LNG as Part of the Expanded South Corridor

Athens University History Museum

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INSTITUTE OF ENERGY
FOR SOUTH EAST EUROPE
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Global LNG Trade (1990-2040)

LNG exports

- Middle East
- N America
- Russia
- Africa
- Australia
- Other

Bcf/d

1990 2000 2010 2020 2030 2040

LNG imports

- China
- Other Asia
- India
- OECD Asia
- Europe
- Other

Bcf/d

1990 2000 2010 2020 2030 2040

Source: BP Energy Outlook 2018
Asian LNG Trade and Gas Supply to Europe (2010-2040)

Source: BP Energy Outlook 2018
LNG Contracted Volumes in Europe over 2015-22

Source: IEA Gas Market Report 2017
The SE European Region Defined

Core Countries
- Albania
- BiH
- Bulgaria
- Croatia
- Cyprus
- FYROM
- Greece
- Kosovo
- Montenegro
- Romania
- Serbia
- Slovenia
- Turkey

Peripheral Countries
- Egypt
- Hungary
- Israel
- Italy
- Lebanon
- Moldova
- Syria
- Ukraine

Source: IENE
Russian Gas Supplies to Selected SE European Countries (2016)

Note: Albania, Montenegro, Kosovo and Cyprus do not produce, import or consume natural gas.

Source: Gazprom
<table>
<thead>
<tr>
<th>Country</th>
<th>2008</th>
<th>2015</th>
<th>2025e</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gas production (bcm/y)</td>
<td>Gas consumption (bcm/y)</td>
<td>Gas production (bcm/y)</td>
</tr>
<tr>
<td>Albania</td>
<td>0.02</td>
<td>0.02</td>
<td>0.0</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>0.0</td>
<td>0.31</td>
<td>0.0</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.31</td>
<td>3.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Croatia</td>
<td>2.03</td>
<td>3.1</td>
<td>1.75</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>FYROM</td>
<td>0.0</td>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>Greece</td>
<td>0.0</td>
<td>4.25</td>
<td>0.009</td>
</tr>
<tr>
<td>Kosovo</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Montenegro</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Romania</td>
<td>11.2</td>
<td>16.9</td>
<td>10.46</td>
</tr>
<tr>
<td>Serbia</td>
<td>0.25</td>
<td>1.92</td>
<td>0.54</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.0</td>
<td>0.51</td>
<td>0.0</td>
</tr>
<tr>
<td>Turkey</td>
<td>1.03</td>
<td>36.9</td>
<td>0.37</td>
</tr>
<tr>
<td>Total</td>
<td>14.84</td>
<td>67.46</td>
<td>13.23</td>
</tr>
</tbody>
</table>

Sources: IENE, IEA, 10-year Development Plans of gas TSOs, BP Statistical Review for World Energy 2017
Gas Interconnections in SE Europe

The TANAP and TAP gas pipelines as well as Turkish Stream are under construction, with IGB at an advanced planning stage with FID already taken. The IAP, the IGI Poseidon in connection with East Med pipeline and the Vertical Corridor and the IGF are still in the study phase. Blue Stream and Trans Balkan are existing pipelines.

Source: IENE (February 2018)
Today, there are **5 LNG importing terminals in operation** across SE Europe:
- 2 land based in Turkey (Aliaga and Marmara Ereqlisi)
- 1 land based in Greece (Revithoussa)
- 2 FSRUs in Turkey (ETKI and Botas-Dortyol)

By 2020, a number of **new LNG terminals** will be added:
- 1 FSRU (Gulf of Saros) in Turkey
- 1 FSRU (Alexandroupolis) in Greece
- 1 FSRU (Krk Island) in Croatia
LNG Terminals in SE Europe

Source: IENE (February 2018)

*Indicates the size of onshore storage relative to onshore terminal capacity.

Source: 2017 IGU World LNG Report
World LNG Estimated Landed Prices:
January 2018

Note: Includes information and Data supplied by IHS Global Inc. and its affiliates ("IHS"); Copyright (publication year) all rights reserved. Prices are the monthly average of the weekly landed prices for the listed month. Landed prices are based on a netback calculation.

Source: FERC
The Alexandroupolis FSRU Project

- Security & Diversification of Supply
- New Pricing
- Enhancing trading optionality

Source: IENE study, “Gas Supply in SE Europe and the Key Role of LNG”, (M46), Athens, December 2017
The Alexandroupolis FSRU as Part of the Expanded South Corridor

- The selection of Alexandroupolis is not random. It takes into consideration:
  1. the increased gas liquidity in Northern Greece with the existing 296-km ITG
  2. the under construction TAP
  3. the planned IGB, IGI and
  4. the potential UGS in South Kavala

- The Alexandroupolis FSRU project:
  - can early be termed as a new gas gateway to Europe and an important component of the aforementioned Expanded South Corridor concept.
  - will be close to targeting markets with rising gas demand, including Greece, Bulgaria, Serbia, FYROM, Turkey, Romania, Hungary and Ukraine.
  - can facilitate the city of Alexandroupolis to emerge as a significant regional gas hub due to the lack of other similar gas interchange in SE Europe.
  - will be the only new gas infrastructure project in SE Europe which will not rely on Turkey as a transit country (TANAP/TAP system, Turkish Stream, new quantities from Iran, Caspian, etc.).
Poseidon Med II LNG Bunkering Project

Source: DEPA
Sources of Finance vs Country Risk (I)

- The **main sources of finance** for planned LNG projects in SE Europe include:
  - Government/own resources
  - International Financial Institutions (IFIs)
    - European Commission
    - European Bank for Reconstruction and Development (EBRD)
    - European Investment Bank (EIB)
    - World Bank
    - German government-owned development bank KfW
    - European Western Balkans Joint Fund (EWBJF)
    - International Development Association (IDA)
  - Commercial banks/private investors
Sources of Finance vs Country Risk (II)

- However, the implementation of LNG projects in SE Europe may be hindered by the high **Country Risk** of several SEE countries and the **increased cost of capital**.

<table>
<thead>
<tr>
<th>Country</th>
<th>Moody’s ratings</th>
<th>S&amp;P ratings</th>
<th>Fitch ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosnia and Herzegovina</td>
<td>B3 (February 2016)</td>
<td>B (March 2012)</td>
<td>n.a.</td>
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<tr>
<td>Bulgaria</td>
<td>Baa2 (May 2017)</td>
<td>BB+ (June 2017)</td>
<td>BBB- (June 2017)</td>
</tr>
<tr>
<td>Croatia</td>
<td>Ba2 (March 2017)</td>
<td>BB (September 2017)</td>
<td>BB (July 2017)</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Ba3 (July 2017)</td>
<td>BB+ (September 2017)</td>
<td>BB (October 2017)</td>
</tr>
<tr>
<td>FYROM</td>
<td>n.a.</td>
<td>BB- (May 2013)</td>
<td>BB (August 2017)</td>
</tr>
<tr>
<td>Greece</td>
<td>Caa2 (June 2017)</td>
<td>B- (July 2017)</td>
<td>B- (August 2017)</td>
</tr>
<tr>
<td>Romania</td>
<td>Baa3 (April 2017)</td>
<td>BBB- (May 2014)</td>
<td>BBB- (July 2017)</td>
</tr>
<tr>
<td>Serbia</td>
<td>n.a.</td>
<td>BB- (December 2016)</td>
<td>BB- (June 2017)</td>
</tr>
<tr>
<td>Turkey</td>
<td>Ba1 (March 2017)</td>
<td>BB (January 2017)</td>
<td>BB+ (July 2017)</td>
</tr>
</tbody>
</table>

Source: IENE study, “Gas Supply in SE Europe and the Key Role of LNG”, (M46), Athens, December 2017
Key Messages (I)

- The **global gas market** continues to evolve rapidly.
  - The shale revolution shows no sign of running out of steam, and its effects are now being amplified by a second revolution, caused this time by rising supplies of LNG.

- **New liquefaction capacity**, mostly from the US, Qatar and Australia, is coming online at a time when the LNG market is already well supplied.

- Europe sees an important opportunity to meet its energy needs by **developing the Expanded Southern Gas Corridor**.

- Europe currently has a **huge excess of LNG import capacity**, which is unevenly distributed between Western and SE Europe and Central Europe.

- SE Europe will play a significant role in **expanding LNG trade** in Europe by 2020 through the construction and operation of several new LNG regasification projects such as the FSRU unit that is planned to be located offshore in Alexandroupolis.
Key Messages (II)

- The selection of Alexandroupolis is **not random** and the project can be characterized as a new gas gateway to Europe.

- The **Alexandroupolis FSRU project** will be the only new gas infrastructure project in SE Europe which will **not rely on Turkey as a transit country** (TANAP/TAP system, Turkish Stream, new quantities from Iran, Caspian, etc.).

- **Greece** and **Turkey** are the only SEE countries that currently possess LNG gasification terminals which are well linked and integrated into their national gas systems.
  - The **spare capacity** of the existing LNG terminals in both countries has on many occasions been used for **transshipment purposes**, which shows the **dual role** that LNG gasification terminals can play in the region.

- **LNG prospects** in **SE Europe** and the East Mediterranean in particular, are **far better placed than five years ago**.
  - The development of a **small scale LNG market** is feasible in SE Europe.
Key Messages (III)

- **Geopolitical factors** play an important role in gas infrastructure projects in the SE European region.

- The geopolitical importance of the Alexandroupolis FSRU project has grown as a result of the Ukraine crisis, the abandonment of the South Stream pipeline and Russia’s decision to discontinue transit flows through Ukraine as of 2019.

- The development of a **regional gas trading hub in SE Europe** would be a positive outcome for the rest of Europe as it would facilitate **flexibility, efficiency and transparency**.

- An important parameter is the **country risk factor**.

- **No significant technical** and **non-technical obstacles** in pursuing the implementation of current plans for the expansion of major gas infrastructure projects, at national and regional level.
Gas Supply in SE Europe and the Key Role of LNG

An IENE Study Project (M46)

Final Report

Athens, December 2017
Thank you for your attention

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