

“City Gas Industry's Agenda in Japan”

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1. Status of Japanese Economy

The Japanese economy remains in a recovery phase mainly driven by private sector demand, since it hit bottom in January 2002. The period from the latter half of 2003 to early 2004 saw an accelerated economic recovery backed by rapid overseas economic growth and rather steady growth in investment and consumption in the home market. While the momentum has slightly slowed since then due to the surge in energy prices and slippage of economic activities overseas, the basic tone of economic recovery continues.

2. Outline of Japan's City Gas Industry

With this background of economic developments, the sales volume of Japan's city gas industry has increased with an average 4.8% annual growth rate so far in the 21st century. This is not only due to healthier economic conditions but also to active marketing efforts for natural gas as an environmentally friendly and clean energy source by the city gas industry, backed by proactive recognition of global environmental issues by Japanese corporations.

The major source of city gas is dominated by LNG, which represents 85% of the total city gas supplied in Japan. The remaining 15% is divided into domestic natural gas (5%) and petroleum products (10%) including LPG. The latest data tell us that there are 27.5 million city gas customers and 26 million LPG (which is distributed in cylinders) retail customers in Japan. In terms of sales volume, the city gas businesses sold 30.1 billion m³ (1.06 tcf), nearly twice as much as LPG businesses.

Japan's city gas companies import natural gas as LNG from seven countries including Alaska, Malaysia, Indonesia, Australia, Brunei, Qatar, and Oman. 19.24 million tons of LNG was imported in fiscal 2004. Imports from Russia are also planned for the future. Some companies use indigenous natural gas produced in Niigata, Akita, and Chiba

prefectures for the city gas businesses. Other countries in Asia are becoming more active in LNG trades. In addition to the buyers in the three current importing Asian countries of Japan, South Korea, and Taiwan, India started importing LNG in 2004.

There are 215 city gas business entities in Japan, one fifth (1/5) of which are run by municipalities (as of September 1, 2005). 90% of the investor-owned city gas utilities are small companies, half of which have less than 10,000 customers each, which is a significant difference from the electric power utility industry in the country which is dominated by big 10 investor-owned companies.

3. Japan's Energy Policy: Basic Goals of 3 Es

The basic policy goals of the **Basic Plan for Energy Supply and Demand**, which was established by the government in 2003, are summarized as 3 E's: "Energy Security"; "Environmental Protection"; and "Efficiency".

Stable supply of energy, or "**Energy Security**", has been always a universal and important agenda item for resource-poor Japan which depends on overseas for more than 80% of its energy sources. As energy is one of the fundamentals of people's daily lives and economic activities, ensuring its stable supply is always important.

Oil is expected to stay as a major energy source in 2030 representing 35% of the total energy supply in the world at that time, as shown in the International Energy Agency's (IEA) outlook. In the meantime, energy demand is expected to grow in the future especially in the Asian region where we see a remarkable economic growth. However, critics point out that the world's dependence on the politically unstable Middle East might be heavier in the future.

Against this background, it is important for Japan with its inherently vulnerable energy supply structure to spread supply sources geographically without depending on any specific regions, to diversify energy sources focusing on the ones with little risk of disruption, and to promote energy saving measures.

The second E represents "**Environmental Protection**". In the Kyoto Protocol that entered into effect in February 2005, Japan has committed to reduce its greenhouse gas emissions by 6% from its level of 1990 by 2010. In order to achieve this goal, the following measures are considered to be important: promotion of saving energy;

expanded use of nuclear power, solar energy, wind power, and other natural energy sources; and shift to natural gas which has less carbon dioxide emissions.

The third one is "**Efficiency**", which should provide customers with expanded options and enhance competitive advantages in global markets. The competitive market mechanism achieved through energy market liberalization and other measures is expected to improve the quality of life by bringing more choices to customers and lower energy prices -- as well as to strengthen competitive advantages of Japanese economy within the global markets.

4. Long-term Energy Outlook

With these recognitions, the Japanese government composed the "**long-term outlook of energy supply and demand until the year 2030**" in March 2005. According to this outlook, energy demands in residential and transportation sectors are expected to continue their growth. Final energy consumption is forecast to peak in 2021 and primary energy supply composition is forecast to change drastically, due both to the expected decrease in population (expected to begin in 2006), and to development and penetration of newer energy-efficient technologies.

The figures for the year 2030 forecast that oil and coal will decrease shares to 42% and 17% from 50% and 18% in 2000. Natural gas, nuclear, and renewable energy sources are expected to increase to 18%, 15% and 8%, from 13%, 13%, and 6%, in 2000, respectively.

The position of natural gas, the main source of city gas, in the "long-term outlook of supply and demand" should be mentioned here. Worldwide natural gas reserves are widely distributed around the world and the reserve to production ratio (R/P) is said to be 67 years. This compares favorably with oil R/P, which has been estimated to be 40 years or so for many years. More natural gas reserves are expected to be proved and sufficient supply is expected to continue come in the future.

Methane hydrate, a sherbet-state substance that captures methane molecules inside water (ice) -molecule is said to be usually embedded in layers below continental shelves of several hundred meters of water depth or below permafrost in Siberia, Canada, and Alaska. Japan's surrounding waters are also reported to have reserves equivalent to around 100 years of natural gas consumption in the country.

Natural gas is positioned as an important energy source in the Basic Energy Plan, from the viewpoints of stable supply and environmental preservation and the Plan promotes an accelerated shift to natural gas. These developments are significant for those of us who are involved in the expansion of natural gas utilization.

While its expanded use is promoted, natural gas represented only 14% in Japan's primary energy supply in 2004. This is merely a half of the levels seen in the United States or in Europe, which means there still may be much room to expand markets for natural gas in Japan. The share of natural gas is expected to grow to as much as 18% in 2030, according to the long-term outlook of energy supply and demand.

5. Intensified Competition between Energy Sources, Regulatory Reform

Until 1995 when regulatory reform was first introduced into the city gas sector in Japan, city gas utility companies had been granted monopolized franchises of supply areas in exchange for obligation to supply all the customers in the areas who wished to be supplied. All gas tariff schedules had to be approved by the central government.

The 1995 regulatory reform allowed the gas companies to freely set prices, abolish monopolistic supply areas, and supply customers in other companies' service areas for gas sales to large-volume end-users of more than 2 million m³ (70.66 million cf) per year.

In addition, the city gas supply services that had been limited to city gas utility companies, now could be provided by new entrant companies (such as electric power and oil companies) that met certain terms and conditions.

Additional regulatory reforming measures for gas business were implemented in 1999 and 2004, resulting in the current threshold of 500,000 m³ (17.665 million cf) a year of gas consumption for large-volume customers of liberalized services. Some of the city gas utility companies are now required to provide third-party gas transportation services via the companies' pipeline networks.

The currently liberalized gas customers, including medium and large manufacturers and commercial facilities, represent 44% in sales volume of the total city gas market in the country. The share of liberalized part will increase to around 60%, when the

threshold is lowered to 100,000 m³ (3.533 million cf) a year in 2007. This per customer consumption is equivalent to that of 250 average homes, targeting small city hotels and small manufacturing facilities.

In the meantime, the electric power industry has undergone regulatory reforms as well, resulting in expanding liberalized market that includes most manufacturing and office buildings, except only general residential customers. The liberalized portion represents 63% of the total electric power sales in the country as of April 2005.

Therefore, a customer whose usage exceeds a certain threshold can choose service provider of gas or electric power, other than the incumbent gas or electric power utility company.

New entrants to the city gas market include electric power, domestic natural gas producing, oil, and trading companies. Japan's gas industry has seen 16 new entrants in 74 cases as of August 2005. The share of those new entrants in the liberalized large-volume supply is about 7.6%.

An example of new entrants is The Tokyo Electric Power Company (TEPCO), who supplies its gas to customers located in the franchise area of Tokyo Gas, utilizing pipelines of the gas company. Some electric power companies are actively seeking opportunities in gas business, even utilizing their own pipelines.

Those regulatory reform measures are designed to encourage new initiatives to promote improved services, including efficiency gains and lower service prices through competition, innovative rate schedules coping with needs in the markets, and bundled supply services of gas and electric power. Newly established comprehensive energy services can revitalize the markets.

A potential adverse outcome of these liberalization developments in pursuing efficiency may be offering unsustainable customer discounts which could cause failures in securing adequate supply to match demands. There also might be undesirable situations in which gas companies intentionally avoid those customers that would not bring them much margin, or they are reluctant to invest in or be involved in those activities which would be useful to the society but would not be of economic interest, such as environmental measures.

As both city gas and electric power utility companies and government agencies strongly recognize the importance of the roles of public utilities, they believe a step-by-step approach is desirable for liberalization and regulatory reform, which has been carried out accordingly by examining the outcomes at each stage.

6. Initiatives of Stable Natural Gas Supply and Measures toward Global Environmental Issues

Activities of city gas companies leading the efforts for a stable and secure supply and environmental measures are outlined in the following paragraphs.

While city gas companies are vested with social responsibility of bringing citizens improved lives through stable supply of energy and recognize their active roles in promoting natural gas as part of national environmental measures, they are also conducting thorough efficiency enhancement measures to survive the intensified competition.

As for the stable supply, maximum efforts are undertaken at each stage of the business, from gas resource procurement, regasification (production), transportation, delivery and research and development, to ensure that 27.5 million customers continue to use city gas with much comfort and expectation of stability.

One of the focuses of risk management for the stable supply is on countermeasures for earthquakes. Terrible impacts of earthquakes and the importance of preparedness in normal daily life are well recognized through the experiences of the catastrophic earthquakes in 1989 in San Francisco and in late 2004 off Sumatra.

As the backbone of city gas industry, trunk line transmission pipeline networks are made of inherently solid and stable steel pipes and their earthquake-proof nature was demonstrated at the time of the Great Hanshin Earthquake in 1995, which registered a magnitude of 7.2 on the Richter scale and intensity of 7 on the Japanese earthquake scale. Low pressure pipelines, which are used to deliver gas to small end-users, are being replaced with polyethylene pipes, which could absorb impacts of ground deformations and minimize damages.

A remote supervising system which can instantly grasp detailed damage information through high-spec earthquake sensors. These can shut down gas supply to the damaged

areas to prevent secondly disasters such as fires in the event of a large-scale earthquake. Microchip-controlled gas meters can automatically shut down gas delivery in the case of an earthquake of larger than Japanese seismic intensity scale 5. All of these are believed to be effective measures against earthquakes.

As for environmental measures, promoting use of natural gas, which emits less CO₂ than other energy sources, contributes significantly to preventing global warming. Penetration of highly efficient and clean natural gas utilization systems is an effective measure to improve environment in various regions. In that aspect, the world's first commercialized residential fuel cells were put into the market in spring this year.

The Japan Gas Association set its own "Environmental Activity Guideline" in 1994 and joined the Japan Business Federation's, or Nippon Keidanren's "Voluntary Action Plan on the Environment" in 1997. Through these programs, the Japan's city gas industry is actively promoting the use of environmentally friendly natural gas and taking initiatives to reduce CO₂ and other emissions.