
Presenters:
Peiguang WANG, Guojun YANG, Luyao SHENG, Jia CHEN, Binyi LIU

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<table>
<thead>
<tr>
<th>PRESENTER*</th>
<th>COMPANY/INSTITUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guojun YANG</td>
<td>Sinopec Group</td>
</tr>
<tr>
<td>Luyao SHENG</td>
<td>Sinopec Group</td>
</tr>
<tr>
<td>Jia CHEN</td>
<td>Fujian Province Development and Reform Commission</td>
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<td>Peiguang WANG</td>
<td>Beijing Gas Group Ltd.</td>
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<tr>
<td>Binyi LIU</td>
<td>CNOOC-Fujian LNG Co., Ltd.</td>
</tr>
</tbody>
</table>

(*From left to right)
Outline

China
Japan
South Korea
Indonesia
Australia
1.1 China Overview

Net Oil Importer

Net Gas Importer

Second largest net importer of crude oil and petroleum products

Largest global energy consumer

Early 1990s

2007

2009

2011
1.2 China Proved Gas Reserves & Production

Large Share

Turning Point
1.3 China Gas Consumption & Pricing

- **Highly competitive Domestic market**

- **Oil linked Import LNG Market**

![Chart showing consumption data](chart1.png)

![Chart showing ex-factory price](chart2.png)

![Chart showing importlng price & JCC price](chart3.png)
1.4 China Gas transportation

45,000 kilometers Pipeline

20 LNG terminals
2.1 JAPAN

- An island country located in the Pacific Ocean
- The population of 127 million is the world's tenth largest.
- The third largest national economy in the world. A large industrial capacity.
- First began importing LNG, with imports from Alaska in 1969. a pioneer in the global LNG trade.
- The world's largest liquefied natural gas importer, accounted for 32% of the global market share of LNG demand in 2016.

Composition of Primary Energy Supply

2.2 THE SUPPLY SIDE

PROVED RESERVES:
• limited domestic energy resources that have met less than 10% of the country’s total primary energy use each year since 2012.

• According to the OGJ, Japan had 738 billion cubic feet (Bcf) of proved natural gas reserves as of January 2017.

PRODUCTION:
• has been limited for more than a decade as a result of declining reserves.

• In 2015, production was about 100 Bcf, down from a high of about 140 Bcf in 2007, according to the International Energy Agency.

• Japanese oil companies have sought participation in exploration and production projects around the world.
2.3 THE DEMAND SIDE

CONSUMPTION
The consumption of Japan Asia-Pacific and World

Japan’s consumption Ratio in Asia Pacific region

IMPORT

Source: BP Statistical Review of World Energy, 2018 for 2017 data


2.3 THE DEMAND SIDE

IMPORTER

- Sector organization: Inpex and other companies created from the former Japan National Oil Company. Mitsubishi, Mitsui, and various other Japanese companies. Osaka Gas, Tokyo Gas, Toho Gas.

TRANSPORT

- More than 30 LNG import terminals, a total natural gas send-out capacity of 9.7 Tcf/y as of 2016.
- The largest LNG storage tank capacity in the world, holding 590 MMcf.
- Most of the LNG terminals are located in the main population centers and near major urban.
- Lacks extensive gas pipeline infrastructure, relies on LNG imports in many coastal demand centers, uses LPG in other areas.
2.4 PRICING

• In the Asia-Pacific, except for the LNG price of some Indonesian exports linked to the Indonesian oil production price index, other LNGs are mostly linked to the Japanese integrated crude oil price (JCC).

• LNG price (in US$/MMBtu) = slope X JCC + alpha
  e.g. = 0.1485 X $50 + 0.10
  = US$7.525/mmBtu

Other prices:
• some LNG contracts are based on U.S. natural gas market prices.
3.1 South Korea Overview

- South Korea is an energy-intensive nation, relying on imports to meet about 98% of its fossil fuel consumption.

- South Korea was the world’s eighth largest energy consumer in 2017, ranking No.3 in the list of LNG import countries.
3.2 South Korea Proved Reserves and Production

- Proved reserve: up to 50,000 million cubic meters in 2008, and has declined to 7,079 million cubic meters in 2013.

- Production from the Ulleung Basin began in 2004, reaching a peak of 651,000,000 cubic meters in 2009 and declining since then.
3.3 South Korea Consumption and Pricing

- South Korea consumed 1.7 tcf of dry natural gas in 2017.
- Power generation accounted for about half of the consumption.

- Prices are mainly driven by supply and demand, which are also linked to the price of crude oil and relevant petroleum products.
3.4 South Korea Transportation

LNG sources come from:

- Qatar,
- Australia
- Indonesia
- Oman
- Nigeria and Russia.

Source: IHS Energy
Note: Others include Algeria, Angola, Equatorial Guinea, Norway, Papua New Guinea, Peru, Trinidad and Tobago, and re-exports.
4.1 Indonesia Overview

◆ Indonesia is a Southeast Asian country and the largest archipelagic country in the world.

◆ Indonesia's development of LNG has always been at the leading level in the world.
  • 1977: started exporting
  • 1984~2005: the largest exporter of LNG in the world.
  • 2017: Indonesia’s export of LNG ranked fifth in the world.

Islands: 17508
Land: 1.904 million square kilometers
Ocean: 3.166 million square kilometers
4.2 Indonesia Proved Gas Reserves

◆ **Indonesia is relatively rich in natural gas resources.**
  - The proven reserves of natural gas ranked the third in the Asia-Pacific region, which accounted for about 15% of the total in the Asia-Pacific region in 2017.

◆ **Natural gas exploration efforts were relatively inadequate in recent years.**
  - The proportion of natural gas proven reserves in the Asia-Pacific region has declined gradually from 25% to 15%.
4.3 Indonesia Gas Production and Consumption

**Production**: The share of Indonesia's natural gas and LNG in the world has gradually declined.

**Consumption**: Although the total consumption of natural gas has increased slightly, the proportion of consumption in the Asia Pacific region has gradually decreased. According to Reuters, Indonesia will become a net importer of LNG in the future.
4.4 Indonesia Gas transportation

Indonesia's LNG is export oriented
◆ 1984-2006, Indonesia's LNG exports rank first in the world.
◆ Over the past 8 years, Indonesia's exports of LNG and its share of global exports have declined.
◆ In 2017, Indonesia's LNG exports were 21.7 Bcm, accounted for 5.5% of global LNG exports.

The export direction of Indonesia's LNG has changed.
◆ More than 80% of LNG in the country were used for export.
◆ Exporting countries had become more diversified.
◆ Share and direction of transactions have been constantly changing.
◆ It is expect to change from LNG net exporter to net importer in the future.
AUSTRALIA

7,617,930 km² (6th)

25 million

13th economy

2nd LNG exporter (2017)

Source: https://en.wikipedia.org/wiki/Australia

5.1 PROVED RESERVES

<table>
<thead>
<tr>
<th>Resource category</th>
<th>Conventional gas (tcf)</th>
<th>Coal seam gas (tcf)</th>
<th>Tight gas (tcf)</th>
<th>Shale gas (tcf)</th>
<th>Total gas (tcf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>70</td>
<td>43</td>
<td>0</td>
<td>0</td>
<td>113</td>
</tr>
<tr>
<td>Contingent resources</td>
<td>99</td>
<td>32</td>
<td>2</td>
<td>11</td>
<td>144</td>
</tr>
<tr>
<td>All identified resources</td>
<td>169</td>
<td>75</td>
<td>2</td>
<td>11</td>
<td>257</td>
</tr>
</tbody>
</table>

Gas Reserves Distribution

Source: Australia Energy Resources Assessment 2018

Source: Gas Resources Australia, Eni.com, GIPPS, & a Cathermine Australia Pty Ltd.
With all care taken in the compilation of the presented information by Cathermine, no warranty is provided as to the accuracy or completeness of the information, and it is the responsibility of the Customer to ensure, by independent means, that those parts of the information used by it are correct before any reliance is placed on them. Accurate as of August 2017.
5.2 PRODUCTION


LNG Projects Distribution

Source: Resources and Energy Quarterly June 2018

<table>
<thead>
<tr>
<th>Project</th>
<th>Main Owners</th>
<th>State/Territory</th>
<th>Capacity (Mt)</th>
<th>Trains</th>
<th>First train</th>
</tr>
</thead>
<tbody>
<tr>
<td>North West Shelf</td>
<td>Woodside/BHP Billiton/BP/ Chevron /Shell/MIMI</td>
<td>WA</td>
<td>16.3</td>
<td>5</td>
<td>1989</td>
</tr>
<tr>
<td>Darwin LNG</td>
<td>ConocoPhillips/Santos/Inpex/Tan/KERA/Tokyo Gas</td>
<td>NT</td>
<td>3.7</td>
<td>1</td>
<td>2006</td>
</tr>
<tr>
<td>Pluto LNG</td>
<td>Woodside/Tokyo Gas/Kansai Electric</td>
<td>WA</td>
<td>4.3</td>
<td>1</td>
<td>2012</td>
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<tr>
<td>Curtis LNG</td>
<td>BG Group/CONOCO</td>
<td>QLD</td>
<td>8.5</td>
<td>2</td>
<td>Train 1: 2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Train 2: 2015</td>
</tr>
<tr>
<td>Gladstone LNG</td>
<td>Santos/Petronas/Total/Kogas</td>
<td>QLD</td>
<td>7.8</td>
<td>2</td>
<td>Train 1: 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Train 2: May 2016</td>
</tr>
<tr>
<td>Australia Pacific LNG</td>
<td>Origin/ConocoPhillips/Sinopec</td>
<td>QLD</td>
<td>9</td>
<td>2</td>
<td>Train 1: 2015</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Train 2: October 2016</td>
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<tr>
<td>Gorgon LNG</td>
<td>Chevron/Shell/ExxonMobil</td>
<td>WA</td>
<td>15.6</td>
<td>3</td>
<td>Train 1: Q1 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Train 2: Q1 2017</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Train 3: Q3 2017</td>
</tr>
<tr>
<td>Waitsstone LNG</td>
<td>Chevron/Apache/KUFPEC/Shell</td>
<td>WA</td>
<td>8.9</td>
<td>2</td>
<td>Train 1 Q2 2017</td>
</tr>
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<td></td>
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<td></td>
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<td>Train 2: Q2 2018</td>
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<tr>
<td>Prelude Floating LNG</td>
<td>Shell/Inpex/Kogas</td>
<td>WA</td>
<td>3.6</td>
<td>1</td>
<td>Q1 2019</td>
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<tr>
<td>Ichthys LNG</td>
<td>Inpex/Total</td>
<td>NT</td>
<td>8.9</td>
<td>2</td>
<td>Train 1: Q3 2017</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Train 2: Q2 2018</td>
</tr>
</tbody>
</table>

Source: Department of Industry, Innovation and Science 2017

Source: BP Statistical Review of World Energy 2018
5.3 CONSUMPTION

Natural Gas Consumption Gradually Grows & Accounts for Nearly One Quarter in 2016-17.

Primary Energy Consumption by Fuel Type

Natural gas Consumption by Industry Type

Source: Department of the Environment and Energy, Australia Energy Statistics 2018, Table C.


Three Regional Markets Separated & Distinguished by Industry
5.4 PRICING

Oil-linked Pricing Mechanism - Japan Customs-Cleared Crude (JCC) Dominates in Asia Market

<table>
<thead>
<tr>
<th>Year</th>
<th>LNG Japan CIF</th>
<th>Natural gas UK (Heren NBP Index)</th>
<th>Natural gas US Henry Hub</th>
<th>Natural gas OECD countries CIF</th>
</tr>
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<tbody>
<tr>
<td>1998</td>
<td>3.05</td>
<td>1.86</td>
<td>2.08</td>
<td>2.16</td>
</tr>
<tr>
<td>1999</td>
<td>3.14</td>
<td>1.58</td>
<td>2.27</td>
<td>2.98</td>
</tr>
<tr>
<td>2000</td>
<td>4.72</td>
<td>2.71</td>
<td>4.23</td>
<td>4.83</td>
</tr>
<tr>
<td>2001</td>
<td>4.64</td>
<td>3.17</td>
<td>4.07</td>
<td>4.08</td>
</tr>
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<td>2002</td>
<td>4.27</td>
<td>2.37</td>
<td>3.33</td>
<td>4.17</td>
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<td>2003</td>
<td>4.77</td>
<td>3.33</td>
<td>3.63</td>
<td>3.89</td>
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<td>2004</td>
<td>5.18</td>
<td>4.46</td>
<td>5.85</td>
<td>6.27</td>
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<td>2005</td>
<td>6.05</td>
<td>7.38</td>
<td>8.79</td>
<td>8.74</td>
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<tr>
<td>2006</td>
<td>7.14</td>
<td>7.87</td>
<td>6.76</td>
<td>10.66</td>
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<td>2007</td>
<td>7.73</td>
<td>6.01</td>
<td>6.95</td>
<td>11.95</td>
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<td>2008</td>
<td>12.55</td>
<td>10.79</td>
<td>8.85</td>
<td>16.76</td>
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<td>2009</td>
<td>9.06</td>
<td>4.85</td>
<td>3.89</td>
<td>10.41</td>
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<td>2010</td>
<td>10.91</td>
<td>6.56</td>
<td>4.39</td>
<td>13.47</td>
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<td>2011</td>
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<td>4.01</td>
<td>18.55</td>
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<td>2012</td>
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<td>18.82</td>
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<td>2013</td>
<td>16.17</td>
<td>10.64</td>
<td>3.71</td>
<td>18.25</td>
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<td>2014</td>
<td>16.33</td>
<td>8.25</td>
<td>4.35</td>
<td>16.80</td>
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<tr>
<td>2015</td>
<td>10.31</td>
<td>6.53</td>
<td>2.60</td>
<td>8.77</td>
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<td>2016</td>
<td>6.94</td>
<td>4.69</td>
<td>2.46</td>
<td>7.04</td>
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<tr>
<td>2017</td>
<td>8.10</td>
<td>5.80</td>
<td>2.96</td>
<td>8.97</td>
</tr>
</tbody>
</table>

1 Source: EDMC Energy Trend. 2 Source: ICIS Heren Energy Ltd. 3 Source: Energy Intelligence Group, Natural Gas Week. 4 Source: ©OECD/IEA 2018, Oil, Gas, Coal and Electricity, Quarterly Statistics [www.iea.org/statistics]. Note: CIF = cost+insurance+freight (average prices)
5.5 TRANSPORT


Three Regional Transmission Pipelines Separated

Mainly Delivered to Asia-Pacific Region

Source: Resources and Energy Quarterly June 2018.

LNG Exporting Volume & Value

Source: Australian Energy Resources Assessment 2018
6 SUMMARY

(1) **China** will actively implement the Paris climate agreement to reduce carbon dioxide emissions in the coming years by increasing the proportion of natural gas in primary energy consumption. And the natural gas industry will enter a golden period of development.

(2) **Japan** is the world’s largest LNG importer. Many Japanese oil companies have sought participation in exploration and production projects around the world. Japan’s energy demand and strategy have a considerable impact on the Asia-Pacific region and the world.

(3) **South Korea** is lack of domestic energy resources, relying on imports to meet domestic energy consumption. LNG imports are mainly from Qatar, Oman, Nigeria, Russia, and Australia.

(4) **Indonesia** is an important LNG producer and exporter, which has relatively abundant resources. In terms of natural gas demand growing fast, it is expected to become a net LNG importer in the future.

(5) Based on abundant reserves being progressively developed for domestic use and exporting in LNG projects, **Australia**’s LNG exports mainly delivered to Asia-Pacific region overtaking Qatar as the world NO.1 is becoming realistic and closer.
QUESTIONS