Development of the demand for gas industry in Japan

29/November/2007

The Japan Gas Association
Energy in Japan
Characteristics of Japan’s Energy Situation

- Ratio of natural gas in total primary energy supply is lower than that of European countries and the US.
- High dependence on imported energy resources
- Japan’s national energy policies rank natural gas as a very important energy for Japan.
- Objectives of current national energy policies; “Energy Security” and “Energy Conservation”
- Japan represents 40% of world’s LNG trading.
High dependence on imported energy resources

Source: Energy Balances of OECD Countries 2003-2004, IEA
*IEA defines nuclear power as indigenous energy.
Total primary energy supply in Japan continues to increase.
Japan’s ratio of natural gas is lower than that of European countries and the US.

Japan’s Primary Energy Supply Outlook

- Natural gas is expected to increase its share from 14% (FY2000) to 18% (FY2030)

Source: Subcommittee on Demand and Supply, Advisory Committee for Natural Resources and Energy, Interim Report 2005
LNG trade, which is popular in Asia-Pacific region, represents 28% of the world’s natural gas trade.

Natural gas trade by pipeline is brisk in Europe and North America.
The world’s LNG trade volume is increasing rapidly.

Source: Cedigaz
Japan’s Share in World’s LNG Trade (2006 import)

- Japan accounts for nearly 40% of the world’s LNG transactions.

Source: Cedigaz
Current LNG Projects (Long term contract basis)

- Japan imports LNG from 8 countries/regions.

- 64 million ton (FY2006)
  - Indonesia: 28.4%
  - Australia: 21.4%
  - Malaysia: 19.4%
  - Brunei: 9.4%
  - Oman: 3.4%
  - Abu Dhabi: 6.7%
  - Alaska: 2%
  - Qatar: 9.4%
65% of LNG is for power generation.

Source: The Institute of Energy Economics, Japan
Natural Gas in Government’s Energy Policy

Basic Plan for Energy Supply and Demand (Endorsed by the Cabinet in 2003)

- Natural gas is a vital energy source both in terms of stable supply and environmental protection.

Outlook for Energy Supply & Demand for 2030 (Summary as of March 2005)

- The share of natural gas will increase thanks to the spread of distributed power sources. [2000:13% ➞ 2030:16%(Energy-saving case)]

Kyoto Protocol Target Achievement Plan (Endorsed by the Cabinet on April, 2005)

- Natural gas is a clean source of energy that imposes a relatively small environmental load.
- A shift to natural gas should be accelerated with due consideration for the balance with other energy sources.
City Gas Industry in Japan
Number of City Gas Utilities

- 212 city gas utilities in Japan
- 1/6 are run by municipalities
- 90% of utilities are medium- or small-sized

<table>
<thead>
<tr>
<th>(Number of Customers)</th>
<th>Private</th>
<th>Municipal</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000 or less</td>
<td>84</td>
<td>14</td>
<td>98</td>
<td>46.2</td>
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<tr>
<td>10,001 – 100,000</td>
<td>72</td>
<td>20</td>
<td>92</td>
<td>43.4</td>
</tr>
<tr>
<td>100,001 – 500,000</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>7.6</td>
</tr>
<tr>
<td>500,001 or more</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>176</strong></td>
<td><strong>36</strong></td>
<td><strong>212</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

(as of the end of March, 2007)

- 212 city gas utilities in Japan
- 1/6 are run by municipalities
- 90% of utilities are medium- or small-sized

Diagram:
- 46.2% 10,000 or less
- 43.4% 10,001 – 100,000
- 7.6% 100,001 – 500,000
- 2.8% 500,001 or more
Gas sales volume increased for the 29th consecutive year.

Source: The Japan Gas Association

- Residential: General households (cooking, water heating, air cooling and heating, drying, etc.)
- Commercial: Companies/business establishments, wholesale/retail stores, restaurants, inns/hotels, department stores/supermarkets, beauty parlors, dry cleaning stores, amusement/entertainment facilities, boarding houses/dormitories, etc.
- Industrial: Manufacturers, etc. in fields such as foodstuffs/food products, textiles, paper/pulp, chemicals, ceramics/earth/stone, steel, non-ferrous metals, metals, machinery, etc.
- Others: Schools, public agencies, hospitals, clinics, medical offices, etc.
Gas Sales Volume by Sector and Utilities

- 212 city gas utilities in Japan (as of the end of March, 2007)
- ‘Big 4’ utilities represents 76.3% of total sales volume in Japan

Sales volume by sector (billion cubic meter)

- Residential: 9.8 bcm (29.0%)
- Commercial: 4.8 bcm (14.2%)
- Industrial: 16.5 bcm (48.8%)
- Others: 2.8 bcm (8.0%)
- Total: 33.8 bcm

Sales volume by utilities (billion cubic meter)

- Tokyo Gas: 12.3 bcm (36.4%)
- Osaka Gas: 8.9 bcm (26.3%)
- Toho Gas: 3.8 bcm (11.2%)
- Saibu Gas: 0.8 bcm (2.4%)
- Others: 8.0 bcm (23.7%)
- Total: 33.8 bcm

Source: The Japan Gas Association

*Big 4: The four biggest utilities are Tokyo Gas, Osaka Gas, Toho Gas and Saibu Gas
The number of natural gas customers is 28.1 million, while that of LPG is 26.1 million.

*The big 4 utilities’ customers account for 71.6% of the nation’s city gas customers.

*The big 4: Tokyo Gas, Osaka Gas, Toho Gas and Saibu Gas

**Number of Customers by Sector and by Utilities**

(as of April 2007)

- **Residential**: 94.0% (26.4 million)
- **Commercial**: 4.6% (1.3 million)
- **Industrial**: 0.4% (0.1 million)
- **Others**: 1.0% (0.3 million)

Total: 28.1 million customers (as of Apr. 2007)

*Reference: LPG Customers

| Total | 26.1 million |

Source: The Japan Gas Association
The Japan LPGas Association
Current Situation of City Gas Industry

- No nation-wide trunk line
- Major gas utilities; LNG importer and distributor
- Wider range of responsibilities for safety
- No combination utility (gas and electricity)
- Fierce competition with other energy sources
- METI --- Sole regulator
Gas Utilization for Market Cultivation
Gas Fired Cogeneration

- Natural gas fired cogeneration

• Diffusion of gas cogeneration systems and the target

Source: The Japan Gas Association

* Steam turbine not included
* The target includes fuel cell cogeneration
Residential Cogeneration

• “Eco-Will,” 1kW gas fueled engine cogeneration system
• Energy efficiency: 85%
  (Generating efficiency: 20%, Exhaust heat recovery: 65%)
• Target: 175 thousand units in 2010
Residential High-efficiency Water Heater

• “Eco-Jozu,” a condensing water heater
  
  • Heat efficiency: 95%
  • Target: 2 million units in 2010

![Diagram of water heater efficiency](image)
Gas Air Conditioning

- 22.3% of the entire installed capacity of air conditioners nationwide (as of fiscal '05, excl. residential use)

Diffusion of gas air conditioning

Source: The Japan Gas Association
Natural Gas Vehicle

- 31,462 NGVs and 324 refueling stations

Source: The Japan Gas Association
Fuel Cell

- Target: 2.2 GW (including 1.2 GW for residential use) in 2010
- Apr. ’05: Tokyo Gas Co., Ltd. installed the world’s first commercial PEFC.
- Efforts of gas companies and FC manufacturers:
  - Lower cost and higher durability
- R&D for SOFC

Panasonic Model (1 kW PEFC)
Conclusion --- Our Challenge

Gas Utilities’ Measures

In the upstream sector

- Ensuring a long-term stable supply of LNG
  
  Contributing to improvements in energy security

Enhancing the value for customers

- Reducing price by increasing the efficiency of business management
- Maintaining and improving levels of security and services

In the downstream sector

- Promoting wide-area and advanced use of natural gas
  
  Contributing to energy conservation and reductions in CO2

We will continue to raise the value of natural gas for customers.
Fin.