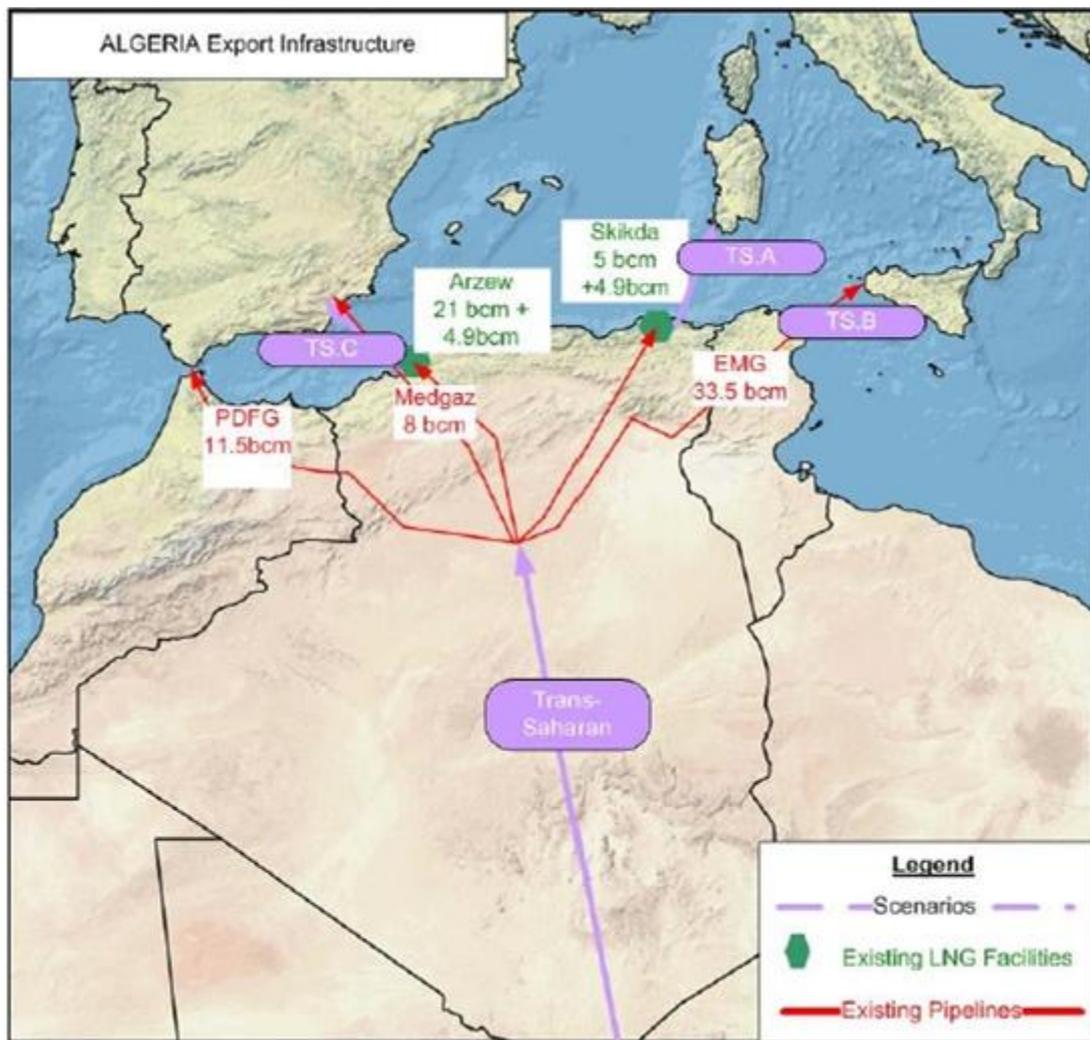
<sup>358</sup>*Ibid.*, pp. 40.

<sup>359</sup> Edison, Website, "Galsi: Algeria-Sardinia-Italy Gas Pipeline".  
<http://www.edison.it/en/company/gas-infrastructure/galsi.shtml>

<sup>360</sup> ENI, Website, "Transmed".  
[http://www.eni.com/en\\_IT/innovation-technology/eni-projects/transmed/transmed-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/transmed/transmed-project.shtml)

consumers. Other options are all directed to non-strategic markets such as Spain from where the gas could hardly be transmitted to other European countries. To circulate the gas to the SEE region, interconnectors could be developed among Italy, Slovenia, Croatia and Hungary in order to supply these countries. The possible expansion of the Transmed pipeline would be also an advantage for the consumers.

Map 3.5: Algerian Export infrastructure



Source: MMD.

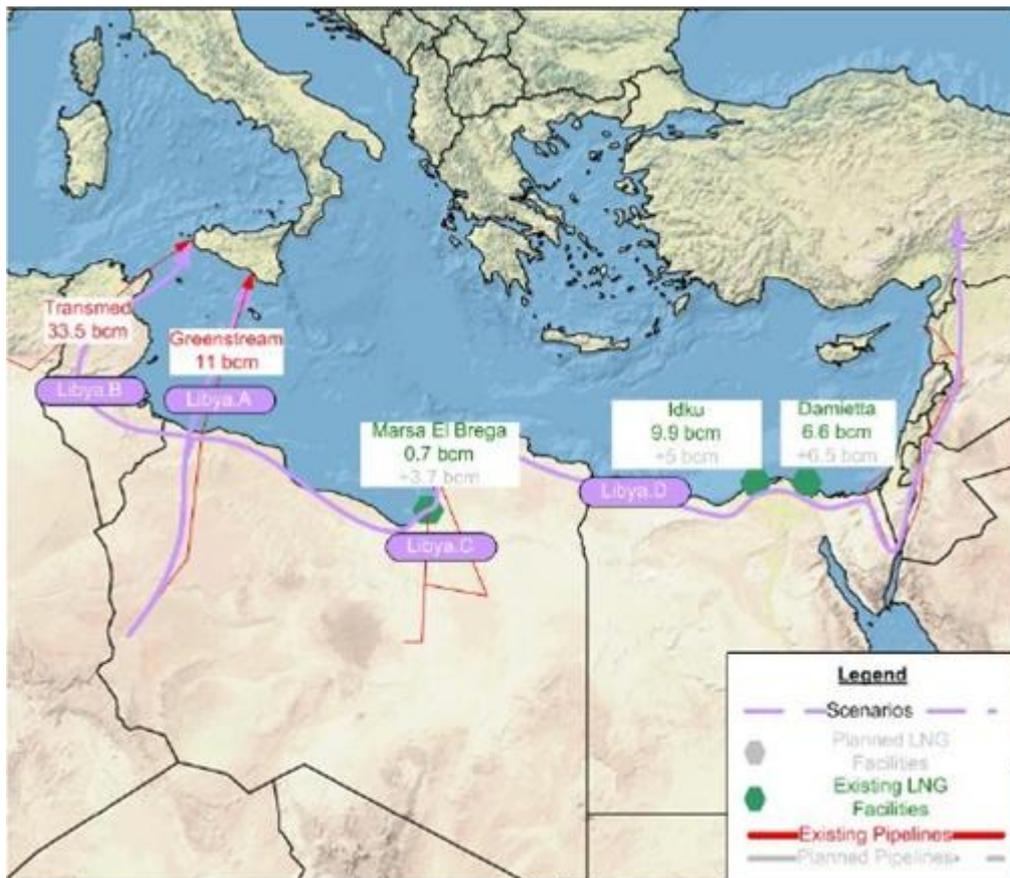
### 3.2.2.3 Libya

The possible four scenarios for Libyan gas to be directed to Europe are listed below.

The first scenario is the expansion of the Green Stream pipeline to 24 bcm/y which currently runs with a capacity of 11.5 bcm/y. The increase in the volumes will constitute a total export capacity of Libya as 40 bcm/y by 2030.<sup>361</sup> In this scenario a new interconnection is expected to be built between Libya, Tunisia, and Italy. This interconnection is expected to carry 12 bcm or 24 bcm of additional natural gas.

The second scenario is to connect the Libyan natural gas into the AGP in Arish, Egypt terminal and transport it via the AGP to Turkey. From Turkey the Libyan supplies would reach western markets. The third scenario is to export Libyan natural gas as LNG. The liquefaction capacities in Mellitah are planned to be expanded from 4.7 bcm/y to 30 bcm/y yet slowly in time.

Map 3.6: Infrastructure Scenarios in Libya



Source: MMD.

<sup>361</sup>MMD, *op. cit.*, pp. 42.

#### **3.2.2.4 Conclusion**

The North African countries are highly promising in their supply volumes and they would expand to market demands quicker as compared to other possible suppliers.

All countries mentioned above have sufficient sources to supply immediately to Europe, nevertheless, they need new infrastructure in order to supply the gas. The scenarios above are all based on the assumption that the Syria-Turkey connection of the AGP has been completed, which is not a realistic project considering the current situation. And as noted, there are several ways to transport the gas via Turkey to Europe if this connection could be utilized. So with the AGP connection Turkey could play a major role in transporting the North African supplies, otherwise, the countries have other options to export their gas.

#### **3.2.3 The Middle East and the Gulf Region**

The countries in this region that will be discussed are Iran, Iraq, and Qatar which are the countries that have a slight chance of exporting natural gas to Europe, except Qatar that already sends 43.4 bcm of LNG to Europe. The countries in the Middle East, particularly in the Gulf region are placing importance on LNG and are willing to advance their liquefaction technologies, because they wish to export LNG to the international markets including the EU. The Gulf region accounts for the 35 percent of the world's proven gas reserves and the transportation of the gas exports to Europe via Turkey is "very much a second stage prospect" for the Gulf States.<sup>362</sup>

##### **3.2.3.1 Iran**

Iran obtains the second largest gas reserves in the world thus it is a very important country in energy sector. The most important field in the country is the South Pars field with estimated natural gas reserves of 12.7 tcm. There are mainly two options that Iranian gas could reach to the international markets. One is via LNG and the other is via Turkey to Europe.

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<sup>362</sup> Roberts, *op. cit.*, pp. 19.

Iran is aiming to export LNG to the international markets, especially to the Asian markets led by China.<sup>363</sup> Although Qatar and Australia will be its competitors in the Asian markets for LNG, which is growing fast Iran seeks ways to good deals in that region.

Another way of transporting Iranian gas via pipeline to Europe can be through Turkey. Iran can supply natural gas into the Southern Corridor project so that Iranian gas could be transported to the European markets. However, this connection has never worked at full capacity and subject to disruptions as well as political attacks.

Iran has huge reserves but its production capacity is low while its domestic demand grows. Iran is currently exporting to Turkey and Armenia, yet both pipeline connections are not working at full capacity. Gas coming from Iran will not be very promising for Europe. The current sanctions will not let Iran to export its resources to the EU. If, in the future, the production increases and political conflicts would be resolved, Iran might use pipeline infrastructure through Turkey to deliver gas to Europe, which seems impossible for the time being.<sup>364</sup>

### **3.2.3.2 Iraq**

Iraq is not supplying natural gas to Europe at the moment, yet the natural gas potential of the country could be significant for Europe in the future. Iraq is expected to supply 15 to 30 bcm of natural gas to Europe from two different fields. One is the Southern Iraq near Basra, and the second is in Kirkuk, “in the non-associated gas fields in Kurdistan region such as Chemchemal and Khor Mor.”<sup>365</sup>

The possible routes for Iraqi gas transiting Turkey have been split into two phases. Phase I includes the gas from Northern Iraq gas and the Phase II includes associated gas from Southern Iraq. If political unrest is disregarded, gas from the Phase I is likely to start in 2016 and from Phase II in 2020. Under these circumstances, Iraq can be an important link between

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<sup>363</sup> Ladane Nasser, “Iran LNG Says It Will Overcome Sanctions To Start Exporting Fuel In 2012”, Bloomberg, 13 Apr 2012.

<http://www.bloomberg.com/news/2011-04-13/iran-lng-says-it-will-overcome-sanctions-to-start-exporting-fuel-in-2012.html>

“Iran in talks with 9 firms to export LNG”, Press Tv, 26 Sep 2011.

<http://www.presstv.ir/detail/201199.html>

<sup>364</sup> U.S. Energy Information Administration (EIA), “Iran”, Nov 2011.

<http://www.eia.gov/countries/cab.cfm?fips=IR>

<sup>365</sup> MMD, *op. cit.*, pp. 36.

Europe and the Middle East and the Gulf region.<sup>366</sup> If Iraq is to supply natural gas to Europe, there are four possibilities of Iraqi natural gas to reach the European grid.

The first option is the 589 km long Kirkuk pipeline to be jointed to the Southern Gas Corridor project so that gas would flow via Turkey to Europe. This scenario foresees supplies coming from Northern Iraq. A similar option to this is to connect the Basra pipeline to the Southern Gas Corridor project and transport it via Turkey. In this case the pipeline will be 1390 km long, which will be more expensive than the previous one.

The second alternative is to export Iraqi gas supplied from Northern Iraq via an interconnector to Jordan and then to Syria from where it will be flowing to Turkey via AGP and continue to Europe.

The third option is to build a pipeline connecting Kirkuk fields to Akkas and to Syria then via AGP, linking it to Southern Gas Corridor initiative. This scenario foresees the export volumes ranging from 10 to 30 bcm. In order to accommodate this export volume, a connection running parallel to AGP will be needed.<sup>367</sup>

The fourth and the last option is the least attractive one in economical terms which is to export the gas from the Kirkuk fields, via Akkas to Jordan and by reverse flow to Damietta, Egypt, using the AGP and export the gas from Egypt as LNG form. The first three options are economically more viable than the last option for the EU.

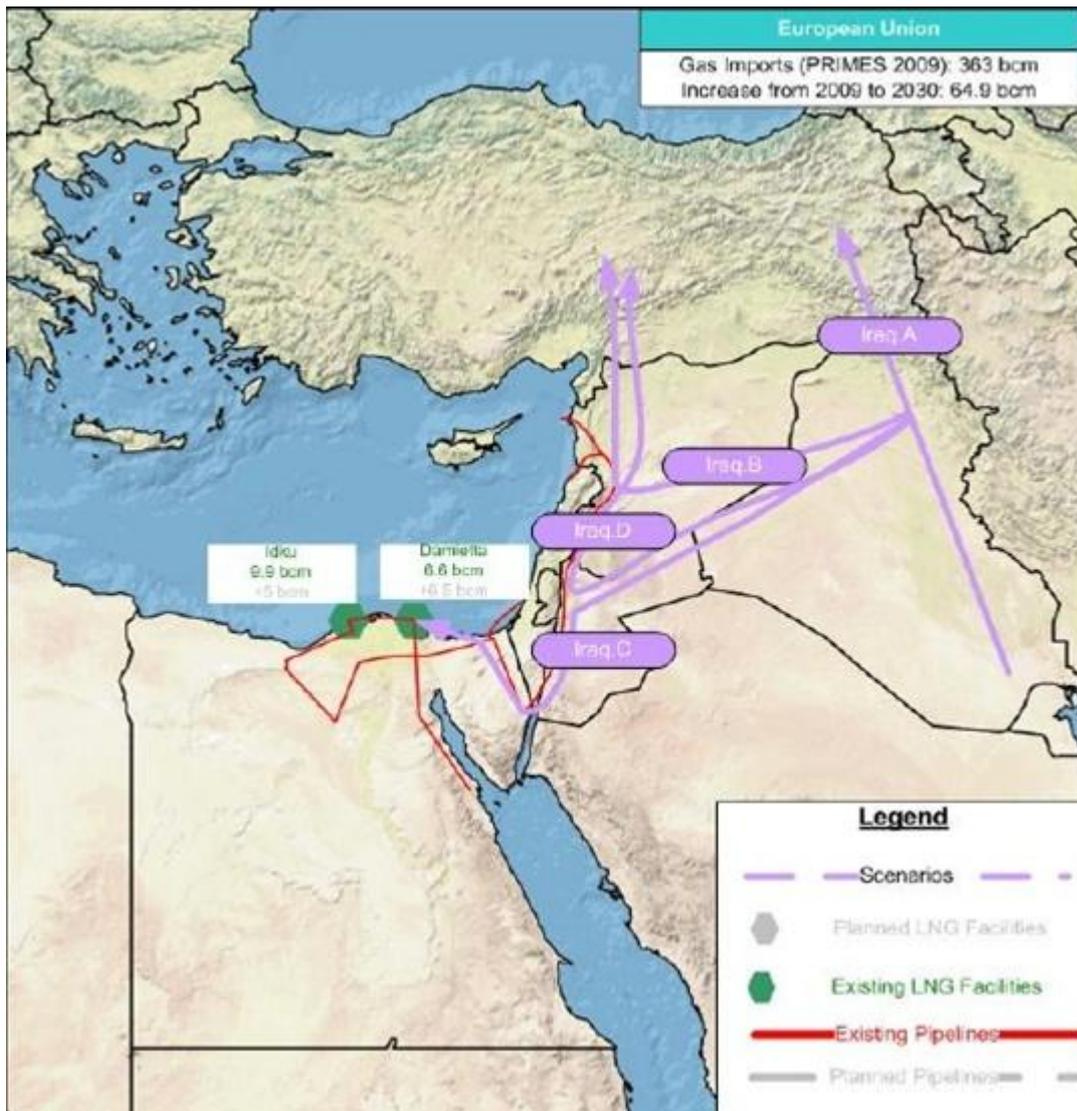
It is clear from the statements above that the most feasible three options are transiting Turkey in order to reach the European grid. Nevertheless, for Iraq there is great uncertainty about the future of gas supplies for export to Europe. If the amounts can be utilized, the export route from Iraq to Europe via Turkey is the most viable and cheaper option.

#### Map 3.7: Infrastructure Scenarios in Iraq

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<sup>366</sup> Roberts, *op. cit.*

<sup>367</sup> MMD, *op. cit.*



Source: MMD.

### 3.2.3.3 Qatar

Qatar supplies the largest volumes of LNG to Europe and supplied 43.4 bcm of LNG to Europe in 2011. The country accounts for 31 percent of the global LNG trade.<sup>368</sup> The current connections regarding LNG facilities are adequate for the supplies that are directed to the EU.

The country has pipeline connections in the Middle East so as an alternative, Qatar can supply additional gas to Europe via Saudi Arabia and Iran. A new link has to be constructed for this purpose, however, and the existing pipelines are needed to be renovated

<sup>368</sup> BP, 2012.

first. The country is not expected to use any connection that would reach Turkey in order to export and its preference is to export LNG.

#### **3.2.3.4 Conclusion**

As mentioned in the previous chapter, there are several potential supplier countries in this region. Those countries either cannot utilize the natural gas sources in their territories due to political instabilities or they prefer to export LNG, such as Qatar, Oman, the UAE and Yemen. For this region, Turkey can play a potentially important role by exporting Iranian and Iraqi gas, yet these resources have to be available first, which is not likely to be realized in the short or medium term due to international and domestic political conditions.

### **3.3 External Challenges towards Turkey's Strategy of Being a Transit Country**

While analyzing the possible routes of transportation of gas from various geographies and countries, one should consider that, Turkey is neither the only way to transport natural gas to Europe nor the sole solution. Turkey, therefore, is just one of the several players in the region and hence challenged by other actors and actions in the same territory. As noted before, in natural gas sector, politics counts more than economics, therefore, the transportation routes, the policies, and the strategies of the states are driven mainly by the political motivations.

Being located as a bridge between Europe as a rich consumer market and the major supplier countries, Turkey must be aware of the interests of other countries in its periphery. Moreover, it should also take into account the strategies and the policies of those countries and form its own effective strategy based on evidence. For instance, Turkey aims to play an important role by transiting the hydrocarbon resources from its neighborhood to the EU; nevertheless, the current embargo on Iran is an important restriction for Turkey. Even though there are no plans to supply Iranian gas to the EU at the moment, the intra-regional politics should be carefully followed by Turkish officials before taking steps. Overall, if the current embargo on Iran is to last longer, Iranian natural gas could not be transported to EU and Turkey's position as a transit country will be challenged once more. On the other hand, the ongoing political instabilities and disputes particularly in the Middle East and the Caspian region, as well as the conflict over the regional leadership between Russia and Turkey, and Iran's controversial position as a supplier raises question marks regarding Turkey's possible contribution of Turkey to the energy security of the EU.

### 3.3.1 The Middle Eastern Challenges

Today, social and political unrest in the Middle East threatens the region's stability as well as Turkey's security. Iraq, especially with its oil fields, is an important energy actor in the world. However, the uncertain legal status in Northern Iraq and insecurity caused by the conflicts between the different ethnic groups make the pipelines in and to Turkey more vulnerable to attacks. The pipelines in this region are already subject to constant attacks.<sup>369</sup> The *Kirkuk-Ceyhan oil pipeline*, running from Iraq to Turkey, was attacked several times and the oil flow was interrupted.<sup>370</sup> This makes the Iraqi supplies intermittent and unreliable. This is not just a threat for the future supplies to Europe but also poses a challenge to Turkey's potential role as a transit country.

Iran, on the other hand, has conflicting interests with Turkey regarding the Caspian resources and the political hegemony over the states in the Caspian. Russia, Iran, and Turkey cannot agree on the issues related to the Caucasian states and the region's resources. Iran wants Caspian exports to be carried over its territory to international markets challenging Turkey as a transit country. Iran's aim to be a transit country for Caspian energy exports is neither supported by the U.S. nor by the EU as both have expressed their interests in Turkey's being the transit country for Caspian supplies.<sup>371</sup> However, Iran continues to limit Ankara's room to maneuver in the region by preventing the developments in the Caspian Sea.

### 3.3.2 The Caspian Challenges

The Caspian region the most important problem regarding the natural gas transit through Turkey is the uncertain potential and production rates of natural gas. The only country which is able to supply the EU at the moment is Azerbaijan from its Shah Deniz Phase II. Nonetheless, even those resources are not being produced at the moment, they are scheduled for 2017. The exact supply capacity of the region is uncertain. The most promising state in the region for its reserves is Turkmenistan and it has already signed gas deals of considerable volumes with Russia, China and Iran. But the Trans-Caspian shipment

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<sup>369</sup>“Recent attacks on Kirkuk-Ceyhan pipeline”, *Reuters*, 3 Sep 2010.

<http://in.reuters.com/article/2010/09/03/us-iraq-oil-ceyhan-factbox-idINTRE6823C720100903>

<sup>370</sup>Patrick Osgood, “Bomb blasts close Kirkuk-Ceyhan pipeline”, *Arabian Oil and Gas*, 5 Apr 2012.

<http://www.arabianoilandgas.com/article-10132-updated-bomb-blasts-close-kirkuk-ceyhan-pipeline/>

<sup>371</sup>Kulpash Konyrova, “Central Asia, Iran and Turkey in gas power struggle”, *The New Europe*, 10 Feb 2012.

<http://www.neurope.eu/article/central-asia-iran-and-turkey-cold-snap-power-struggle>

obstacles remain as formidable challenge for Turkmenistan and Kazakhstan to export gas to Europe.

There is also instability in the Caspian region and many ethnic conflicts which adversely affect trade and political relations endangering Turkey's position as a stable route for transporting Caspian gas.

### **3.3.3 Russian Challenges**

Russia aims to reposition itself as the regional leader in the Caucasus and reinforce its privileged status for the transportation of Caspian resources to the international markets. The country, therefore, constitutes a challenge for Turkey's energy and foreign policies in the Caspian region. So far, as mentioned, Turkmen gas has been carried to Europe via Russian territories. Nevertheless, the transportation of Caspian resources via Russian territory is against the political interests the EU and the U.S; moreover it detracts from Turkey's potential role as a transit country.

On the one hand, Russia and Turkey are interdependent: Turkey imports 70 percent of its gas from Russia and Russia needs Turkey in order to construct the South Stream pipeline which will go under the Black Sea in the Turkish EEC.<sup>372</sup> On the other hand, these countries' interests diverge a great deal. While Turkey aims to become a transit country for the EU, Russia prefers to supply the EU market without any other additional route for supplies. Therefore, Russia prefers the natural gas flows from its own territory and tries to eliminate Turkey as a supply route for the EU. Neither the South Stream nor the TANAP is being constructed at the moment. The future will show to what extent Russia can be a threat for Turkey, or vice versa.

### **3.3.4 A challenge for the EU: Turkey as a Natural Gas Consumer**

The growing domestic natural gas market in Turkey may also detract from the future of supplies to the EU. Turkey is the fifth largest economy in the EU and sixteenth largest in the world and considered as one of the great emerging economies.<sup>373</sup> With a 9.9 percent

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<sup>372</sup> Soner Cagaptay and Nazlı Gencsoy, "Improving Turkish-Russian Relations: Turkey's New Foreign Policy and Its Implications for the United States", *Policy Watch*, 12 Jan 2005.

<http://www.cagaptay.com/671/improving-turkish-russian-relations>

<sup>373</sup> Invest in Turkey, "Turkey at Glance: Economic Outlook".

<http://www.invest.gov.tr/en-us/turkey/factsandfigures/pages/economy.aspx#PageTop>

annual growth rate, Turkey is a big market and a big consumer of energy.<sup>374</sup> The fast development brings along energy deficit in industry, power production and several other areas.

Turkey is the fifth largest primary energy and eighth largest natural gas consumer in Europe.<sup>375</sup> The share of gas in overall energy consumption is 30 percent; of coal and oil are 32 and 27 percent, respectively.<sup>376</sup> The energy mix of the country is based heavily toward hydrocarbons, leaving only 11 percent to the green energy sources. Like the other major emerging economies such as China, Brazil and India, the natural gas consumption in Turkey is also expected to rise considerably in the next 15 years.

Turkey consumed 47.5 bcm of natural gas in 2011 and exported 35.6 bcm of piped gas and 6.2 bcm of LNG.<sup>377</sup> The most reliable suppliers of natural gas for Turkey are first Azerbaijan and then Russia, accounting for 11 percent and 67 percent of the piped gas imports to Turkey. Estimates foresee minimum 2 percent annual growth rate, and the consumption level is expected to reach 55-60 bcm by 2017.<sup>378</sup> It is expected to increase up to 80 bcm by 2035.<sup>379</sup> Considering the lack of natural gas production in Turkey, the total demand of the country will be exported by from its neighborhood in the first place. At this point, the growing demand for natural gas in the EU and Turkey point to conflicting interests, because both will intend to import from the same sources of supply. While arguing Turkey's potential role as a transit country, it should also be considered that, the export volumes that is to transit Turkey to supply Europe may well be taken at the Turkish border for domestic consumption.

On the other hand, the growing natural gas import demand of Turkey is also a challenge for the country itself. If Turkey makes agreements with the potential supplier

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<sup>374</sup> "Turkish economy sets a record in annual growth rate: 9.9 pct", The Journal of Turkish Weekly, 1 Apr 2005. <http://www.turkishweekly.net/news/7187/turkish-economy-sets-a-record-in-annual-growth-rate-9-9-pct.html>

<sup>375</sup> Eurogas, 2011.

<sup>376</sup> Energy Delta Institute, Energy Business School, "Turkey". <http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/country-gas-profile-turkey>

<sup>377</sup> BP, 2012.

<sup>378</sup> "Turkey's natural gas market: Expectations and developments 2012", Deloitte, Apr 2012, pp. 19. [http://www.deloitte.com/assets/Dcom-turkey/Local%20Assets/Documents/turkey\\_tr\\_energy\\_naturalgas\\_030512.pdf](http://www.deloitte.com/assets/Dcom-turkey/Local%20Assets/Documents/turkey_tr_energy_naturalgas_030512.pdf)

<sup>379</sup> My own calculation taking the natural gas consumption growth rate figure from Deloitte's report "Turkey's natural gas market: Expectations and developments 2012". The Average Compound Growth Rate (ACGR) is taken as 9.3 percent as indicated in that report page 15.

countries to the EU and guarantee their supply volumes, there will be no or little gas left to be carried to Europe. This will pose a challenge for Turkey's aim of becoming a transit state or the "fourth artery" of the EU.

In conclusion, Turkey aims to become an important transit route for Europe; nevertheless, the country itself is projected to need more imports in the near future. The possible suppliers that are expected to supply the EU can also make agreements with Turkey at certain volumes. Although this may not stop all the gas that is to be transported to Europe, it will certainly decrease the volume of the exports. Turkey's being a growing market could therefore constitute a challenge for the EU; however, the long-term effects are to be seen in the future.

## CONCLUSION

Natural gas is a vital commodity for the EU. Being environmentally friendly and the cleanest hydrocarbon, natural gas is widely preferred in the EU. The EU's natural gas consumption is expected to increase substantially while the natural gas production levels are declining steadily and the proven natural gas reserves in the EU are diminishing. This growing demand and decreasing production increases the import volumes and import dependence of the EU, particularly in the South East European (SEE) region. Crises of oil and gas emphasized the importance of energy security and supply security. The energy and supply security issues are further considered by the EU in several policy objectives. The EU sees the diversification of the suppliers and the supply routes as the most important steps to ensure its supply security.

The diversification of suppliers is mainly directed to diminish dependence on Russian supplies, amounting to 34 percent of the EU's natural gas imports. Some of the SEE countries' dependence on Russian gas reaches 100 percent. The most important project of the EU regarding the diversification policies is the Southern Gas Corridor project. This project aims to carry gas from the Caspian basin accompanied by possible Middle Eastern and the North African gas supplies via Turkey. Having the motto 'to bring gas from non-Russian supplies via non-Russian territories', the Southern Gas Corridor project is welcomed by the EU states as well as the U.S., the Caspian and Central Asian states and Turkey. A study conveyed by the Observatoire Méditerranéen de l'Énergie (OME) compared the pipeline options to carry Caspian gas to Europe and concluded that "projects to connect Turkey to Austria either through Bulgaria, Romania and Hungary, or through Macedonia, Bosnia-Herzegovina, Croatia, Serbia and Slovenia (or possibly both) are more likely to see the light, but would still require substantial political backing."<sup>380</sup> A project aiming to reduce the energy dependence of the European countries should first cross the SEE territory as the supply dependence issue in these countries is much more serious than in the others. A great number of gas companies in Europe, particularly in the Central, South Eastern Europe are searching for ways to bring the Caspian basin and Middle Eastern sources to their land "through fully

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<sup>380</sup>Roberts, *op. cit.*

commercial pipeline systems transiting Turkey and the Balkans.”<sup>381</sup> The potential future suppliers to the EU are therefore analyzed in this study.

There are three major supplier regions where the additional supplies for natural gas could be carried from. These regions are the Caspian region, the North African region and the Middle East and the Gulf region. The first one is the most likely region to supply Europe. While, Azerbaijan is the most promising one to send supplies to Europe in the near future, the other countries in the region have substantial obstructions preventing them to export gas to the West. The most important factor hindering the natural gas exports of these countries to West is Russia. Russia has already signed long-term agreements with those countries in order to block their export capacities. Moreover, even if additional volumes would be produced, Russia and Iran do not permit the construction of a Trans-Caspian pipeline which is the only secure and independent way of transporting gas from the Central Asian suppliers. As the export option to the West is severely blocked by Russia, these countries already turned towards the East and made long-term supply agreements, particularly with China.

The second region, North African, is in a state of flux and its lack of stability is affecting its energy production and infrastructure. Currently, the region sends LNG and piped gas to the EU. The future supplies from Egypt is subject to the political environment as well as the construction of the Arab Gas Pipeline (AGP) which is carrying Egyptian gas to Jordan, Lebanon, and Syria and a link from Syria to Turkey is projected. Nevertheless, the countries in this region prefer sending LNG exports to Europe rather than pipeline connections. Algeria is the most promising state in the region to send additional supplies to the EU as further EU public investments are not needed and the current infrastructure of the country is adequate to accommodate additional supplies.

The third region is the Middle East and the Gulf Region where major producers are Iran, Iraq, and Qatar. There is a serious security challenge in the region. The ongoing political instability and civil unrest endanger energy production and transmission. Even if they have huge reserves, Iran and Iraq are not likely to be reliable suppliers for the EU. The United Arab Emirates (UAE), Yemen and Oman, on the other hand, need infrastructural developments and exploration further to produce and export gas in the face of their own

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<sup>381</sup>*Ibid.*

rising demand. Other than Qatar, no other country in the region is able to supply the EU at the moment.

In addition to those three major regions, there are also potential supply volumes and suppliers in the Arctic, Eastern Mediterranean and West African region. Norway and Russia are the two important countries which currently export the EU and are likely to increase their exports after the developments in the Arctic Ocean. Israel and Cyprus in the Eastern Mediterranean region continue the exploration and production activities but results are not certain yet. The West African region is promising thanks to the advancement in production in Nigeria and Angola. These countries export LNG to Europe.

Concluding from the analyses on the potential supplier regions, the countries that are most likely to send supplies to the EU are Azerbaijan, Egypt, Libya, Algeria, Qatar, and Nigeria. Considering the geographical situation of Turkey, it is well placed for accommodating the pipeline connections from the East and South to the West. Being one of the major emerging economies in the world, Turkey seems to be like a reliable country for transit. However, there are several challenges undermining the viability of Turkey's possible role of a transit country.

The first challenge is the political unrest in Turkey's periphery. It adversely affects pipeline security. Social, ethnic and political conflicts in the Middle East and the Caspian states raise doubts over supply security. Terrorist attacks may cause significant disruptions in the gas flow. Instability also makes it difficult to invest in major new projects in many parts of the region.

Secondly, the domestic demand is projected to increase at a considerable level in the future. According to estimates, Turkey is likely to consume around 60-80 bcm of natural gas by 2035.<sup>382</sup> In this respect, it is highly questionable whether there will be enough gas to transport to Europe if the current trends continue in Turkey. If they do, then the domestic need for natural gas will hardly be supplied from the neighboring countries, and the country will absorb the gas needed for export to Europe. This is a double sided challenge, both for the

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<sup>382</sup> My own calculation taking the natural gas consumption growth rate figure from Deloitte's report "Turkey's natural gas market: Expectations and developments 2012". The Average Compound Growth Rate (ACGR) is taken as 9.3 percent as indicated in that report on page 15.

EU and for Turkey; if Turkey exports more, there may be no additional gas left for the EU, and if not, Turkey could not perform an active transiting role.

Thirdly, the EU places particular importance on LNG imports. It is stated in this document that the “geographical diversification of the suppliers would appear desirable ... particularly in LNG.”<sup>383</sup> Currently in Europe, there are 6 LNG terminals under construction and 27 LNG terminals are being built in various parts of Europe, including Croatia and Albania. An additional 32 are at the project stage.<sup>384</sup> LNG exports will play a more important role in diversification of the supplies in the future. Both the EU and the supplier countries will prefer LNG connections because (a) it is safer, there is limited possibility for terrorist attacks, (b) it is reliable as transit countries are eliminated or decreased to the minimum. For instance it is better for Egypt to send it LNG than piped gas since it decreases the possibility of bottlenecks.

Fourthly, most of the natural gas agreements are already made and guaranteed by long-term contracts so there is no available gas left which is likely to cross the Turkish territory for transit. Caspian resources are a good example of this. Future production is already contracted by the states such as China and Russia, so even if the production increases it will flow to these states, not to Europe.

Fifthly, as mentioned above, for most of the projects, it is not economically viable either to cross through Turkey or flow to the western markets. For example, China pays for the infrastructure to obtain Central Asian gas, whereas financing from the market is required to build pipelines to Europe. For most of the suppliers in the African and the Middle Eastern countries, it is logical and cost-effective to export LNG to Europe than use pipelines. This diminishes the Turkish option for transit.

Lastly, even if the natural gas volumes could be transported to the EU through Turkey’s territory, the question of “reliability of the Turkish route” remains. This question stems from Turkey’s being located in unstable neighborhood and where conflicts and terrorist sabotages occur endangering the security of the pipelines. And secondly, Turkey’s own

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<sup>383</sup> Roberts, *op. cit.*

<sup>384</sup> “LNG in Europe: An Overview of European Import Terminals”, King & Spalding, 2006.  
[http://www.kslaw.com/library/pdf/LNG\\_in\\_Europe.pdf](http://www.kslaw.com/library/pdf/LNG_in_Europe.pdf)

growing demand may stand in the way of transiting supplies. Turkey may end up consuming the volumes natural gas that is supposed to be carried to the EU.

It is hard to project Turkey's long-term role as a transit state. It is dependent on several different external and internal factors. To sum up, in the short and the medium term, Turkey can only be a transit country by transiting 10 bcm of Azeri gas until the Bulgarian border via the TANAP project and at the moment, the potential role of Turkey cannot go beyond being a transit country between Azerbaijan and Europe. At present, it is not feasible to talk about Turkey's importance as a transit country or a bridge. The first assumptions regarding Turkey's future potential roles could be formed after the initial success of TANAP or a related Southern Gas Corridor project.

## Bibliography

Act Media. (10/05/2012). For lack of investments, Romania's dependence on oil and gas will increase. <http://actmedia.eu/energy-and-environment/for-lack-of-investments-romania-s-dependence-on-oil-and-gas-imports-will-increase/39915> Date of access: June 06, 2012.

Back, Aaron. (16/06/2011). China, Russia Fail to Finalize Gas Deal. *Wall Street Journal*. <http://online.wsj.com/article/SB10001424052702304186404576389652520716210.html> Date of access: June 25, 2012.

Bauerova, Ladka and Natalie Weeks. (11/06/2012). Greek Blackouts Risked As Power Companies' Cash Runs Out: Energy. *Bloomberg*. <http://www.bloomberg.com/news/2012-06-10/greek-blackouts-risked-as-power-companies-cash-runs-out-energy.html> Date of access: July 15, 2012.

BBC. (13/12/2009). China's President Hu Jintao opens Kazakh gas pipeline. <http://news.bbc.co.uk/2/hi/8410369.stm> Date of access: May 29, 2012.

BBC. (28/12/2011). South Stream pipeline gets Turkey green light. <http://www.bbc.co.uk/news/business16348360>

BBC. (05/05/2012). Tamari shut down leaves Japan with no nuclear power. <http://www.bbc.co.uk/news/world-asia-17967202> Date of access: April 08, 2012.

Breathing Earth, *Statistics*. <http://www.breathingearth.net/> Date of access: May 09, 2012.

British Petroleum. (06/2011). *BP Statistical Review of World Energy 2011*. [http://www.bp.com/assets/bp\\_internet/globalbp/globalbp\\_uk\\_english/reports\\_and\\_publications/statistical\\_energy\\_review\\_2011/STAGING/local\\_assets/pdf/statistical\\_review\\_of\\_world\\_energy\\_full\\_report\\_2011.pdf](http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2011.pdf)

British Petroleum. (06/2012). *BP Statistical Review of World Energy 2012*. [http://www.bp.com/assets/bp\\_internet/globalbp/globalbp\\_uk\\_english/reports\\_and\\_publications/statistical\\_energy\\_review\\_2011/STAGING/local\\_assets/pdf/statistical\\_review\\_of\\_world\\_energy\\_full\\_report\\_2012.pdf](http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf)

Brunwasser, Matthew and Judy Dempsey. (18/06/2008). Russia signs deal to bring natural gas pipeline through Bulgaria. *The New York Times*. [http://www.nytimes.com/2008/01/18/world/europe/18iht-putin.4.9333114.html?\\_r=2](http://www.nytimes.com/2008/01/18/world/europe/18iht-putin.4.9333114.html?_r=2) Date of access: June 10, 2012.

Buisset, S., O. Oye, and J. Selleslaghs. *Lobbying Shale Gas in Europe*. <http://www.pacturope.eu/pact/wp-content/uploads/2012/06/Lobbying-shale-gas-in-Europe.pdf>

Bulgarian Association Natural Gas. Website. *In Bulgaria- General Facts*. [http://www.naturalgas.bg/en/pages/index/page/in\\_the\\_country](http://www.naturalgas.bg/en/pages/index/page/in_the_country) Date of access: May 09, 2012.

Bulgartransgaz. Website. *Natural Gas Storage*. <http://www.bulgartransgaz.bg/en/index.php?page=13&sid=25> Date of access: May 09, 2012.

Bulgartransgaz. Website. *Transit transmission of natural gas*.  
<http://www.bulgartransgaz.bg/en/index.php?page=13&sid=24> Date of access: May 09, 2012.

Bulgartransgaz. Website. *Transmission of natural gas to end consumers within Bulgaria*.  
<http://www.bulgartransgaz.bg/en/index.php?page=13&sid=23> Date of access: May 09, 2012.

Cagaptay, Soner and Nazlı Gencsoy. (12/01/2005). Improving Turkish-Russian Relations: Turkey's New Foreign Policy and Its Implications for the United States. *Policy Watch*.  
<http://www.cagaptay.com/671/improving-turkish-russian-relations>

Callahan, Jonathan. (06/12/2010). Qatar's natural gas exports. *Energy Trends*. 6 Dec 2010.  
<http://mazamascience.com/EnergyTrends/?p=237> Date of access: July 10, 2012.

Chazan, Guy. (12/03/2012). LNG demand set to double over the next decade. *Financial Times*.  
[http://www.ft.com/intl/cms/s/3f445f34-6c58-11e1-8c9d-00144feab49a,Authorised=false.html?\\_i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F3f445f34-6c58-11e1-8c9d-00144feab49a.html&\\_i\\_referer=#axzz1wKcq95u](http://www.ft.com/intl/cms/s/3f445f34-6c58-11e1-8c9d-00144feab49a,Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F3f445f34-6c58-11e1-8c9d-00144feab49a.html&_i_referer=#axzz1wKcq95u)  
Date of access: July 09, 2012.

Christie, Edward Hunter. (2010). EU natural gas demand: uncertainty, dependence and bargaining power. Turku School of Economics.  
[http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/Julkaisut/Christie\\_netti\\_final.pdf](http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/Julkaisut/Christie_netti_final.pdf)

Crooks, Ed. (17/04/2012). Exports of US energy wins final approval. *Financial Times*.  
[http://www.ft.com/intl/cms/s/d3411cca-8816-11e1-8a47-00144feab49a,Authorised=false.html?\\_i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd3411cca-8816-11e1-8a47-00144feab49a.html&\\_i\\_referer=#axzz1wKcq95u](http://www.ft.com/intl/cms/s/d3411cca-8816-11e1-8a47-00144feab49a,Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd3411cca-8816-11e1-8a47-00144feab49a.html&_i_referer=#axzz1wKcq95u)  
Date of access: May 04, 2012.

—. (17/04/2012). LNG plant to be first in US for 40 year. *Financial Times*.  
<http://www.ft.com/intl/cms/s/0/714be024-88a0-11e1-9b8d-00144feab49a.html#axzz1wKcq95u> Date of access: May 04, 2012.

De Jong, Sijbren. (08/03/2011). Europe's Southern Gas Corridor: Central Asia and the EU's Drive Towards Energy Diversification. *EU Grasp Policy Brief*. <http://www.eugrasp.eu/wp-content/uploads/2012/03/Europes-Southern-Gas-Corridor-Central-Asia-and-the-EUs-Drive-Towards-Energy-Diversification.pdf>

Delegation of the EU to Egypt. *Exports to EU*.  
[http://eeas.europa.eu/delegations/egypt/eu\\_egypt/trade\\_relation/export\\_to\\_eu/index\\_en.htm](http://eeas.europa.eu/delegations/egypt/eu_egypt/trade_relation/export_to_eu/index_en.htm)  
Date of access: May 11, 2012.

Delegation of the EU to the Republic of Yemen. *Investments*.  
[http://eeas.europa.eu/delegations/yemen/eu\\_yemen/trade/investments/index\\_en.htm](http://eeas.europa.eu/delegations/yemen/eu_yemen/trade/investments/index_en.htm) Date of access: May 11, 2012.

Deloitte. (2012). Turkey's natural gas market: Expectations and developments 2012.  
[http://www.deloitte.com/assets/Dcom-Turkey/Local%20Assets/Documents/turkey\\_tr\\_energy\\_naturalgas\\_030512.pdf](http://www.deloitte.com/assets/Dcom-Turkey/Local%20Assets/Documents/turkey_tr_energy_naturalgas_030512.pdf) Date of access: June 05, 2012

Dempsey, Judy. (07/03/2012). European Pipeline Project Faces Formidable Obstacles. *New York Times*.  
[http://www.nytimes.com/2011/03/08/business/global/08nabucco.html?\\_r=2&pagewanted=all](http://www.nytimes.com/2011/03/08/business/global/08nabucco.html?_r=2&pagewanted=all)  
Date of access: July 10, 2012.

Doukov, Dimitar. (06/07/2009). Energy Efficiency: A Cost Effective Solution for Energy Security. *Bulgarian Energy Efficiency Fund*. <http://www.osce.org/eea/37903> Date of access: May 09, 2012.

Eckert, Vera and Jackie Cowhig. (01/10/2010). Analysis: Turkey to make up for falling Europe coal use. *Reuters*. <http://www.reuters.com/article/2010/09/01/us-europe-coal-imports-idUSTRE6803ZC20100901>

Edison. Website. *Galsi: Algeria-Sardinia-Italy Gas Pipeline*. <http://www.edison.it/en/company/gas-infrastructures/galsi.shtml> Date of access: June 05, 2012.

Energy Charter. Website. *1994 Treaty*. <http://www.encharter.org/index.php?id=28> Date of access: April 05, 2012.

Energy Delta Institute: Energy Business School. *Bulgaria*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/bulgaria> Date of access: May 10, 2012.

Energy Delta Institute: Energy Business School. *France*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/country-gas-profile-france> Date of access: May 23, 2012.

Energy Delta Institute: Energy Business School. *Greece*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/greece> Date of access: May 13, 2012.

Energy Delta Institute: Energy Business School. *Hungary*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/hungary> Date of access: May 23, 2012.

Energy Delta Institute: Energy Business School. *Romania*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/interactive-world-gas-map/europe/romania> Date of access: May 24, 2012

Energy Delta Institute: Energy Business School. *Turkey*.  
<http://www.energydelta.org/mainmenu/edi-intelligence-2/our-services/country-gas-profiles/country-gas-profile-turkey> Date of access: June 08, 2012.

ENI. Website. *Green Stream*. [http://www.eni.com/en\\_IT/innovation-technology/eni-projects/greenstream/greenstream-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/greenstream/greenstream-project.shtml) Date of access: June 20, 2012

ENI. Website. *Transmed*. [http://www.eni.com/en\\_IT/innovation-technology/eni-projects/transmed/transmed-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/transmed/transmed-project.shtml) Date of access: June 20, 2012

ENI. Website. *Western Libyan Gas Project*. [http://www.eni.com/en\\_IT/innovation-technology/eni-projects/western-lybian-gas-project/western-lybian-gas-project.shtml](http://www.eni.com/en_IT/innovation-technology/eni-projects/western-lybian-gas-project/western-lybian-gas-project.shtml) Date of access: June 20, 2012

EurActive. (15/04/2011). Turkey caught between Nabucco and South Stream. <http://www.eurasiareview.com/15042011-turkey-caught-between-nabucco-and-south-stream/> Date of access: May 16, 2012.

Eurogas. *Natural Gas Demand and Supply, Long term outlook to 2030*. <http://www.eurogas.org/uploaded/Eurogas%20long%20term%20outlook%20to%202030%20-%20final.pdf>

Eurogas. *Statistical Report 2011*. [http://eurogas.org/uploaded/Statistical%20Report%202011\\_091211.pdf](http://eurogas.org/uploaded/Statistical%20Report%202011_091211.pdf)

Eurogas. *Statistics 1994-2009*. [http://eurogas.org/figures\\_statistics.aspx](http://eurogas.org/figures_statistics.aspx)

Eurogas. *Statistics 2003-2009*. [http://eurogas.org/figures\\_statistics.aspx](http://eurogas.org/figures_statistics.aspx)

Eurogas. *Statistics 2005*. <http://www.eurogas.org/uploaded/statistics%202005.pdf>

Eurogas. *Statistics 2006*. [http://eurogas.org/uploaded/Eurogas%20Annual%20Report%202006-2007\\_%20statistics.pdf](http://eurogas.org/uploaded/Eurogas%20Annual%20Report%202006-2007_%20statistics.pdf)

Eurogas. *Statistics 2008-2011*. [http://eurogas.org/figures\\_statistics.aspx](http://eurogas.org/figures_statistics.aspx)

Eurogas. *Statistics 2009*. [http://www.eurogas.org/uploaded/Eurogas%20Statistical%20Report%202010\\_Final%20291110.pdf](http://www.eurogas.org/uploaded/Eurogas%20Statistical%20Report%202010_Final%20291110.pdf)

Europa. Website. *Energy Roadmap 2050*. [http://ec.europa.eu/energy/energy2020/roadmap/index\\_en.htm](http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm) Date of access: April 20, 2012.

Europa. Website. *EU - Romania Relations*. [http://ec.europa.eu/enlargement/archives/romania/eu\\_romania\\_relations\\_en.htm](http://ec.europa.eu/enlargement/archives/romania/eu_romania_relations_en.htm) Date of access: May 13, 2012.

Europa. Website. *Summaries of EU Legislation, Energy*. [http://europa.eu/legislation\\_summaries/energy/index\\_en.htm](http://europa.eu/legislation_summaries/energy/index_en.htm) Date of access: April 20, 2012.

European Commission. Website. *Nuclear energy: The European Atomic Energy Community (EURATOM)*. [http://ec.europa.eu/energy/nuclear/euratom/euratom\\_en.htm](http://ec.europa.eu/energy/nuclear/euratom/euratom_en.htm) Date of access: April 20, 2012.

European Commission. *Europe 2020: Priorities*. [http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/index\\_en.htm](http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/index_en.htm) Date of access: April 20, 2012.

European Commission. Website. *Europe 2020*. [http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm) Date of access: April 20, 2012.

European Commission. Website. *European Climate Change Programme*.  
[http://ec.europa.eu/clima/policies/eccp/index\\_en.htm](http://ec.europa.eu/clima/policies/eccp/index_en.htm) Date of access: April 20, 2012.

European Commission. Website. *European Emission Trading Scheme (EU ETS)*.  
[http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm) Date of access: April 20, 2012.

European Dialogue. Political situation in Turkey and the economic power of Russia can negatively affect Nabucco project accomplishment. <http://eurodialogue.org/Political-Situation-Turkey-Economic-Power-Russia-Can-Negatively-Affect-Nabucco-Project>

European Parliament. Website. *Parliamentarian Questions*.  
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+E-2005-2475+0+DOC+XML+V0//EN> Date of access: April 20, 2012.

Evin, Ahmet. "Energy and Turkey's Neighborhood: Post-Soviet Transformation and Transatlantic Interests". In Ronald Linden, Ahmet Evin, Kemal Kiriçi, Thomas Straubhaar, Thomas, Nathalie Tocci, Juliette Tolay and Joshua Walker(eds.) *Turkey and Its Neighbors: Foreign Relations in Transition*. Colorado: Lynne Rienner Publishers.

Fabiani, Ricardo. (13/08/2009). Is the Trans-Sahara Gas Pipeline a Viable Project? The Impact of Terrorism Risk. Jamestown Foundation. *Terrorism Monitor*. Vol: 7/25.  
[http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=35412](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=35412)

Foster, John. (23/03/2012). Afghanistan, the TAPI pipeline, and Energy Geopolitics. *Journal of Energy Security*.  
[http://www.ensec.org/index.php?option=com\\_content&view=article&id=233:afghanistan-the-tapi-pipeline-and-energy-geopolitics&catid=103:energysecurityissuecontent&Itemid=358](http://www.ensec.org/index.php?option=com_content&view=article&id=233:afghanistan-the-tapi-pipeline-and-energy-geopolitics&catid=103:energysecurityissuecontent&Itemid=358)

Gas LNG Europe (GLE). (06/09/2011). *LNG Terminals in Europe*.  
[http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat\\_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals](http://www.gie.eu.com/index.php/events-diary/workshops/gle-workshops/cat_view/16-gle-workshops/33-2011-workshops/34-first-ceer-workshop-on-access-to-european-lng-terminals)  
Date of access: July 16, 2012.

GASSCO. Website. *Norwegian gas to Europe: reliable and forward-looking*.  
[http://www.gassco.no/wps/wcm/connect/eebc5c8046ff4108b441b4bb467833c3/11771-Gassco\\_hovedbrosjyre2011\\_engelsk\\_WEB.pdf?MOD=AJPERES](http://www.gassco.no/wps/wcm/connect/eebc5c8046ff4108b441b4bb467833c3/11771-Gassco_hovedbrosjyre2011_engelsk_WEB.pdf?MOD=AJPERES) Date of access: June 13, 2012.

Gazprom Export. *Foreign Partners: Hungary*.  
<http://www.gazpromexport.ru/en/partners/hungary/> Date of access: May 25, 2012.

Gazprom Export. *Foreign Partners: Romania*.  
<http://www.gazpromexport.ru/en/partners/romania/> Date of access: May 25, 2012.

Gazprom. Website. *South Stream*.  
<http://www.gazprom.com/about/production/projects/pipelines/south-stream/> Date of access: June 21, 2012.

Geopolitical Information Service (GIS). (27/03/2012). Energy: Why 'TANAP' is changing the Eurasian pipeline competition.  
[http://www.acus.org/files/EnergyEnvironment/032712\\_Umbach\\_EurasianPipelineCompetition\\_PartII.pdf](http://www.acus.org/files/EnergyEnvironment/032712_Umbach_EurasianPipelineCompetition_PartII.pdf) Date of access: July 10, 2012.

- Gloan, M.D. ed. (18/05/2012). US Spot Henry Hub gas price slips from 3-month high. *Reuters*. <http://www.reuters.com/article/2012/05/18/markets-natgas-spot-idUSL1E8GI9ME20120518> Date of access: July 15, 2012.
- Global trade. (24/10/2012). Oil and Gas Market Overview-An Expert's View about Energy in Romania. <http://www.globaltrade.net/f/market-research/text/Romania/Energy-Coke-Oil-Gas-Electricity-Oil-and-Gas-Market-Overview.html>
- Global-Politics. *Nabucco or South Stream?* <http://www.global-politics.co.uk/issue9/matus/>
- Gloystein, Henning and Charlie Dunmore. (03/02/2012). Russian gas supply falls further, EU says no crisis. *Reuters*. <http://www.reuters.com/article/2012/02/03/eu-gas-supply-idUSL5E8D32MX20120203> Date of access: April 07, 2012.
- Gow, David. (07/01/2009). Russia-Ukraine gas crisis intensifies as all European supplies are cut off. *The Guardian*. <http://www.guardian.co.uk/business/2009/jan/07/gas-ukraine> Date of access: June 09, 2012.
- Grgic, Borut. (11/10/2011). Guest post: BP pipeline – late but good. *Financial Times*. <http://blogs.ft.com/beyond-brics/2011/10/11/guest-post-the-bp-pipeline-plan-is-late-but-good/> Date of access: April 08, 2012.
- Guneev, Sergey. (09/09/2010). Turkmenistan set to continue strategic energy cooperation with Russia. *Ria Novosti*. <http://en.rian.ru/world/20100930/160776513.html>
- Hafner, Manfred, Sohbet Karpuz, Benoit Esnault and Habib el-Andalousi. *Long-term natural gas supply to Europe: Import potential, infrastructure needs and investment promotion*. Observatoire Mediterranean de l'Energie (OME). <http://www.worldenergy.org/documents/p000963.pdf>
- Heinrich Böll Stiftung. Website. *Climate Change*. <http://www.za.boell.org/web/climate-change-496.html> Date of access: May 05, 2012.
- Hitiris, Theo. (2008). *European Union Economics: 4th Edition*. Prentice Hall, pp. 327-331.
- Hromadko, Jan et al. (18/06/2012). RWE May Reconsider Nabucco Pipeline. *Wall Street Journal*. <http://online.wsj.com/article/SB10001424052970204468004577166273792137122.html> Date of access: July, 10 2012.
- ICIS. (05/02/2010). Oman cuts back its LNG ambitions. <http://www.icis.com/heren/articles/2010/02/05/9332360/oman-cuts-back-its-lng-ambitions.html> Date of access: June 30, 2012.
- ICIS. (24/08/2010). Nabucco consortium ditches Iranian supply plans. <http://www.icis.com/heren/articles/2010/08/24/9387934/gas/esgm/nabucco-consortium-ditches-iranian-supply-plans.html> Date of access: June 12, 2012.
- Index Mundi. Greece. <http://www.indexmundi.com/g/g.aspx?c=bu&v=137> Date of access: May 09, 2012.

International Carbon Action Partnership. Website.  
[http://icapcarbonaction.com/index.php?option=com\\_content&view=article&id=52&Itemid=2](http://icapcarbonaction.com/index.php?option=com_content&view=article&id=52&Itemid=2)  
Date of access: April 10, 2012

International Energy Agency. (2011). *Natural Gas Information*.

International Energy Agency. (06/2009). Natural Gas in China, Market Evolution and Strategy. [http://www.iea.org/papers/2009/nat\\_gas\\_china.pdf](http://www.iea.org/papers/2009/nat_gas_china.pdf)

International Energy Agency. (2012). Oil and Gas Security: Emergency Response of IEA Countries- Hungary. [http://www.iea.org/papers/security/hungary\\_2012.pdf](http://www.iea.org/papers/security/hungary_2012.pdf)

International Energy Agency. Website. *Energy Security*.  
<http://www.iea.org/topics/energysecurity/> Date of access: April 05, 2012.

International Energy Agency. Website. *Responding to major supply disruptions*.  
<http://www.iea.org/topics/energysecurity/respondingtomajorsupplydisruptions/>

International Energy Agency. (2011). *World Energy Outlook 2011*.

International Energy Agency. (2011). *World Energy Outlook 2011: Are We Entering a Golden Age of Gas? : Special Report*.

Invest in Turkey. *Turkey at Glance: Economic Outlook*. <http://www.invest.gov.tr/en-us/turkey/factsandfigures/pages/economy.aspx#PageTop> Date of access: June 16, 2012.

Investing News. (27/03/2012). *Natural Gas in West Africa*.  
<http://www.thestreet.com/story/11475780/1/natural-gas-in-west-africa.html>

Iskanderov, Pyotr. (04/06/2012). Construction of South Stream to begin before the end of 2012. *The Voice of Russia*. [http://english.ruvr.ru/2012\\_06\\_04/77038801/](http://english.ruvr.ru/2012_06_04/77038801/)

İktisadi Kalkınma Vakfı. (2005). *Avrupa Birliği'nin Enerji Politikası*. İstanbul: İKV.

Johnson, Tony. (10/06/2011). Post-Fukushima: Will natural gas replace nuclear energy? *IBT*. <http://www.ibtimes.com/articles/160674/20110610/fukushima-energy-future-nuclear-natural-gas-future-energy-global-gas-market-obstacles-germany-japan.htm> Date of access: May 29, 2012.

Jones, David. (02/06/2011). Renewables and natural gas battle it out post- Fukushima. *Platts*. [http://www.platts.com/weblog/oilblog/2011/06/02/renewables\\_and.html](http://www.platts.com/weblog/oilblog/2011/06/02/renewables_and.html) Date of access: May 04, 2012.

Joskow, Paul L. (07/02/2012). The Future of Nuclear Power After Fukushima. *Sloan foundation and MIT*.  
<http://www.law.upenn.edu/academics/institutes/regulation/papers/JoskowParsonsNuclearPower.pdf>

King & Spalding. (2006). *LNG in Europe: An Overview of European Import Terminals*.  
[http://www.kslaw.com/library/pdf/LNG\\_in\\_Europe.pdf](http://www.kslaw.com/library/pdf/LNG_in_Europe.pdf) Date of access: May 05, 2011.

KMPG Global Energy Institute. Central and Eastern European Shale Gas Outlook. <http://www.kpmg.com/HU/en/IssuesAndInsights/ArticlesPublications/Documents/KPMG-CEE-Shale-Gas-Outlook.pdf> Date of access: July 18, 2012.

Konyrova, Kulpash. (10/02/2012). Central Asia, Iran and Turkey in gas power struggle. *The New Europe*. <http://www.neurope.eu/article/central-asia-iran-and-turkey-cold-snap-power-struggle> Date of access: July 12, 2012.

Korosi, Tamas. (18-19/01/2011). Natural Gas System in Hungary. *United Nations*. [http://www.unece.org/fileadmin/DAM/energy/se/pp/wpgas/21wpg\\_2011/19Jan2010/Hun\\_Korosi.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pp/wpgas/21wpg_2011/19Jan2010/Hun_Korosi.pdf)

Kovacevic, Alexandar. (05/03/2009). “The Impact of the Russia-Ukraine Gas Crises in South Eastern Europe”. *Oxford Institute for Energy Studies*. <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG29-TheImpactoftheRussiaUkrainianCrisisinSouthEasternEurope-AleksandarKovacevic-2009.pdf>

Laxmidas, Shrikesh. (24/08/2012). Angola LNG to start exports June, eyes Europe, Asia. *Reuters*. <http://af.reuters.com/article/topNews/idAFJJOE83N0AT20120424>

Lever, Liam. (07/02/2012). Romania’s gas supply improves but still short in wake of cold snap. *Romania Business*. <http://www.romania-insider.com/romanias-gas-supply-improves-but-still-short-in-wake-of-cold-snap/48312/>

Leverett, Flint. (05/2010). Iran’s latest export/import options. *New American Foundation*.

Lijdsman, Ryan W. Unconventional Gas in Ukraine: Boom or Bust. *US-Ukraine Foundation*. <http://www.usukraine.org/bizlinks/Reports/UnconventionalGasinUkraineBoomorBust.pdf>

MacDonald, Mott. (11/2010). *Supplying the EU natural gas market*. pp. 15. [http://ec.europa.eu/energy/international/studies/doc/2010\\_11\\_supplying\\_eu\\_gas\\_market.pdf](http://ec.europa.eu/energy/international/studies/doc/2010_11_supplying_eu_gas_market.pdf)

Michael Ratner, Paul Belkin, Jim Nichol, and Steven Woehrel. (13/03/2012). *Europe’s Energy Security: Options and Challenges to Natural Gas Supply Diversification*. Congressional Research Service(CRS). <http://www.fas.org/sgp/crs/row/R42405.pdf>

Mitsubishi Heavy Industries Ltd. Website. <http://www.mhi.co.jp/en/index.html> Date of access: July 15, 2012.

Nasseri, Ladane. (13/04/2012). Iran LNG Says It Will Overcome Sanctions To Start Exporting Fuel In 2012. *Bloomberg*. <http://www.bloomberg.com/news/2011-04-13/iran-lng-says-it-will-overcome-sanctions-to-start-exporting-fuel-in-2012.html> Date of access: July 15, 2012.

Natural Gas for Europe. (06/06/2012). BTE Pipeline Supply to Resume on June 8th. <http://www.naturalgaseurope.com/bte-supply-resume-june-8th-6729> Date of access: July 10, 2012.

Natural Gas for Europe. (16/05/2012). European Commission Clears Angola LNG Sale. <http://www.naturalgaseurope.com/european-commission-clears-angola-sale-6402> Date of access: July 05, 2012.

Natural Gas for Europe. (17/05/2012). LNG: Security of Gas Supply Will Matter in 2012. <http://www.naturalgaseurope.com/lng-security-of-gas-supply> Date of access: July 05, 2012.

Nichol, Jim. (12/01/2011). Central Asia: Regional Developments and Implications for U.S. Interests. Congressional Research Service. pp. 43. <http://www.fas.org/sgp/crs/row/RL33458.pdf>

Nord Stream. Website. *The Pipeline*. <http://www.nord-stream.com/pipeline/> Date of access: July 10, 2012.

Nova, Jane. (04/08/2006). Yemen's Natural Gas: Who Benefits? *Worldpress*. <http://worldpress.org/Mideast/2439.cfm>

Offshore. Website. Deepwater gas gathering scheme to end flaring offshore Angola. <http://www.offshore-mag.com/articles/print/volume-60/issue-8/news/deepwater-gas-gathering-scheme-to-end-flaring-offshore-angola.html> Date of access: June 06, 2012.

Osgood, Patrick. (05/04/2012). Bomb blasts close Kirkuk-Ceyhan pipeline. *Arabian Oil and Gas*. <http://www.arabianoilandgas.com/article-10132-updated-bomb-blasts-close-kirkuk-ceyhan-pipeline/>

Paul, Amanda and Borut Grgic. (27/10/2010). Entering the end game: the race for Caspian gas. *European Policy Center*. [http://www.epc.eu/documents/uploads/pub\\_1162\\_caspian\\_gas.pdf](http://www.epc.eu/documents/uploads/pub_1162_caspian_gas.pdf)

Personal Interview. (30/03/2012). Enno Harks.

Petromin Pipeliner. (04-06/2011). Website. *Turkmenistan-Pakistan-Afghanistan-India Gas Pipeline: South Asia's key project*. <http://www.pm-pipeliner.safan.com/mag/ppl0411/r06.pdf>

PetroStrategies Inc. (22/07/2012). *Libya*. [http://www.petrostrategies.org/Learning\\_Center/libya.htm#Natural\\_Gas](http://www.petrostrategies.org/Learning_Center/libya.htm#Natural_Gas)

Philippe and Partners. (08/11/2012). *Final report on shale gas in Europe*. pp. 48. [http://ec.europa.eu/energy/studies/doc/2012\\_unconventional\\_gas\\_in\\_europe.pdf](http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf)

Pinter, Judith. (06/06/2012). Central and Eastern Europe - Shale gas development "inevitable." KMPG Global Energy Institute. <http://www.kpmg.com/CEE/en/IssuesAndInsights/ArticlesPublications/Documents/press-release-cee-shale-gas-outlook.pdf> Date of access: July 12, 2012.

Platts. (29/06/2012). *US, EU sanctions on Iran alter oil supply picture*. <http://www.platts.com/newsfeature/2012/iran/index>

Press Tv. (26/09/2011). Iran in talks with 9 firms to export LNG. <http://www.presstv.ir/detail/201199.html> Date of access: May 29, 2012.

Republic of Turkey Ministry of Energy and Natural Resources. (2009). *Strategic Plan (2010 – 2014)*. pp. 29. [http://www.enerji.gov.tr/yayinlar\\_raporlar\\_EN/ETKB\\_2010\\_2014\\_Stratejik\\_Plani\\_EN.pdf](http://www.enerji.gov.tr/yayinlar_raporlar_EN/ETKB_2010_2014_Stratejik_Plani_EN.pdf) Date of access: June 06, 2012.

Reuters. (03/09/2010). Recent attacks on Kirkuk-Ceyhan pipeline. <http://in.reuters.com/article/2010/09/03/us-iraq-oil-ceyhan-factbox-idINTRE6823C720100903>

Reuters. (16/05/2012). Ukraine sees 2017 for commercial shale gas output. <http://www.reuters.com/article/2012/05/16/ukraine-gas-shale-idUSL5E8GGAJY20120516>

Ria Novosti. (30/06/2011). Gazprom ready to lay gas pipeline to China. <http://en.rian.ru/russia/20110630/164936135.html> Date of access: 05 June, 2012.

Roberts, John (10/2004). The Turkish Gate: Energy Transit and Security Issues. EU-Turkey Working Papers. CEPS. No: 11. [http://aei.pitt.edu/6768/1/1166\\_11.pdf](http://aei.pitt.edu/6768/1/1166_11.pdf)

Robin, Jean-Yves and Vincent Demoury. (2011). *The LNG Industry*. International Group of Liquefied Natural Gas Importers. [http://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/gnl\\_2011\\_giignl.pdf](http://www.connaissancedesenergies.org/sites/default/files/pdf-pt-vue/gnl_2011_giignl.pdf)

Russian National Security Council. (05/2009). Russian National Security Strategy. May 2009. <http://www.scrf.gov.ru/documents/99.html>

Sartori, Nicolò. (01/01/2012). The European Commission's Policy Towards the Southern Gas Corridor: Between National Interests and Economic Fundamentals. *Istituto Affari Internazionali*.

Socor, Vladimir. (30/10/2009). Southern Corridor, White Stream: the Strategic Rationale. Jamestown Foundation. *Eurasia Daily Monitor*. Vol: 6/200. [http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews\[tt\\_news\]=35676&tx\\_ttnews\[backPid\]=7&cHash=6399a84a28](http://www.jamestown.org/single/?no_cache=1&tx_ttnews[tt_news]=35676&tx_ttnews[backPid]=7&cHash=6399a84a28) Date of access: March 23, 2012.

—. (20/09/2011). European Union Officially Endorses Trans-Caspian Pipeline to Link Up With Nabucco. Jamestown. *Eurasia Daily Monitor*. [http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=38425](http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=38425) Date of access: March 23, 2012.

—. (09/04/2012). The Trans-Anatolia Gas Pipeline and Its Continuation Options to Europe. Jamestown Foundation. *Eurasia Daily Monitor*. Vol: 9/70. [http://www.jamestown.org/regions/turkey/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=39243&tx\\_ttnews%5BbackPid%5D=408&cHash=5d8fd34494577afe4cee70562daa8a9d](http://www.jamestown.org/regions/turkey/single/?no_cache=1&tx_ttnews%5Btt_news%5D=39243&tx_ttnews%5BbackPid%5D=408&cHash=5d8fd34494577afe4cee70562daa8a9d) date of access: April 15, 2012.

—. (27/06/2012). Aliyev, Erdogan Sign Inter-Governmental Agreement on Trans-Anatolia Gas Pipeline to Europe. Jamestown. [http://www.jamestown.org/regions/turkey/single/?no\\_cache=1&tx\\_ttnews%5Btt\\_news%5D=39545&tx\\_ttnews%5BbackPid%5D=408&cHash=252b4982cfa67ef2647f8fae7bb0fc22](http://www.jamestown.org/regions/turkey/single/?no_cache=1&tx_ttnews%5Btt_news%5D=39545&tx_ttnews%5BbackPid%5D=408&cHash=252b4982cfa67ef2647f8fae7bb0fc22) Date of access: July 20, 2012.

Soltanov, Elnur. (02/01/2012). The South East Europe Pipeline: Greater Benefit for a Greater Number of Actors. *Istituto Affari Internazionali*. <http://www.iai.it/pdf/DocIAI/iaiw1202.pdf>

Statoil. Website. *A reliable gas supplier*. [http://www.statoil.com/en/OurOperations/pipelines/Downloads/Natural\\_gas\\_pdf.pdf](http://www.statoil.com/en/OurOperations/pipelines/Downloads/Natural_gas_pdf.pdf)

Stephen Blank. (04/02/2010). The Strategic Implications of the Turkmenistan-China Pipeline Project. Jamestown Foundation. *China Brief*. Vol: 10/3.

[http://www.jamestown.org/programs/chinabrief/single/?tx\\_ttnews%5Btt\\_news%5D=36010&tx\\_ttnews%5BbackPid%5D=414&no\\_cache=1](http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5Btt_news%5D=36010&tx_ttnews%5BbackPid%5D=414&no_cache=1)

Stratfor. (14/02/2012). The Next Stage of Russia's Resurgence: The Caucasus States.

<http://www.eurasianet.org/node/65000>

TASS. (25/05/2012). BP drops out of Nabucco pipeline.

[http://english.ruvr.ru/2012\\_05\\_25/75963790/](http://english.ruvr.ru/2012_05_25/75963790/)

Terry, Ashley. (2011). The Arab Spring. *Global News*.

<http://www.globalnews.ca/2011/arabspring/> Date of access: June 02, 2012.

The Journal of Turkish Weekly. (01/04/2005). Turkish economy sets a record in annual growth rate: 9.9 pct.

<http://www.turkishweekly.net/news/7187/turkish-economy-sets-a-record-in-annual-growth-rate-9-9-pct.html>

Transgaz. Website. *Milestones in the Romanian natural gas industry*.

<http://www.transgaz.ro/en/istoric.php> Date of access: June 10, 2012.

Trend. (17/11/2011). U.S. Embassy clarifies Richard Morningstar's statements made at press conference in Baku.

<http://en.trend.az/news/politics/1958342.html> Date of access: May 11, 2011.

TurkishNY. (28/06/2012). Iran Suspends Natural Gas Flows to Turkey.

<http://www.turkishny.com/english-news/5-english-news/93330-iran-suspends-natural-gas-flow-to-turkey>

U.S. Energy Information Administration. (06/2011). Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays.

<ftp://ftp.eia.doe.gov/natgas/usshaleplays.pdf>

U.S. Energy Information Administration. (08/03/2012). *Algeria*.

<http://205.254.135.7/countries/cab.cfm?fips=AG> Date of access: June 10, 2012.

U.S. Energy Information Administration. (08/2011). *Angola*.

<http://www.eia.gov/countries/cab.cfm?fips=AO> Date of access: June 11, 2012.

U.S. Energy Information Administration. (30/06/2011). *Cyprus*.

<http://www.eia.gov/countries/country-data.cfm?fips=CY> Date of access: June 11, 2012.

U.S. Energy Information Administration. (02/2011). *Egypt*.

<http://205.254.135.7/countries/country-data.cfm?fips=EG&trk=c> Date of access: June 10, 2012.

U.S. Energy Information Administration. (11/2011). *Iran*.

<http://www.eia.gov/countries/cab.cfm?fips=IR> Date of access: June 09, 2012.

U.S. Energy Information Administration. (06/2012). *Libya*.

<http://205.254.135.7/countries/cab.cfm?fips=LY> Date of access: June 10, 2012.

U.S. Energy Information Administration. (08/2011). *Nigeria*.  
<http://www.eia.gov/countries/cab.cfm?fips=NI> Date of access: June 10, 2012.

U.S. Energy Information Administration. (02/2011). *Oman*.  
<http://205.254.135.7/countries/cab.cfm?fips=MU> Date of access: June 10, 2012.

U.S. Energy Information Administration. (01/2011). *United Arab Emirates*.  
<http://www.eia.gov/countries/cab.cfm?fips=TC> Date of access: June 09, 2012.

U.S. Energy Information Administration. (15/02/2012). *Yemen*.  
<http://www.eia.gov/countries/cab.cfm?fips=YM>

UG Center. (14/03/2011). Uzbekistan To Tap Massive Shale Oil Reserve.  
[http://www.ugcenter.com/International-Shales/Uzbekistan-Tap-Massive-Shale-Oil-Reserves\\_78873](http://www.ugcenter.com/International-Shales/Uzbekistan-Tap-Massive-Shale-Oil-Reserves_78873)

United Nations. Website. *Framework Convention on Climate Change*.  
[http://unfccc.int/essential\\_background/convention/background/items/1353.php](http://unfccc.int/essential_background/convention/background/items/1353.php) Date of access: June 20, 2012.

United Nations. Website. *Framework Convention on Climate Change – Kyoto Protocol*.  
[http://unfccc.int/kyoto\\_protocol/items/2830.php](http://unfccc.int/kyoto_protocol/items/2830.php) Date of access: June 20, 2012.

USAK. (27/07/2012). Exporting gas to Europe: What does Turkmenistan want? *International Strategic Research Organization*. <http://www.usak.org.tr/EN/myazdir.asp?id=1108>

Vukmanovic, Oleg and Barbara Lewis. (28/06/2012). Shah Deniz partners back Nabucco West pipeline: BP. *Reuters*. <http://www.reuters.com/article/2012/06/28/us-caspian-nabucco-idUSBRE85R13220120628> Date of access: July 12, 2012.

Vural, Tolga. Turkey as an energy bridge between East and West. *Museo Energia*.  
<http://www.museoenergia.it/museo.php?stanza=78&ppost=998>

Wall Street Journal. (06/06/2012). First Angola LNG Supplies Imminent; Europe, Asia Market Targeted –Chevron. <http://online.wsj.com/article/BT-CO-20120606-702147.html>  
Date of access: May 05, 2012.

Wall Street Journal. (24/04/2012). Hungary's MOL Won't Fund Nabucco Pipeline.  
<http://online.wsj.com/article/SB10001424052702303592404577364232277881786.html> Date of access: May 05, 2012.

Watkins, Eric. (30/12/2011). Russia to build South Stream gas pipeline via Turkey. *Oil and Gas Journal*. <http://www.ogj.com/articles/2011/12/russia-to-build-south-stream-gas-pipeline-via-turkey.html>

White Stream. Website. (20/02/2012). Diversifying Europe's Gas Imports. <http://www.gueu-whitestream.com/main.php?id=1> Date of access: June 16, 2012.

Winrow, Gareth M. Turkey as an Energy Transit State. Presented at the Conference entitled: Black Sea: Energy and the Environment, Istanbul Bilgi University, 15 May 2003.

Yergin, Daniel. (2006). Ensuring Energy Security: Old Questions, New Answers. *Foreign Affairs*, 85 (2): 69-79.