

# The Natural Gas Sector in SE Europe

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## Contents

|  |    |
|--|----|
| <b>1. The Region – Supply and Demand</b> ..... | 2  |
| - Turkey .....                                 | 3  |
| - The others .....                             | 5  |
| <b>2. Major Infrastructure Projects</b> .....  | 8  |
| - TAP – TANAP .....                            | 8  |
| - Turkish Stream (ex. South Stream) .....      | 9  |
| - Interconnectors .....                        | 10 |
| - The Vertical Corridor .....                  | 12 |
| - FSRU Terminals .....                         | 12 |
| - Gas Storage .....                            | 13 |
| <b>3. The East Med.</b> .....                  | 15 |
| - Israel and Cyprus .....                      | 15 |
| - Exporting East Med Gas to Egypt .....        | 15 |
| - Other Prospects .....                        | 16 |
| - The East Med Pipeline .....                  | 16 |

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## The Region – Supply and Demand

Natural gas is gaining ground in SE Europe which imports increasingly more quantities, mainly from Russia but also, in the case of Turkey from Iran and Azerbaijan, and also through LNG. Latest available figures (for 2013) suggest that SE European countries (including Turkey) consumed some 73.0 BCM's, of which 80% was imported. That means that a sizeable fiscal expenditure was required for these imports with efforts to discover and exploit indigenous gas deposits already being accelerated in several countries of the region.

**Table 1: Natural Gas Production and Consumption in SE Europe (2013)**

| <b>COUNTRY</b>       | <b>GAS PRODUCTION<br/>(bcm/year)</b> | <b>GAS CONSUMPTION<br/>(bcm/year)</b> |
|----------------------|--------------------------------------|---------------------------------------|
| ALBANIA              | 0.03                                 | 0.03                                  |
| BOSNIA & HERZEGOVINA | 0                                    | 0.2                                   |
| BULGARIA             | 0.2                                  | 2.6                                   |
| CROATIA              | 1.9                                  | 3.0                                   |
| CYPRUS               | 0                                    | 0                                     |
| F.Y.R.O.M.           | 0                                    | 0.1                                   |
| GREECE               | 0                                    | 3.5                                   |
| MONTENEGRO           | 0                                    | 0                                     |
| ROMANIA              | 10.9                                 | 13.5                                  |
| SERBIA & KOSOVO      | 0.35                                 | 2.5                                   |
| SLOVENIA             | 0.003                                | 0.85                                  |
| TURKEY               | 0.7                                  | 47.8                                  |
| <b>TOTAL</b>         | <b>14.08</b>                         | <b>74.08</b>                          |

Source: IENE

Six of the SE European countries (Greece, Croatia, Bulgaria, Romania, Turkey and Serbia) already use natural gas having well established markets, with supplies coming primarily through imports from Russia from Azerbaijan, LNG cargos and in the case of Turkey also from Iran. Two countries have a significant proportion of their demand met from domestic supplies (Croatia, Romania) and three others cover small percentage from domestic gas (Bulgaria, Serbia, Turkey). In projecting future gas demand for the region, one of the main issues is the extent to which availability of gas supplies would make possible the displacement of other fuels in various categories of demand such as power generation and for residential, commercial and industrial applications. Relative prices and competing fuels lie at the heart of analysis, although potential growth in demand for gas will also be driven by other factors, including environmental aspects and national policies.

Regarding the upstream sector, consistent efforts are now in evidence in Romania, Bulgaria, Croatia, Montenegro, Greece and Turkey to exploit existing fields but also identify new ones. Europe also sees an important opportunity to meet its energy needs by developing the Southern gas corridor, at the core of which are gas supplies from the Caspian area (mainly from Azerbaijan but also in the future from Turkmenistan, Kazakhstan and Iran) and possibly

from the Middle East (Iraq). According to the current state of play in South Eastern Europe, forecasts predict that the demand will grow up to 2025 at a rate of 1% each year.



Furthermore the need of the region to enhance its supply security, which is heavily dependent on pipe-gas from Russia, allows even more room for new players to enter this market. Regarding the Italian market, even though it is currently oversupplied, there is a strong need for further diversification and the promotion of strong gas to gas competition. As a result Italy and the SE European region remain an attractive market with room for new sources.

## Turkey

Special mention must be made to Turkey's natural gas sector as country is the region's major gas importer by far. Energy demand in Turkey has been growing by an impressive 5 - 8% annually, which is one of the highest rates in the world. In addition, natural gas consumption is the fastest growing primary energy source in Turkey. Due to the efforts to diversify energy supply, the consumption of imported natural gas has risen rapidly. According to the 2013 BP Statistical Energy Survey, Turkish natural gas consumption in 2010, one year after the global financial crisis, reached 39,0 bcm. In 2011 natural gas consumption showed a sharp increase at 45,7 bcm, while in 2012, there was a smaller increase reaching 45,9 bcm, which corresponds to 1,4% of the world total. In 2013 it was estimated at 46,6 bcm. Turkey is the biggest gas consumer, as well as among the most import-dependent countries in the region, because it covers almost all of its gas needs from imports.

**Table 2. Turkey: Natural Gas Consumption 2010 – 2013.**

| Years       | From Pipelines (%) | From LNG (%) | Total (bcm)/9155 Kcal |
|-------------|--------------------|--------------|-----------------------|
| <b>2010</b> | 78,5               | 21,5         | <b>38,037</b>         |
| <b>2011</b> | 85,2               | 14,8         | <b>43,874</b>         |
| <b>2012</b> | 82,9               | 17,1         | <b>45,922</b>         |
| <b>2013</b> | 87,8               | 12,2         | <b>46,600</b>         |

Source: IENE

By 2013, more than 50% of Turkey's gas imports were supplied from Russia, mainly via the Blue Stream pipeline in the Black Sea (24,5 bcm), nearly 15% was supplied from Iran (7,5 bcm), about 6,5% from Azerbaijan (2,9 bcm), and the remainder from Algeria and Nigeria, in LNG form.

**Table 3. Turkey: Natural Gas Consumption Forecast for 2014 – 2023.**

| Years       | From Pipelines (%) | From LNG (%) | Total (bcm)   |
|-------------|--------------------|--------------|---------------|
| <b>2014</b> | 87                 | 13           | <b>46,500</b> |
| <b>2015</b> | 86                 | 14           | <b>49,541</b> |
| <b>2016</b> | 85                 | 15           | <b>52,500</b> |
| <b>2017</b> | 84                 | 16           | <b>55,200</b> |
| <b>2018</b> | 77                 | 23           | <b>59,852</b> |
| <b>2019</b> | 78                 | 22           | <b>57,779</b> |
| <b>2020</b> | 78                 | 22           | <b>60,414</b> |
| <b>2021</b> | 79                 | 21           | <b>61,103</b> |
| <b>2022</b> | 79                 | 21           | <b>61,510</b> |
| <b>2023</b> | 79                 | 21           | <b>60,971</b> |

Source: IENE, IEA Mid Gas Report, IEA 2014

**Figure 3.3: Turkey's existing and planned oil & natural gas pipelines and infrastructure**



Turkey is also keen to develop the offshore oil and gas potential in the Eastern Mediterranean. It is becoming increasingly clear that from 2018/2019 onwards there will be substantial natural gas volumes (5-25 bcm/year) available for export from the Levantine Basin. And, as exploration continues, the companies involved believe that there could be more gas and oil discoveries in the same area.

Turkey's interest in natural gas is strong both as a potential producer but also from a customer point of view and as a transit country to European markets. According to the "BP Statistical Review of World Energy 2014", natural gas consumption in Turkey has rapidly increased from 14.6 bcm in 2000 to 39 bcm in 2010 and to 47,8 bcm in 2014.

In future, gas consumption is expected to increase as more regions in Turkey are connected to natural gas distribution networks and new gas-fired power generation capacity continues to come on stream throughout the country.

Most of the gas is currently imported by pipeline from Russia and Azerbaijan, but Turkey has also two important LNG import terminals. On the transit side, virtually all of the various pipeline projects which plan to transport Caspian natural gas to the European markets involve Turkey as a transit country – TANAP, the Trans-Anatolian Pipeline, (to be built by BOTAS and by Azerbaijan's SOCAR), even Turk Stream the successor of the South Stream project.

The following is a summary of the latest gas developments in selected countries in SE Europe:

### **Greece**

Gas imports account for about 100% of the total volumes of consumed gas in Greece. Most of Greece's gas imports are being realised via pipeline, and 29% is imported via LNG through the Revithoussa LNG terminal. Greece's gas pipeline imports come mainly from Russia (2,3 bcm) and a small portion of 0,6 bcm from Azerbaijan through Turkey, while most LNG originates from Algeria and Qatar (1,3 bcm). The share of Russian gas in Greece's gas imports contracted to 55% in 2012. Greece has an extensive portfolio of energy exploration projects for the future, though the present financial crisis has put a damper on these for now. Greece's domestic natural gas consumption is steadily increasing - from 2,0 bcm in 2000 to 4,2 bcm in 2012 according to DESFA - but there was a decrease in 2013, as total demand reached 3,6 bcm.

**Table 4. Greece: Natural Gas Consumption 2010-2013.**

| Years | From Pipelines (%) | From LNG (%) | Total (bcm)  |
|-------|--------------------|--------------|--------------|
| 2010  | 70,81              | 29,19        | <b>3,651</b> |
| 2011  | 75,26              | 24,74        | <b>4,591</b> |
| 2012  | 70,72              | 29,28        | <b>4,219</b> |
| 2013  | 84,67              | 15,33        | <b>3,641</b> |

Source: IENE

Greece's demand is likely to reach 5,0 bcm by 2020 according to DESFA estimates as shown in the following table.

**Table 5. Greece: Natural Gas Consumption Forecast for 2014-2023.**

| Years | From Pipelines (%) | From LNG (%) | Total (bcm)  |
|-------|--------------------|--------------|--------------|
| 2014  | 85,12              | 14,88        | <b>3,399</b> |
| 2015  | 82,91              | 17,09        | <b>3,522</b> |
| 2016  | 78,69              | 21,31        | <b>4,107</b> |
| 2017  | 76,70              | 23,30        | <b>4,368</b> |
| 2018  | 74,19              | 25,81        | <b>4,650</b> |
| 2019  | 78,75              | 21,25        | <b>4,508</b> |
| 2020  | 75,94              | 24,06        | <b>4,806</b> |
| 2021  | 84,35              | 15,65        | <b>4,446</b> |
| 2022  | 82,97              | 17,03        | <b>4,580</b> |
| 2023  | 80,57              | 19,43        | <b>4,779</b> |

Source: DESFA

## Bulgaria

In 2011 natural gas demand in Bulgaria showed a significant increase compared to 2009 and 2010. In 2009 Bulgaria consumed almost 2,54 bcm which is a significant decrease of 24% compared with the consumption in 2008 which reached the 3,35 bcm. Some 0,22 bcm of its total consumption in 2009 were covered by indigenous production, while the rest was imported from Russia. In 2010 the consumption of natural gas in Bulgaria increased to 2,66 bcm, while in 2011 a further increase was noted to 2,99 bcm. In 2012 there was a small decrease compared to 2011, as total gas demand reached 2,75 bcm, while in 2013 there was a small increase to 2,81 bcm. Most of the natural gas consumed in Bulgaria is used to satisfy industrial and public sector needs, although a significant proportion is used by District Heating companies mainly for the production of heat and relatively smaller portion of electricity.

**Table 6. Bulgaria: Natural Gas Consumption 2010 – 2013.**

| Years       | From Pipelines (%) | From LNG (%) | Total (bcm) |
|-------------|--------------------|--------------|-------------|
| <b>2010</b> | 100                | 0            | <b>2,66</b> |
| <b>2011</b> | 100                | 0            | <b>2,99</b> |
| <b>2012</b> | 100                | 0            | <b>2,75</b> |
| <b>2013</b> | 100                | 0            | <b>2,81</b> |

Source: IENE

The forecasts are that during 2014 - 2025 the demand for natural gas will rise on average by approximately 3,2% per year, reaching 6,0 bcm by the end of the period.

**Table 7. Bulgaria: Natural Gas Consumption Forecast for 2014 – 2023.**

| Years       | From Pipelines (%) | From LNG (%) | Total (bcm) |
|-------------|--------------------|--------------|-------------|
| <b>2014</b> | 100                | 0            | <b>2,9</b>  |
| <b>2015</b> | 100                | 0            | <b>3,5</b>  |
| <b>2016</b> | 100                | 0            | <b>3,9</b>  |
| <b>2017</b> | 100                | 0            | <b>4,0</b>  |
| <b>2018</b> | 99,5               | 0,5          | <b>4,2</b>  |
| <b>2019</b> | 99,3               | 0,7          | <b>4,4</b>  |
| <b>2020</b> | 99,3               | 0,9          | <b>4,7</b>  |
| <b>2021</b> | 98,8               | 1,2          | <b>5,0</b>  |
| <b>2022</b> | 98,6               | 1,4          | <b>5,1</b>  |
| <b>2023</b> | 98,3               | 1,7          | <b>5,4</b>  |

Source: IENE

## Croatia

Gas production in Croatia is likely to peak over the next five years, with production expected to rise from 1,61 bcm in 2012 to 2,5 bcm in 2018.

Natural gas is produced in Croatia from 16 on-shore and nine off-shore gas fields and is currently meeting 46% of total domestic demand according to the Ministry's 2013 annual energy report. Consumption is also set to rise, from 2,82 bcm in 2012 to 3,7 bcm by 2017. Investment activities so far have focused on the completion of the development - investment cycle of the gas transmission system, as well as on the preparation of the new projects such as the planned LNG Terminal on the island of Krk. This LNG terminal, named Adria LNG, is a proposed liquefied natural gas (LNG) regasification terminal in Omisalj on the island of Krk. The project was first considered in 1995, when initial exploratory work was undertaken. A feasibility study was completed by 2008 and the location permit was issued in 2010 after environmental impact assessment was carried out. The terminal will provide additional source of natural gas for the Croatian market. The terminal will also be a distribution point for natural gas to the surrounding market, including Austria, Hungary,

Serbia, Romania and Slovenia. For this purpose, a new natural gas pipeline between Croatia and Hungary was built.

Almost all of the gas quantities imported in Croatia are delivered via pipeline and mainly come from Russia. In 2012, 96% of Croatia's gas imports originated from Russia, while the remaining 4% of imported gas originated from other countries. So far, there are no LNG imports.

## **Romania**

Romania is the region's major gas producer. Romania in 2013 imported 2,6 bcm of natural gas, representing 15,5% of its domestic consumption (13,5 bcm), while domestic production remained steady at 10,9 bcm. Dry natural gas production has declined steadily over the past three decades, from its peak of 40 Bcm in 1983 to 10.9 bcm in 2013.

Almost all of the gas quantities imported in Romania are delivered via pipeline, as there are no LNG import facilities. The vast majority of the gas pipeline imports originate from Russia.

According to several studies Romania has a significant natural gas potential from both onshore and offshore fields. Romania has the fifth-largest natural gas reserves in Europe with 105 bcm of proved reserves as of January 1, 2014.

There are some new, potentially significant, offshore discoveries in Romania but their effect on the market of the region still remains to be seen as full exploration has not yet been undertaken. Two very promising offshore gas fields, Doina and Ana, are located on the continental shelf of the Black Sea in block XV. Doina was discovered in 1990 and developed by Petrom. It began production in 1995 and produces natural gas and condensates. The total proven reserves of the Doina gas field are around 2.7 bcm. On the other hand Ana was discovered and developed by Sterling Resources. It went on stream in 2010 and it produces natural gas and condensates. The total proven reserves of the Ana gas field are around 7.0 bcm. According to Sterling Ltd Ana and Doina fields are vital for opening up the Black Sea gas business in Romania.

Romania also is looking to develop a shale gas industry and reduce its reliance on Russian natural gas supplies. Romania appears set to start exploring its shale gas reserves in a drive for energy independence, despite local protests against the potential risks and Europe-wide concerns about the technology used to exploit unconventional gas sources.

## **Major Infrastructure Projects**

### **TAP – TANAP**

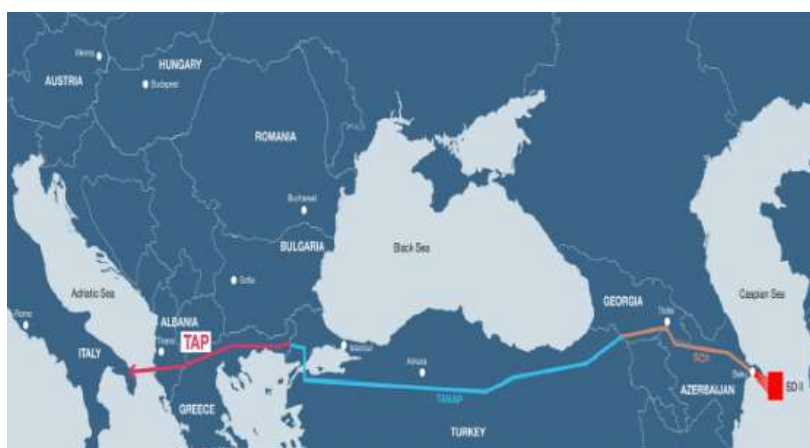
#### **Trans Anatolian Gas Pipeline (TANAP)**

The Trans Anadolu Gas Pipeline (TANAP) is a joint Azeri – Turkish project and aims to bring gas from Azerbaijan to the European edge of Turkey, where it will be connected with the



TAP pipeline. The TANAP project envisages the construction of a pipeline from the eastern border of Turkey to the country's western border to supply gas from the Shah Deniz gas-condensate field in the Caspian Sea. Ongoing preparations to build TANAP, are to be completed by 2019 and will cost roughly \$10 billion.

The pipeline, about 2.000 km long, is planned to be laid from the Georgian-Turkish Border and up to the Turkish–Greek Border (The pipeline which will transfer gas from Azerbaijan to Turkish border across Georgia is the South Caucasus Pipeline, which is being expanded and has a different ownership structure to TANAP). At first stage, the carrying capacity of TANAP will be 16 bcm of gas per year, 212 bcf (6 bcm) of which will be consumed by the Turkish consumers and 353 bcf (10 Bcm) will be delivered to European countries via TAP. At a second stage, it is planned to increase deliveries up to 847 bcf (24 bcm). The gas pipeline is planned to be put into operation in 2019 and will be devoted from the beginning to gas produced from the Shah-Deniz Phase-2 field.



### Trans Adriatic Pipeline (TAP)

TAP has been selected by the Shah Deniz consortium, instead of the northern route (Nabucco West) to carry gas to Europe from Turkey's western border. The Trans Adriatic Pipeline (TAP) will connect existing and planned grids for natural gas transport in Southeast Europe with gas systems in Western Europe via Greece, Albania, the Adriatic Sea and Italy. The pipeline will therefore give Europe better access to major natural gas reserves located in the Caspian region. The pipeline is designed with an initial 10 bcm/yr transport capacity and will be 48 – inches in diameter. It will have a combined length of 682 km onshore and 105 km offshore. It is estimated that the construction of the pipeline will cost about 5,3 billion dollars. In February 13, 2013, the governments of Greece, Italy and Albania confirmed their full support and commitment to the Trans Adriatic Pipeline (TAP) project by signing in Athens a tri-lateral intergovernmental agreement (IGA).

### Turkish Stream (ex. South Stream)

The **Turkish Stream** is the working name of the proposed natural gas pipeline from Russia to Turkey across the Black Sea which will substitute the now defunct South Stream. The proposal was announced by Russian president Vladimir Putin on 1 December 2014, during his state visit to Turkey. According to Gazprom, the project does not have an official name yet. Landfall will be near the village of Kiyikoy in

Turkey's European sector, and a delivery hub for Turkish consumers will be close to the town of Luleburgaz. The pipeline will terminate in the Turkish-Greek border in the area of Ipsila. Gazprom suggested the European Union (i.e. the European client companies of Gazprom) should build its own link from the as-yet unbuilt gas hub at the Turkish-Greek border to transit some 50 bcm via the new route to various European destinations. A new pipeline will need to be build which will cross North Greece and from there via the Adriatic Sea to Italy.



The planned capacity of the pipeline is 63 billion cubic metres per annum (2.2 trillion cubic feet per annum) of natural gas. Turkey would take about 14 billion cubic metres per annum (490 billion cubic feet per annum) with the rest of the gas to be exported to Europe. Turkey's future take from Turkish Stream is currently being supplied by the Trans Balkan pipeline. The future of this pipeline remains uncertain.

### Interconnectors

Greece, Bulgaria, Romania and Serbia plan to expand their gas infrastructures, especially with gas interconnectors, in order to avoid future gas disruptions and increase their energy security. This network of gas interconnectors will supply the region with new natural gas quantities coming from the TAP pipeline, the liquefied natural gas terminal in Revithoussa (currently the only LNG terminal in Greece) and possibly from one of the planned floating LNG terminals (FSRU) in Northern Greece.

Picture 1. Gas interconnections in SE Europe.



### **The Interconnector Bulgaria and Romania (IBR)**

Bulgaria commenced construction of a gas interconnection with Romania, on August 2011. Total project value is approximately €24 million, €9 million of which are EU funds, €11 million are from Bulgaria, and the rest is to be provided by the Romanian Transgaz. The total length of the pipeline between Giurgiu and Ruse is 25 km with 15,4km in Bulgaria and 2,1 km beneath the Danube. Following a number of technical delays, the Bulgaria-Romania gas grid interconnection was expected to start functioning in June 2015.

### **Bulgarian-Turkish gas interconnection (ITB)**

The project is likely to receive a grant from the European Union. The interconnector project with Turkey is described as being "key" to Bulgaria's energy diversification efforts in view of the fact that the Turkish system has six entry points for natural gas. The 77km-long gas pipeline (75 km on Bulgarian territory and 2 km on Turkish territory) will carry up to 3 bcm metres of natural gas a year initially, the pipe diameter is 28 inches (700 mm) and the working pressure 75 bar. No set date has been announced for its construction.

### **Bulgarian-Serbian gas Interconnection (IBS)**

Interconnector Sofia-Dimitrovgrad (Serbia)-Nis (Serbia), will connect the national transmission networks of Bulgaria and Serbia. The aim is to ensure diversification of routes, intersystem connectivity and gas transmission. It is expected that construction of the pipeline will provide an option for delivery of up to 1,8 bcm/yr of natural gas, in both directions, with the opportunity to further increase the volumes up to 4,5 bcm/yr. The total length of the route is 150 km, of which around 50 km are on Bulgarian territory. Possible pipe diameter is 28" and the working pressure is 55 bar. No set date has yet been announced for the pipeline construction.

### **Greece Bulgaria Gas Interconnector (IGB)**

The IGB, which will supply Bulgaria and hence, South Eastern Europe region, with up to 5 bcma, will be operational by 2018. The project includes the construction of a trans-border reverse flow gas pipeline with a length of about 168,5 km (140 km in Bulgaria, 28,5 km in Greece), connecting the Greek gas network in the area of Komotini with the Bulgarian gas network in the area of Stara Zagora. The capacity of the gas pipeline is foreseen to be 3 up to 5 billion m<sup>3</sup>/yr, with a pipe diameter of 750 mm (32").

## Gas Interconnectors in Romania

### *Hungarian link*

Apart from the interconnector between Romania and Bulgaria (IBR) another key interconnector project is the creation of two-way flows on the Arad-Szeged pipeline from Romania to Hungary, which is currently only capable of importing gas into Romania. Transgaz is looking to complete the project by December 2016, with the condition that it can secure agreement with relevant Hungarian authorities.

### *Serbian link*

Transgaz is developing plans to construct an interconnector with Serbia, which would allow Romania to gain access to the South Stream pipeline. This project could also potentially offer access to LNG imports via the proposed regasification terminal in Croatia. The Serbia interconnector is still in the early stages and the Romanian TSO is now looking to contact relevant authorities on the Serbian side to gauge the appetite for such a pipeline.

## Floating Storage and Regasification Units (FSRU)

There are two noteworthy plans in Greece, regarding the construction of Floating Storage and Regasification Units (FSRU) which are to be located right beside the route of the TAP project and the Greek–Bulgarian interconnector IGB and the existing Greek–Turkey (IGT) nearby the Bulgarian and Turkish markets, in order to be able to link themselves through the planned interconnectors.

Firstly, the private Greek company “Gastrade” part of the Copelouzos Group, which received an Independent Natural Gas System license in 2011, is developing a 6,1 bcm annual capacity floating LNG storage and regasification unit offshore Alexandroupolis. The project was submitted to the Greek energy regulator in 2010 and has received environmental assessment approval in 2013. The 170.000 m<sup>3</sup> offshore storage facility will be linked to the Greek National Natural Gas System through a 28 km subsea and onshore pipeline. The project location is in proximity with the TAP route and is around 55 km from the entry point of the planned interconnector Greece-Bulgaria (IGB). This FSRU has been included in EC’s PCI projects and has already received a € 2,5 million grand to complete final studies.

Concurrently, the Greek DEPA Company is also laying down its own plans concerning a separate FSRU unit, a 3 bcm per annum facility near the port of Kavala and in a strategic location close to the aforementioned pipeline and interconnector. The project aims for a 150.000 cubic meters storage capacity and DEPA already actively seeks international investor backing for this 400 million-dollar plan. The medium-term business plan of DEPA calls for an increase in the capacity of the Kavala FSRU to 5 bcm. DEPA’s planned FSRU project in Kavala, although not as advanced as the “Gastrade” one, is equally important from a strategic sense, since it reinforces Greece’s role, as a potential gas supplier to the other countries in SE Europe.

## The Vertical Corridor

Greek national grid could be a starting point of a gas system which will carry significant gas quantities in a vertical axis (south to north) and in a constant flow to Bulgaria and Romania and from there to a number of countries such as Hungary, Serbia, Moldavia and others. The above idea which is known as the Vertical Corridor and it is supplementary to the South

Corridor, has been adopted by the three governments of Greece, Bulgaria and Romania and will contribute significantly to the gas interconnectivity in SE and Central Europe, especially

after the cancelation of the South Stream project. The Vertical Corridor is emerging as a project to fill the gap of interconnections needed to link SE Europe's isolated markets and provide reverse-flow options for existing routes.

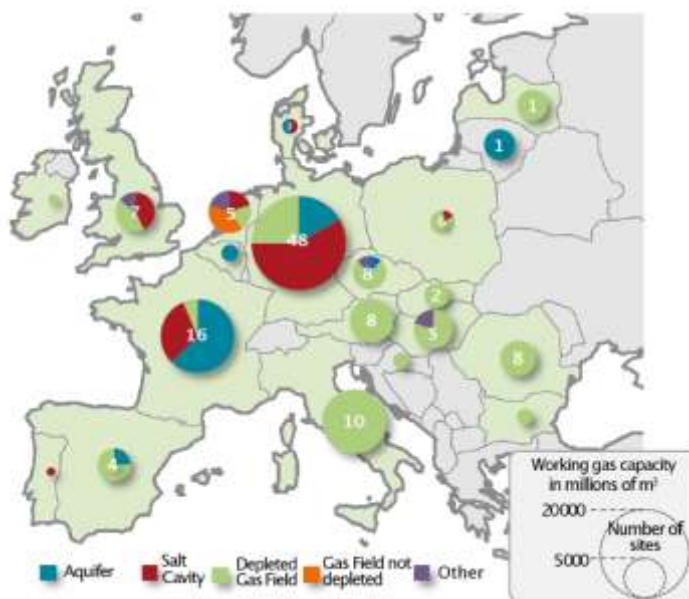


The Vertical Corridor concept will not be a pipeline project as far as the other south corridor projects are concerned but a gas

system that will connect the existing national gas grids and other gas infrastructures in order to secure energy security and ensure liquidity. Such a gas system (which will be consisted by national grids, underground gas storage facilities, interconnectors) will be an important corridor from South to North fully coordinated to the European energy policy. Initially the Vertical Corridor will amount some 3 – 5.0 bcm per year starting from the Greek national grid and later could transfer some 8.0 bcm.

### Gas Storage

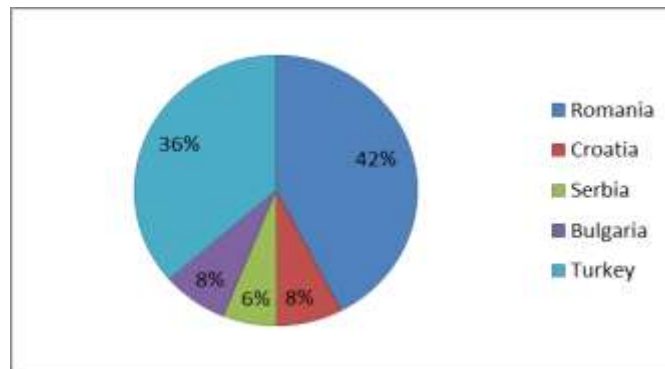
The following map (GSE, 2013) shows the number of existing underground storage sites by country in Europe and their capacity.



The total underground storage capacity in Europe is estimated at 110 billion cubic meters (bcm), of which 87 bcm are located in 28 EU Member States. The global capacity of gas storage is estimated to be more than 300 billion cubic meters.

In SE Europe there are 12 gas storage facilities in operation in 5 countries, which are Romania, Croatia, Serbia, Bulgaria and Turkey. All of these facilities are

depleted fields and their total capacity approaches 7,5 billion cubic meters, in terms of working gas. The following graph illustrates each country's share:



The following table summarises the technical characteristics of each of the 12 existing underground storage facilities in the SE Europe:

**Table 8. Underground Storage Facilities in SE Europe**

| Facility / Location | Company                               | Type               | Working Gas (mcm) | Withdrawal Capacity (mcm/d) | Injection Capacity (mcm/d) | Access    |
|---------------------|---------------------------------------|--------------------|-------------------|-----------------------------|----------------------------|-----------|
| <b>Bulgaria</b>     |                                       |                    | <b>550</b>        | <b>4,20</b>                 | <b>3,50</b>                |           |
| Chiren              | Bulgartransgaz                        | Depleted Gas Field | 550               | 4,20                        | 3,50                       | regulated |
| <b>Croatia</b>      |                                       |                    | <b>553</b>        | <b>5,76</b>                 | <b>3,84</b>                |           |
| Okoli               | Podzemo skladniste plina d.o.o. (PSP) | Depleted Gas Field | 553               | 5,76                        | 3,84                       | regulated |
| <b>Romania</b>      |                                       |                    | <b>3100</b>       | <b>24,27</b>                | <b>30,27</b>               |           |
| Tirgu-Mures         | Depomures                             | Depleted Field     | 300               | 2,00                        | 2,00                       | regulated |
| Nades-Prod-Seleus   | Amgaz                                 | Depleted Field     | 50                | 0,27                        | 0,27                       | regulated |
| Sarmasel            | Romgaz                                | Depleted Field     | 800               | 22,00                       | 28,00                      | regulated |
| Cetatea de Balta    | Romgaz                                | Depleted Field     | 200               |                             |                            | regulated |
| Bilciuresti         | Romgaz                                | Depleted Field     | 1300              |                             |                            | regulated |
| Urziceni            | Romgaz                                | Depleted Field     | 250               |                             |                            | regulated |
| Ghercesti           | Romgaz                                | Depleted Field     | 150               |                             |                            | regulated |
| Balanceanca         | Romgaz                                | Depleted Field     | 50                |                             |                            | regulated |
| <b>Serbia</b>       |                                       |                    | <b>450</b>        | <b>5,00</b>                 | <b>3,50</b>                |           |
| Banatski Dvor       | Srbijagas/Gazprom Germania            | Depleted Field     | 450               | 5,00                        | 3,50                       |           |
| <b>Turkey</b>       |                                       |                    | <b>2660</b>       | <b>20,00</b>                | <b>16,00</b>               |           |
| Marmara             | TPAO                                  | Depleted Field     | 2660              | 20,00                       | 16,00                      |           |

## The East Med.

### Israel an Cyprus

#### Cyprus

Discoveries of natural gas in the eastern Mediterranean region have reshaped the regional energy map. The first significant natural discovery was made in 2009, when the U.S. energy company Noble Energy announced the discovery of the Tamar field in offshore Israel (250 bcm). The Tamar field discovery was followed by the discovery of the much bigger Leviathan field (476 bcm) in offshore Israel in 2010 and the Aphrodite field (140-220 bcm) in offshore Cyprus in 2011.

According to the Cyprus Energy Department, the country's offshore territory could contain as much as 1.700 bcm. Natural gas reserves in the region are relatively insignificant on a global scale, but could contribute in the diversification of gas supply sources of the EU, as well as boost the economies of the region. In June 2013, Cyprus and a U.S.-Israeli partnership, including Noble Energy, signed a memorandum of understanding (MOU) to construct natural gas facilities for both domestic consumption and export.

#### Israel

Israel was the region's second-largest natural gas consumer in 2011. The discovery of its two massive offshore natural gas reservoirs, Tamar and Leviathan, ensured that even with local demand rising, Israel can meet its own gas needs for several decades, as well as becoming a natural gas net exporter. However, there are concerns over how much natural gas the country will be able to export considering the high projected domestic demand. The Tamar natural gas production platform went into production in April 2013 and according to analysts increased Israel's GDP by almost 0,5%. It is projected to increase further the GDP by 1,5% in 2014.

The discoveries in Cyprus and Israel have shown the potential for offshore natural gas production in the eastern Mediterranean and have sparked a flurry of interest in potential natural gas reserves specifically in Syria and Lebanon.

#### Exporting East Med Gas to Egypt

Following the signing of an MOU between the governments of Cyprus and Egypt (February 2015) it is most likely that a new export route will be created the Aphrodite-Leviathan gas reserves.



A 200km underwater pipeline could be built to take gas from the above fields to the liquefaction plant at Damietta in Egypt which is currently under supplied from Egyptian fields. This could be the quickest way for Cyprus to monetize its

gas output with the pipeline ready as early as 2018/2019.

### Other Prospects

Syria launched a licensing round for offshore blocks in 2011, but exploration is postponed indefinitely by the government due to the ongoing conflict in the country. The unstable security environment in Syria, as well as the ongoing territorial disputes of the region, can undermine the success of the exploration activities. Syria does not currently possess the ability to export LNG, nor are current natural gas production levels sufficient to justify exporting volumes via pipeline. Moreover, the Syrian conflict could impair natural gas demand and interrupt production.

Lebanon has no proven gas reserves and exploration efforts are at an early stage. The conflict between government and opposition forces has prevented the launching of an offshore licensing round despite the optimism of government officials about significant potential discoveries in the country.

Discoveries of offshore natural gas reserves will help ensure the energy security of the region as well as stimulate economic growth. However, relations between several eastern Mediterranean countries are tense and the ongoing territorial disputes could undermine exploration and development in the region - particularly in the offshore Levant Basin - and limit cooperation over potential export projects. Eventually, the extent of natural gas development in the area will depend on regional political dynamics.

### The East Med Pipeline

Currently, no countries in the region export natural gas. Israel will most likely start exporting gas to Egypt as early as the second half of 2015 through existing infrastructure. Natural gas development in the region is expected to encounter several challenges. Major investments in infrastructure for natural gas transfer and processing will be required.



The setting of environmental and safety regulations could also prove challenging. Additionally, in order to export gas new infrastructure would also have to be laid by developers and the governments of the region. Natural gas can be exported either in liquid form or via pipeline. The construction of a subsea pipeline to Greece, the East Med pipeline, is a possibility, but would also be very costly

because of the technical difficulties involved.

The broad concept developed by Greece's Public Gas Corporation DEPA is for a new gas corridor in the East Mediterranean based on an underwater gas pipeline connecting Israel/Cyprus to Greece. According to a recent DEPA study, the pipeline will be able to carry around 8 bcma. The initial design of the pipeline foresees a first leg of 150 km connecting



the Cyprus/ Israeli gas fields to Cyprus, a second leg from Cyprus to Crete of 633 km and a third leg from Crete to mainland Greece of 405 km, i.e. a total of 1.188 km. There are two further options for the third leg. The first one foresees that the pipeline from Crete lands in the South Peloponnese whence a 460 km onshore pipeline will connect it to the IGI Poseidon starting point at Thesprotia in Western Greece. The second option, which is less developed from a design point of view, will run beneath the Aegean Sea, connecting the east part of Crete to Komotini in Northern Greece (from where the IGB will start), i.e., a total distance of approximately 700 km.