TYNDP 2017

Supply potentials

System Development Area
Introduction

1. Conventional & Unconventional production (Shale Gas & Biogas)
   • Use of TSO figures for system assessment

2. Import sources:
   • Algeria, Azerbaijan, Libya, LNG, Norway and Russia
   • Aligned minimum supply assumptions for supply adequacy and assessment
   • The modelling always respects supply ranges between the minimum and the maximum for every source
   • Different assessment approach for 2017 (“tomorrow as of today“) and the other modelled years 2020, 2025, 2030, 2035 (supply potentials)

3. Potential import sources not directly used in the assessment:
   • Egypt, Iran, Israel and Turkmenistan
Indigenous production

- **Conventional production**
  - TSO data for existing production
  - Potential inclusion of new (Non-FID) production (Black Sea)
  - Other potential new sources (Cyprus)
  - Quantification during data collection periods

- **Unconventional production**
  - Differentiation between uncertain potential scenarios and the assessment
  - Help transparency by showing analysis
  - Use of TSO data for TYNDP assessment

- **Biomethane**
  - Keep detailed analysis of biogas and biomethane potentials for information and transparency purpose
  - Use of TSO data for TYNDP assessment (aligned with the green ambition in each scenario)
2017: supply assumptions

Indigenous Production

• Use of TSO figures

Imports

• Reasonable range for Algeria, Libya, LNG, Norway and Russia reflecting current market situation

• **Maximum:** Use of the maximum of Summer Supply Outlook 2016 (with a ratio of 183 of 365) and the maximum of Winter Supply Outlook 2015/16 (with a ratio of 183 of 365) for each source.

• **Minimum:** Use of the minimum yearly supply observed in the calendar years 2009-2015 for each source. For Libya 2011 is disregarded.

The modelling assumptions for 2017 differ from the other modelled years.
Russia: Import routes and history

**Three main pipelines:**

- **Nord Stream**: twin offshore pipeline, 1,220 km between Vyborg (Russia) and Greifswald (Germany), **55 bcma**
- **YAMAL-Europe**: 2,000 km to Poland and Germany via Belarus, **33 bcma**
- **Brotherhood** (Urengoy-Ushgorod pipeline): Transit through Ukraine to Central, Western, and Southern European countries and Turkey, **100 bcma**

According to Gazprom Export website

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**Main gas supplier of the EU with the second largest proven gas reserves in the world.**
Russia: Supply potentials TYNDP 2017

Pipeline Gas Supply Potential for Russia

<table>
<thead>
<tr>
<th>bcma</th>
<th>2017*</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>160</td>
<td>194</td>
<td>198</td>
<td>201</td>
<td>205</td>
<td>206</td>
</tr>
<tr>
<td>Minimum</td>
<td>118</td>
<td>122</td>
<td>106</td>
<td>79</td>
<td>79</td>
<td>79</td>
</tr>
</tbody>
</table>

* tomorrow as of today

Source Max: “Gas exports to EU” (Institute of Energy Strategy. Gromov 2011)
Norway: Import routes and history

Second largest gas supplier of the EU, supplying Europe for over 40 years.

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Country</th>
<th>Capacity (Million sm³ / 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 Gas Pipeline</td>
<td>UK</td>
<td>17</td>
</tr>
</tbody>
</table>

According to Gassco website
**Norway: Supply potentials TYNDP 2017**

### Pipeline Gas Supply Potential for Norway

<table>
<thead>
<tr>
<th>bcm</th>
<th>2017*</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum</strong></td>
<td>112</td>
<td>110</td>
<td>110</td>
<td>110</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>95</td>
<td>93</td>
<td>78</td>
<td>59</td>
<td>45</td>
<td>41</td>
</tr>
</tbody>
</table>

* tomorrow as of today

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Source Max: GASSCO: development of annual exports as estimated by Gassco including existing fields, discoveries and yet to find gas fields, kept on the maximum level from 2019 on based on the Gassco experience on production forecasts.

Source Min: Minimum as Minimum of 2009-2014 (93 bcm) and production / sales forecast of resources in existing fields (GASSCO information)
Algeria: Import routes and history

Pipelines:

• **Pipeline Enrico Mattei (GEM):** 1,650 km from Algeria to Italy via Tunisia, **33 Bcma**

• **Maghreb Europe Gasoduc (MEG) pipeline:** 520 km to Spain via Morocco, **12 Bcma**

• **MEDGAZ pipeline:** 200 km from Algeria to Spain, **8 Bcma**

*Third largest gas supplier of the EU, top ten largest gas reserves in the world.*
## Algeria: Supply potentials TYNDP 2017

### Pipeline Gas Supply Potential for Algeria

<table>
<thead>
<tr>
<th>bcma</th>
<th>2017*</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>34</td>
<td>41</td>
<td>46</td>
<td>51</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Minimum</td>
<td>23</td>
<td>21</td>
<td>19</td>
<td>17</td>
<td>14</td>
<td>11</td>
</tr>
</tbody>
</table>

* tomorrow as of today

### Supply potential (pipeline): Algeria

Sources: MEDPRO 2012, BP Statistical Review and IEA WEO 2015
Libya: Import route and history

**Pipeline:**

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

Currently the smallest pipeline supplier of the EU.
### Pipeline Gas Supply Potential for Libya

<table>
<thead>
<tr>
<th>bcma</th>
<th>2017*</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum</strong></td>
<td>8</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

* tomorrow as of today

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**Source Max:** 95% load factor of the Greenstream pipeline capacity.

**Source Min:** Mott MacDonald's report 2010 low case.
Azerbaijan supply scenarios

Pipeline Gas Supply Potential for Azerbaijan

<table>
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<tr>
<th>bcma</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>0</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Source Max: contractual figures for TAP.
Source Min: 80% of the max
LNG import history

BP SR shows a sustained fall from 2012, stabilized in 2014 to around 44 bcma
LNG terminals

- **22 existing terminals**
  (Barcelona, Bilbao, Cartagena, Cavarzere (Porto Levante / Adriatic LNG), Dunkerque, Fos (Tonkin/Cavaou), Gate Terminal, Huelva, Isle of Grain, Klaipeda (LNG), Milford Haven (South Hook), Milford Haven (Dragon LNG), Montoir de Bretagne, Mugardos, Musel, OLT LNG / Livorno, Panigaglia, Revythoussa, Sagunto, Sines, Teesside, Zeebrugge LNG)

- **7.8 Mio m³ LNG Declared Total Maximum Inventory***

- **550 Mio m³/d natural gas Declared Total Reference Sendout***

*: From GLE’s ALSI platform

**New Polish Świnoujście LNG terminal commissioned in 2016**
### LNG Supply Potential

<table>
<thead>
<tr>
<th>bcma</th>
<th>2017*</th>
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<th>2030</th>
<th>2035</th>
<th>2037</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum</strong></td>
<td>71</td>
<td>102</td>
<td>135</td>
<td>150</td>
<td>165</td>
<td>171</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>36</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
</tbody>
</table>

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**Source Max:** 82 bcm (recent historical peak imports in 2011) plus 30% of additional world LNG exports compared to 2013 (source: IEA WEO 2015)

**Source Min:** 70% of minimum EU imports between in 2019-2014
The import range defines the flexibilities for the gas imports. Combining it with the demand and production figures and infrastructure projects will lead to the supply and demand adequacy.
Thank You for Your Attention

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