China Natural Gas Market Status and Outlook

Duan Zhaofang
CNPC ETRI

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Outline

I China Natural Gas Market Status

II China Natural Gas Market Outlook
China gas demand grew rapidly in 2017

- During 2000-2013, China gas consumption increased to 168 bcm, with annual growth rate of 16%. In 2015 and 2016, y-o-y gas growth declined to 4.8% and 6.4%.
- Gas share in total primary energy mix had increased from 2.2% in 2000 to 6.2% in 2016, which was still much lower than the world average.
China gas demand grew rapidly in 2017

- China gas consumption has increased by 17% y-o-y for the first 9 months of 2017.
  - Economic development: GDP grew by 6.9% y-o-y for Q1&Q2, 6.8% for Q3
    Gas consuming industries’ (Steel, glass, chemical) markets improved.
  - Policy: Coal-to-gas projects surged driven by environmental policies
  - Price: Alternative fuels prices increased
  - Transmission line maintenance in Yangtze River Delta; less hydropower generation

![Graph showing gas consumption and growth rate from 2010 to 2017]
Domestic gas supply capacity kept growing

- During 2000-2015, domestic gas production increased from 27 bcm to 132 bcm, with average annual growth rate of 11%.
- In 2016, domestic gas production grew by 1.6% y-o-y.
  - Total shale gas output raised to 7.9 bcm.
  - CBM production was 4.5 bcm.
  - Coal-based synthetic gas production was 1.6 bcm.
- Domestic gas production and total gas supply (including coal-based synthetic gas) grew by 10.9% and 10.8% y-o-y for the first 9 months of 2017.

China gas production 2000~2016
Gas import growth rebounded greatly

Driven by lower import prices and delivery of new contracts, gas imports increased by 19.1% y-o-y in 2016, with foreign dependence rate reaching 37%.

- **PNG imports**: 38.4 bcm, grew by 13.3% y-o-y
- **LNG imports**: 26.06 MT (27.3 bcm), grew by 32.6% y-o-y

China gas imports reached 57.6 bcm for the first 9 months of 2017, increased by 21% y-o-y

- **PNG**: 31.5 bcm, grew by 7.7% y-o-y
- **LNG**: 33.3 bcm, grew by 35% y-o-y

![China gas import growth rate 2006~2016](image)

![China LNG import sources in 2016](image)
Infrastructure construction is moving forward steadily

- **Pipeline**: natural gas trunk pipelines totaled over 70,000 km
- **LNG terminals**: 12 in operation, current import capacity 52.8 MTA by 2016.

3 new terminals under construction, + 1 for extension, total capacity will exceed 68 MTA
Gas market reform accelerated
—gas price liberalization

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Regulation from wellhead to city gate; 0.4 RMB/CM price cap for existing gas, incremental gas prices linked to alternative fuels</td>
</tr>
<tr>
<td>2014</td>
<td>Average city-gate prices 2.96</td>
</tr>
<tr>
<td>2015.4</td>
<td>Non-residential city-gate prices decreased by 0.7 RMB/CM; Negotiable non-residential city gate price within price caps since 2016.11 (20% higher than the base prices)</td>
</tr>
<tr>
<td>2015.11</td>
<td>Incremental gas city-gate prices decreased by 0.44 RMB/CM; Existing gas city-gate prices increased by 0.04 RMB/CM. Two prices got in line with each other.</td>
</tr>
<tr>
<td>2016.11</td>
<td>The notification of lowering non-residential city gate prices</td>
</tr>
<tr>
<td>2017.8</td>
<td>Non-residential city gate prices were lowered by 0.1 RMB/CM since September 1st 2017</td>
</tr>
<tr>
<td>2017.9</td>
<td>Market-oriented gas pricing through trading hubs</td>
</tr>
</tbody>
</table>

Average city-gate prices
Existing : 2.09
Incremental : 2.96

Average city-gate prices 2.09 (lower by 16.7%)
Gas market reform accelerated
—gas pipeline reform

- Gas pipeline reforms accelerated through requiring independent accounting, promoting third-party access to gas infrastructure, and reinforcing regulation and supervision on gas pipeline tariff (national and regional)
- 2016.9-10, NEA released two notifications on pipeline TPA and storage facilities pricing.

2014.3, NDRC
- Regulation for the Nature Gas Infrastructure Construction and Operation
- Encourages investment of gas infrastructure by all kinds of capital. Requires independent accounting of gas infrastructure operation.

2016.8, NDRC
- Regulation for the Nature Gas Pipeline Tariff (trial)
- Measures for Supervision of the Nature Gas Pipeline Tariff and Cost (trial)
- Policies for gas pipeline pricing mechanism and supervision. The pricing mechanism is adjusted to “permitted costs plus reasonable profits”.

2017.6, NDRC
- Strengthening Regulation of Local Natural Gas Transmission and Distribution Tariff and Reducing Gas Costs of Consumers
- Policies to regulate provincial and local gas pipeline pricing aimed to lower end-user’s energy costs.

2017.8, Check and Ratify Interprovincial Pipeline Tariff by NDRC
Gas market reform accelerated
—establishment of gas trading exchange

- Shanghai Petroleum and Gas Exchange formally started operation in November 2016
- Trading volumes in 2016 reached 30.5 bcm (bilateral), PNG 27.9 bcm, LNG 1.75 MT
- LNG and PNG bidding started in July and September of 2017
- More gas trading hubs are emerging in Chongqing, Xinjiang etc.
Gas market reform accelerated — increasing number of new players

- Private companies including Guanghui, ENN etc are participating into LNG business.
- Huadian, ENN, Beijing Gas, Guanghui have signed LNG importing contracts; ENN showed interests to take 11.7% stakes of Santos, making it the largest shareholder of the Australian company; Beijing Gas purchased 20% stakes of Rosneft in VChNG.

LNG importing contracts signed by Chinese buyers 2008-2016
Challenges met by China gas market

- Responsibility and emergency system for gas peak shaving are called for. As coal to gas switching drives gas consumption peak-valley difference bigger, inadequate gas peak shaving capacity is becoming a prominent problem. China has 18 underground gas storages by 2016, with working gas 6.1 Bcm, accounting for 3% of gas consumption.

- Price regulation confines gas supply capacity.

### Foreign countries underground gas storage facilities

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of storages</th>
<th>Working gas Bcm</th>
<th>Maximum withdrawal volumes Bcm/d</th>
<th>Gas consumption Bcm</th>
<th>% of gas consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>400</td>
<td>133.7</td>
<td>3.34</td>
<td>759.4</td>
<td>17.6</td>
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<tr>
<td>Russia</td>
<td>24</td>
<td>69.6</td>
<td>0.74</td>
<td>409.2</td>
<td>17.0</td>
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<tr>
<td>Ukraine</td>
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<td>32.2</td>
<td>0.29</td>
<td>38.4</td>
<td>83.9</td>
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<td>Germany</td>
<td>53</td>
<td>24.6</td>
<td>0.64</td>
<td>70.9</td>
<td>34.7</td>
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<td>Canada</td>
<td>61</td>
<td>23.2</td>
<td>0.36</td>
<td>104.2</td>
<td>22.3</td>
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<tr>
<td>Italy</td>
<td>12</td>
<td>17</td>
<td>0.33</td>
<td>56.8</td>
<td>29.9</td>
</tr>
<tr>
<td>France</td>
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<td>12.2</td>
<td>0.27</td>
<td>35.9</td>
<td>34.0</td>
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<td>Netherlands</td>
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<td>10.2</td>
<td>0.22</td>
<td>32.1</td>
<td>31.8</td>
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<td>Austria</td>
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<td>8.2</td>
<td>0.09</td>
<td>7.8</td>
<td>105.1</td>
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<tr>
<td>Australia</td>
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<td>6.4</td>
<td>0.02</td>
<td>29.2</td>
<td>21.9</td>
</tr>
</tbody>
</table>

End user gas prices by major city
Outline

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Policies to promote China’s gas industry

➢ Central government

✓ Plan: Natural Gas 13th Five Year Plan, Energy 13th Five Year Plan, Long Term Oil and Gas Pipeline Network Planning

✓ Price: Notifications on Strengthening Regulation on Distribution Tariff, Lowering Non-residential City Gate Prices, etc.

✓ Environment: Air Pollution Control Action Plan for Beijing-Tianjin-Hebei Area 2017-2018 etc.

✓ Utilization: Suggestion of Promoting Gas Utilization, etc.

✓ Others: Some Suggestions on Deepening Oil and Gas Industry Reform, etc.

➢ Local government

Actively carried out planning, policies on prices and utilizations.
Huge potential market

- Strategic Action Plan for Energy Development, Natural Gas 13th Five Year Plan, Energy 13th Five Year Plan, Suggestion of Promoting Gas Utilization targeted 10% by 2020 and 15% by 2030 for gas share in primary energy consumption.

- It is estimated that gas consumption will be 400 bcm by 2020 and 600 bcm by 2030.

![Graph showing share of gas in primary energy mix from 2000 to 2030.](image-url)

**Share of gas in primary energy mix – planned goals by 2020 and 2030**
Key orientation of China gas demand

- The major gas consuming sectors in China are city gas (40%), industrial (30%), power generation (15%) and chemical (15%)
- *Suggestion of Promoting Gas Utilization* distributed by 13 national departments pointed out four key utilization areas for gas: cities and towns, power generation, industrial fuels and transportation.
Gas supply capacity will increase steadily

- It is expected that the supply capacity will be 340 bcm in 2020, with 220 bcm domestic gas, and 120 bcm imported gas.
- Supply capacity will be as much as 590 bcm in 2030, with domestic production of 390 bcm and 200 bcm imported gas.
Gas supply capacity will increase steadily

- Shale gas technically recoverable resources totaled at 21.8 Tcm by 2015, according to Ministry of Land and Resources.
- Major exploration and production companies include Sinopec, CNPC, Yanchang Petroleum Group.
- NEA’s Shale Gas Planning (2016-2020) targets shale gas production to reach 30 Bcm by 2020 and 80-100 Bcm by 2030.
Gas supply capacity will increase steadily

- CBM has been developed steadily with surface production reaching 4.5 Bcm in 2016;
- Surface production will lead future CBM growth as a result of increasing coal mines closing down.
- CBM production is expected to mount 24 Bcm by 2020, with surface production reaching 10 Bcm (utilization rate > 90%) and coal mine methane production reaching 140 Bcm (utilization rate > 50%).

Favorable condition:
Supportive policy: subsidy standard raises from 0.2 RMB/CM to 0.3 RMB/CM during 13th Five-year Plan period.

Restraining factors:
Mine rights, geological conditions, technology and equipments, reform process.
Thank You