Supply Potentials

TYNDP 2018

Arturo de Onís
System Development Advisor
TYNDP 2018 Main Steps Timeline

- March ’16: Gas and electricity ENTSOs Scenario Development
- Dec ’16: Gas CBA Methodology 2.0
- Dec ’17: Inclusion of projects in TYNDP
- Jul ’18: System & needs assessment
- Dec ’18: Projects assessment (*)
- Jul ’19: Draft TYNDP Report
- Public workshop, webinar, SJWS or Prime Mover WS
- Consultation with the member states
- Public consultation
- Submission of projects in TYNDP

(*) Dependant on CBA 2.0
Scenario Report Work Progress

Gas and electricity ENTSOs Scenario Development

- Draft scenario storylines: 25/04/2016, 02/06/2016, 05/07/2016
- Workshop: 02/06/2016, 05/07/2016, 10/10/2016
- Scenario storylines
- Data collection
- Scenario building process
- Draft Scen. Report
- Workshop: 09/10/2017
- Public Web Consultation

Dec ’16

Dec ’17

today

- 25/04/2016
- 12/06/2016
- 25/04/2017
- 12/06/2017
- Draft scenario storylines
- Workshop
- Scenario storylines
- Data collection
- Scenario building process
- Draft Scen. Report
- Workshop
- Public Web Consultation

Dec ’17 - SJWS Gas Supply Assumptions
Scenario Report Work Progress

➢ **Improvements** from TYNDP 2017:
  ➢ First time approach to Power-to-gas
  ➢ LNG Diversification
  ➢ Introduction of new potential sources

➢ Current work based on public consultation feedback on Draft Scenario Report:
  ➢ Renewable Gases reviewed based on the Public Consultation feedback
  ➢ Consideration of Turkish Potential
  ➢ Potentials for Russia, Algeria and LNG revised based on WEO 2017 edition

We welcome your contributions during this workshop in view of the Final Scenario Report
Introduction to the use of Potentials

➢ Frame of the future: supplies are inputs to the modelling.
➢ Constraints on the levels of supplies are not intended as forecasts but need to be defined in order to avoid unrealistic supply situations.
➢ The modelling always respects supply ranges between the minimum and the maximum for every source.
➢ The minimum and maximum supply ranges have a direct use as part of the Supply Adequacy Outlook.
➢ Resulting supply mixes are an outcome of the modelling.
➢ The supply mix will depend on the demand scenario.

Supply results will be a combination of the potentials and network constraints
Introduction to the Supply Potentials

1. Indigenous production (National Production & Renewable Gases)
   • Data Collection: use of TSO figures for system assessment

2. Import sources:
   • Pipeline: Algeria, Azerbaijan, Libya, Norway, Russia and Turkey
   • LNG net exporting regions: Middle East, North Africa, S.S. Africa, S. America, N. America, Australia and Other

3. Other potential import sources not directly used in the assessment:
   • Egypt, Iran and Turkmenistan
Imports current status overview

- **Russia**: main gas supplier of the EU and second largest reserves in the world
- **Norway**: second largest gas supplier of the EU, supplying Europe for over 40 years
- **Algeria**: third largest gas supplier of the EU, world top ten reserves
- **Libya**: currently the smallest pipeline supplier of the EU
- **LNG**: sustained fall since 2011, stabilized from 2014 to 2016
Supply Potential Russia

**Russia:** Maximum updated based on WEO 2017* Russian production and minimum based on study from Oxford Institute (TYNDP 17).

**Main pipelines:**

- **Nord Stream:** twin offshore pipeline, 55 bcma
- **YAMAL-Europe:** 33 bcma via Belarus
- **Brotherhood** (Urengoy-Ushgorod): transit through Ukraine, **100 bcma**
- **Other:** around **67.5 bcma**

* WEO 2017 New Policies Scenario
Supply Potential Norway

Norway: Min and Max source is publicly available information from the National Petroleum Directorate: Expected volumes of gas sales from Norwegian fields.

### EXPORT CAPACITY OF THE GASSCO OFFSHORE SYSTEM

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Country</th>
<th>Capacity (Msm³/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europipe</td>
<td>Germany</td>
<td>46</td>
</tr>
<tr>
<td>Europipe II</td>
<td>Germany</td>
<td>71</td>
</tr>
<tr>
<td>Franpipe</td>
<td>France</td>
<td>55</td>
</tr>
<tr>
<td>Norpipe</td>
<td>Germany, the Netherlands</td>
<td>32</td>
</tr>
<tr>
<td>Tampen Link</td>
<td>UK</td>
<td>10-27</td>
</tr>
<tr>
<td>Vesterled</td>
<td>UK</td>
<td>39</td>
</tr>
<tr>
<td>Zeepipe</td>
<td>Belgium</td>
<td>42</td>
</tr>
<tr>
<td>Langeled</td>
<td>UK</td>
<td>72-75</td>
</tr>
<tr>
<td>Gjøa</td>
<td>UK</td>
<td>17</td>
</tr>
</tbody>
</table>

### Pipeline Gas Supply Potential for Norway

<table>
<thead>
<tr>
<th>bcma</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>110</td>
<td>96</td>
<td>93</td>
<td>91</td>
</tr>
<tr>
<td>Min</td>
<td>87</td>
<td>78</td>
<td>59</td>
<td>41</td>
</tr>
</tbody>
</table>
Supply Potential Algeria

**Algeria:** Max updated based on WEO 2017* Algerian production, applying the maximum historical share to EU, and Minimum based on study from Oxford Institute.

**Three Pipelines:**

- **Pipeline Enrico Mattei (GEM):** 33 bcma via Tunisia
- **Maghreb Europe Gasoduc (MEG):** 12 bcma via Morocco
- **MEDGAZ:** 8 bcma directly to Spain

### Pipeline Gas Supply Potential for Algeria

<table>
<thead>
<tr>
<th>bcma</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>45</td>
<td>44</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>Min</td>
<td>21</td>
<td>19</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

* WEO 2017 New Policies Scenario
Supply Potential Libya

**Libya:** Max 90% load factor and Min averaged between lowest historical year and 2011 (exceptional year).

**Pipeline:**

- **Green Stream Pipeline:**
  520 km connecting Libya to Italy via Sicily, **17 bcm/a**

### Pipeline Gas Supply Potential for Libya

<table>
<thead>
<tr>
<th>bcm/a</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>10,8</td>
<td>10,8</td>
<td>10,8</td>
<td>10,8</td>
</tr>
<tr>
<td>Min</td>
<td>3,5</td>
<td>3,5</td>
<td>3,5</td>
<td>3,5</td>
</tr>
</tbody>
</table>
Supply Potential Azerbaijan

Azerbaijan: Min and Max based on volumes contracted by Southern Europe countries expecting supply via TANAP and TAP projects (TYNDP 17).

**Pipelines:**

- **TAP:** 880 km and **10 bcm**
- **TANAP:** 1800 km via Turkey, **16 to 31 bcm**

<table>
<thead>
<tr>
<th>Pipeline Gas Supply Potential for Azerbaijan</th>
</tr>
</thead>
<tbody>
<tr>
<td>bcma</td>
</tr>
<tr>
<td>Max</td>
</tr>
<tr>
<td>Min</td>
</tr>
</tbody>
</table>
LNG Supply Potentials Maximum

**LNG diversification:** updated based on the WEO 2017* trading matrix.

- 23 existing terminals
- 9.5 Mio m³ LNG Declared Total Maximum Inventory
- 209 bcma Declared Total Reference Send-Out

### Maximum Gas Supply Potential LNG

<table>
<thead>
<tr>
<th>Region</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle East</td>
<td>46</td>
<td>53</td>
<td>58</td>
<td>69</td>
</tr>
<tr>
<td>North Africa</td>
<td>19</td>
<td>24</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>SS Africa</td>
<td>17</td>
<td>24</td>
<td>33</td>
<td>53</td>
</tr>
<tr>
<td>S. America</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>N. America</td>
<td>14</td>
<td>48</td>
<td>51</td>
<td>56</td>
</tr>
<tr>
<td>Australia</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>12</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>106</td>
<td>162</td>
<td>181</td>
<td>219</td>
</tr>
</tbody>
</table>

* WEO 2017 New Policies Scenario
**LNG Supply Potentials Minimum**

**LNG minimum:** 70% of the lowest import year based on a 30% further reduction observed from 2011.

- **23 existing terminals**
- **9.5 Mio m³ LNG Declared**
- **Total Maximum Inventory**
- **209 bcma Declared Total Reference Send-Out**

### Minimum Gas Supply Potential LNG

<table>
<thead>
<tr>
<th>Region</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle East</td>
<td>14</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>North Africa</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SS Africa</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>S. America</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N. America</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Australia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>31</strong></td>
<td><strong>31</strong></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

* WEO 2017 New Policies Scenario
Aggregated Maximum & Minimum Ranges

The import range defines the flexibilities for the gas imports. Combining it with the demand and production figures will lead to the supply and demand adequacy.
Turkey: Max and Min based on Turkey’s Energy Profile and Strategy (Ministry of Foreign Affairs)

Turkish Portfolio:

- LNG
- Russia
- Iran
- Azeri
- Other

Turkish portfolio potential is currently delivering 1 bcma to Greece and could also reach Bulgaria.
New Supply Potential Israel

**Israel:** Current developments in the Leviathan field include 9 bcma surplus to be exported abroad of Israel’s neighboring countries perimeter. Source: Delek Group

**Israeli Potential:**

- LNG via Egypt
- Pipelines
  - Via Turkey
  - East-Med Project

Israel potential will be subject to the submission of projects linking the source to the EU
Next Steps

➢ Project Collection coming soon: 31\textsuperscript{st} January to 28\textsuperscript{th} February 2018
➢ Finalised Scenario Report March 2018
➢ Modelling SJWS spring 2018
Thank You for Your Attention

ENTSOG -- European Network of Transmission System Operators for Gas
Avenue de Cortenbergh 100, B-1000 Brussels

EML: Arturo.deonis@entsog.eu
WWW: www.entsog.eu
Data Sources Summary

• Russia  Oxford Institute (Min) and WEO 2017 (Max)
• Norway  Norwegian NPD
• Algeria  Oxford Institute (Min) and WEO 2017 (Max)
• Libya  Own Methodology
• Azeri  TYNDP 2017
• LNG  WEO 2017 NPS Net Exporting Regions split

• New Potentials:
  o Israel  Delek Group Israel
  o Turkey  Turkey’s Energy Profile and Strategy (M.F.A.)