Prospect of Korean Natural Gas Market

Tokyo, 27 October 2009

Wonhee Han
Senior Researcher

Northeast Asia Petroleum Forum 2009

IEEJ: November 2009
Prospect of Korean Natural Gas Market

Contents

- Key features of Korean Natural Gas Market
- Issues on Government Policies
- Outlook for Natural Gas D/S
Total Primary Energy Supply

- Natural gas imported from 1986 aiming at diversifying energy source and improving air quality
- AAGR('87-'07) : TPES 6.6%, Coal 4.8%, Oil 6.5%, Natural Gas 15.0%, Nuclear 6.7%

Source: KEEI

IEEJ: November 2009
Demand for power generation continued to grow while demand for residential use slowed down

AAGR('98-'08→'03-'08): City Gas 9%→5%, Power Generation 10%→11%

Source: KOGAS
Natural Gas Demand Pattern

- On top of insufficient storage capacity, seasonality of gas demand threatens stable gas supply
- Relatively high monthly TDR requires large investments in further storage capacity expansion

**Monthly Natural Gas Consumption**

- Power Generation
- City Gas

**Monthly TDR**

\[ \text{TDR (Turn Down Ratio)} = \frac{\text{Max Monthly Consumption}}{\text{Min Monthly Consumption}} \]

Source: KEEI
Korea relies heavily on mid-term and long term LNG imports for its natural gas supply.

Korea has been diversifying its LNG import sources for the better security of natural gas supply.

Natural Gas Supply in 2008

- 67% Domestic Production
- 18% Long-term LNG Imports
- 15% Mid-term LNG Imports
- 1% Spot LNG Imports

LNG Imports by Country

- Others
- Egypt
- Australia
- Oman
- Qatar
- Brunei
- Indonesia

Source: KOGAS
Structure of Natural Gas Market

Prospect of Korean Natural Gas Market
Prospect of Korean Natural Gas Market

**National Pipeline Network**

- **Trunk line**: 2,739 km
- **Distribution line**: 221,947 km

As of June 2009

**LNG Terminals**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Start-up</th>
<th>Storage Capacity (1,000 ㎥, #)</th>
<th>Send-out Capacity (billion ㎥/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incheon</td>
<td>KOGAS</td>
<td>Oct. 1996 2,680(19)</td>
<td>42.24</td>
</tr>
<tr>
<td>Pyeongtaek</td>
<td>KOGAS</td>
<td>Nov. 1986 1,560(14)</td>
<td>38.81</td>
</tr>
<tr>
<td>Tongyeong</td>
<td>KOGAS</td>
<td>Sep. 2002 1,680(12)</td>
<td>18.66</td>
</tr>
<tr>
<td>Kwangyang</td>
<td>POSCO</td>
<td>Jul. 2005 200(2)</td>
<td>2.30</td>
</tr>
</tbody>
</table>

As of Dec. 2008

IEEJ: November 2009
New government established aggressive energy policy targets for “low carbon green growth”

Such policies have a significant implication on future natural gas market if they are realized

**1st National Energy Basic Plan**

**Low Carbon Green Growth**

- **Realize low carbon & energy consumption**
  - Energy Intensity (TOE/$1,000 of GDP)
    - ('06) 0.347 → ('30) 0.185

- **Reduce dependence on fossil fuels**
  - Fossil fuel share in TPES(%)
    - ('06) 81.6 → ('30) 61.0

- **Foster green energy industries**
  - Investment of 111.5 trillion Won

- **Enhance energy self-sufficiency and welfare**
  - Oil & gas self-sufficiency* (%)
    - ('06) 3.2 → ('30) 40.0

*Total equity volume of oil & gas production secured by Korean companies
÷ Annual import volume

**National Energy Mix : BAU vs Target**

<table>
<thead>
<tr>
<th>2006</th>
<th>BAU</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Million TOE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewables</td>
<td>233</td>
<td>343</td>
</tr>
<tr>
<td>Nuclear</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

Source : 1st National Energy Basic Plan, 2008
Natural Gas Policy

- Natural gas policy has traditionally focused on ensuring the stable supply for economic growth
- The long-delayed gas competition legislation is now awaiting the National Assembly’s vote

Stable & Efficient Gas Supply

- **Stable gas supply**
  - Diversify supply sources; ex) Russian PNG
  - Expand further gas infrastructure
  - Enhance gas self-sufficiency
  - Promote city gas supply to remote areas
  - Support low-income class

- **Efficient gas market**
  - Phase-in competition; 1st Import/Wholesale for Power Generation
  - Create open access system to supply facilities
  - Facilitate direct imports for their own use
  - Rationalize gas tariff system
  - Establish fair competition regulatory system

1st Phase Promotion of Competition

Import/Wholesale
- Direct Importers
- Private
- KOGAS

KOGAS
- Transmission
- Storage
- City Gas
- Distribution
- Own Use
- Power Generation
- Retirement

IEEJ: November 2009
Demand forecasts vary due to economic recession, uncertain demand for power generation

Demand for power generation is expected to slow down and to account for 24% in total by 2020

**Comparison of Natural Gas Demand**

<table>
<thead>
<tr>
<th>Year</th>
<th>City Gas</th>
<th>Power Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>58%</td>
<td>42%</td>
</tr>
<tr>
<td>2010</td>
<td>59%</td>
<td>41%</td>
</tr>
<tr>
<td>2012</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>58%</td>
<td>41%</td>
</tr>
<tr>
<td>2016</td>
<td>76%</td>
<td>24%</td>
</tr>
<tr>
<td>2018</td>
<td>76%</td>
<td>24%</td>
</tr>
<tr>
<td>2020</td>
<td>76%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Source: KEEI, KOGAS, Wood Mackenzie

**Natural Gas Demand by Use**

- **City Gas**
  - 2008: 58%
  - 2014: 59%
  - 2020: 76%

- **Power Generation**
  - 2008: 42%
  - 2014: 41%
  - 2020: 24%

Source: 9th Natural Gas Long-term D/S Plan, 2008
Korea is striving to secure LNG as well as PNG in the long run for stable & self-sufficient supply
KOGAS is in talks with Gazprom to buy Russian gas in various forms including PNG, LNG, CNG
Korea is expected to face supply shortage during 2012-14 despite the uncertainty of gas demand. It seems to be relatively easy to deal with it thanks to the unprecedented global LNG oversupply.
Summary

Natural Gas, the fast-growing energy over the past two decades

- Contributed to energy security and environmental improvement
- Mostly imported in the form of LNG from diverse overseas sources

New challenges to natural gas market;

- New aggressive energy policy targets for “low carbon green growth”
- Introduction of competition starting with import/wholesale for power generation sector

Outlook for natural gas market

- Uncertain demand caused by economic recession & demand for power generation
- New strategic effort to secure stable & self-sufficient supply in the long run
- Gas supply shortage in the mid-term, but could be relatively easily coped with
Prospect of Korean Natural Gas Market

Thank You!!!

Q & A

Contact: report@tky.ieej.or.jp

hanwonhe@kogas.re.kr