

WORLDWIDE LNG DEMAND AND SUPPLY SCENARIO

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Abstract: The worldwide gas usage and demand are increasing in the present day. With the increase of supply facilities and efficient technical support of LNG, its demand is also continuously increasing. As a result, the use of LNG is taking an important place in the energy sector of the world. At present, LNG and compressed natural gas are being used as a transportation fuel in a smaller quantity and after decompression LNG is actually used like regular pipeline gas. One potential application in transport sector may be fuel cells in which natural gas can provide the source of hydrogen. Fuel cells are being considered for power generation apart from transport. The demand and supply facilities for LNG will be reviewed in this presentation.

Keywords: Natural Gas, LNG Demand and Supply, Import and Export

INTRODUCTION

A network of sophisticated pipeline systems transports oil, natural gas and petroleum products from producing fields and refineries around the world to consumers in every nation. This network gathers oil and gas from thousands of individual wells. Some of these wells are in the most remote and hostile areas of the world. This network distributes a range of products to power plants, fertilizer factories, heavy and light industries, individuals, residences and businesses. The liquid form of natural gas is LNG. So the chemical properties of LNG and natural gas are identical except their physical properties. As a result, wide fluctuations in energy prices have caused some concern over LNG along with oil price. The LNG trade is rising recently. The utilization of natural gas is playing an important role in the first decade of 21st century. As natural gas contains around 94% methane and the sulfur content is low, it is clean burning, efficient and usually cost-competitive with other fossil fuels. Currently, 128 LNG ships are operating globally, with a further 29 on order. Hyundai Heavy Industries in Korea believes that orders will rise to 50 by early 2002, and industry players report a three-year lag time for any new orders.

WORLDWIDE NATURAL GAS AND ITS DEMAND

For the last 20 years, proven worldwide reserves of natural gas have been increasing constantly and it reaches upto 146 trillion m³. If the current production level is maintained steadily, the present reserves will last 63 years. Former Soviet Union and Middle East contain about 39% and 34% of proved reserves respectively and the rest is in Africa, Asia Pacific,

Europe, USA and Canada. More than 75% of world gas production is being used by North America, Europe and the former Soviet Union.

According to *Avidan (2000)*, the Russian Federation is the largest gas exporter (120 billion m³) and USA is the largest gas importer (88 billion m³). The largest amount of gas imported in 1998 was by the USA from Canada (87 billion m³), followed by Germany from Russia (32 billion m³) and Japan from Indonesia (24 billion m³) in LNG form. The natural gas consumption is faster than that of any other petroleum products in the present decade. The present use is about half that of oil, the use of natural gas will increase 100 million boe/d by 2020. The present demand or usage of natural gas in Organization of Economic Co-operation Development (OECD) countries is 46%. The demand of Organization of Petroleum Exporting Countries (OPEC) is 13% and the rest of the world required 41%.

PAST AND PRESENT LNG SCENARIO

According to *Fesharaki (2000)*, while worldwide gas demand growth has outpaced that of oil demand two to one during the past decade, development of a global gas market continues to lag. In an analysis of global gas supply, demand and trade, he noted that, while more than half of the world's oil is traded internationally, over 80% of the world's gas production is consumed within the country where it is produced. Within international gas trade, 75% is via pipeline-notably to the US and Western Europe and the rest are as LNG. Global trade in gas started at the level of 4.4 bcfd in 1970 and has risen to about 43 bcfd in 1998. Correspondingly, LNG's share of that trade has jumped from about 6% in 1970 to 25% in 1998.

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Import Scenario

North America, Europe and former Soviet Union are importing LNG. There are only three Asian countries currently importing LNG. They are Taiwan, South Korea and Japan. Though these three countries are importing LNG it does not mean that these are the most advanced economy of the region or they don't have any fossil fuel reserves. Asia accounts for about 75% of the world's LNG trade and has similarly dominated the growth in LNG demand during the 1980s and 1990s. Now a days, Japan alone accounts for 58% of LNG demand, while South Korea is the only other country with a market share of 13% and all other countries shares are less than 10% (*Fesharaki 2000*).

Except for the early 1980, LNG import in Asia has been growing at a rapid rate since Japan started the trade in 1969. LNG imports in Asia in 1970, with Japan, as the only importer was less than 1 mmtpy. It increased to 28 mmtpy in 1986 with the addition of South Korea. In 1990, Taiwan joined the ranks of buyers, and Asia LNG imports reached 39 mmtpy. In 1998, oil demand in the region declined because of the financial crisis, but LNG imports increased to 63 mmtpy from 62 mmtpy in 1997. For 1999, the imports increase to an estimated 69 mmtpy. In 2000, imports increased to 72 mmtpy. In 2001, imports are expected to reach 75 mmtpy (*web site*). In 2010, a combined volume of 110 billion cubic meter of LNG is expected to be delivered to Japan and South Korea (*Asakura 2000*).

Asia still has large potential increasing its LNG imports in the long term. This is due to primarily to the likely growth in LNG consumption. India and China are going to be the new family of LNG importer in Asia.

Export Scenario

90 million tpy is the current LNG supply capacity of the world (*Avidan 2000*). The Asia-Pacific region dominates in LNG exports, with Indonesia, Malaysia, Australia, and Brunei together accounting for more than two-thirds of the market. 10 to 15% of LNG supply is imported from Alaska and the Middle East countries, including Abu Dhabi, Qatar and Oman. Trinidad, Tobago, Nigeria have recently joined as traditional suppliers Algeria used to export LNG to France and Europe. Now projects are also being purchased in Australia, Yemen, Sakhalin, Indonesia, Malaysia and Venezuela as well as expansions in Trinidad, Nigeria and Qatar. The Middle East's share of the supply market is increasing. Indonesia and Malaysia, two of the world's largest suppliers, produce LNG through joint ventures involving participation from a state corporation and or more of the largest multinational energy companies. Using the technical know-how of these multinationals, LNG producing countries are able to compute a long-term foothold in consuming regions.

Alaska has been exporting more than 1 mmtpy of LNG to Japan for more than 30 years through Phillips's kenai facility. A newly proposed project is the Trans-Alaska natural gas pipeline designed to supply north slop gas to a proposed LNG export Terminal in the South. One of the major contributors is the ongoing Ras Laffin/Dolphin project in Qatar. It will provide LNG supply to India. The eight years of production history from Qatar's North Field confirm the deliverability of the world's largest non-associated gas field.

FACILITIES REQUIRED FOR LNG

Natural gas must be liquefied in order to carry enough volume to be practical. Tanker movement of liquefied natural gas requires a liquefaction facility in the exporting country and a gasification facility in the receiving country. Both facilities typically are located as the loading and unloading ports. The first shipment of sizeable volume of refined petroleum products was made from United State to England in early 1960s. Since 1950, the size of the Tankers has increased steadily. Beginning in 1960, ocean transport of natural gas in liquid form expanded. When cooling liquefies natural gas, it is reduced in volume by about 600 to 1, making it economical to transport by special ocean carriers.

A liquefaction plant is required in the port where the LNG is loaded. Natural gas is transported from the producing field to the liquefaction plant by pipeline in the gaseous state. After liquefaction, LNG is loaded onto the Tanker through short loading lines connecting the liquefaction plant with offshore loading facilities. At all tanker's destination in the consuming country, another plant is required to regasify the LNG for distribution to users as natural gas. Storage at both origin and destination facilities is required.

FUTURE DEMAND OF LNG IN THE ASIA-PACIFIC REGION

S. Korea and India will be the hubs of LNG demand growth in the region, while China has longer-term potential in the new century. The likely oversupply situation is changing the structure of the LNG industry. The power of buyers is increasing and several importers have attempted to change the traditional terms in LNG contracts. S. Korea has been leading the charge and is likely to be followed by other existing or emerging LNG importers, particularly India. The implications of this for LNG business over the next 10-20 years can be enormous. India is the third largest consumer of natural gas in the region and has been relying exclusively on domestic production. Indian LNG importer will differ significantly from existing buyers in the region, such as Japan, S. Korea and Taiwan. The following Table 1 is showing the projected LNG demand in Asia-Pacific region.

Table 1: Estimates of LNG demand in Asia-pacific region 1997-'98 and for the future are (source -Fesharaki 2000):

country	1997	1998	1999	2000	2005			2010		
					Low	Base	High	Low	Base	High
	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy	mmtpy
Japan	47.2	49.1	51.6	52.8	53.0	54.0	60.0	54.0	56.0	65.0
S. Korea	11.6	10.6	12.0	13.5	16.0	17.0	20.0	17.5	20.0	25.0
Taiwan	3.1	3.4	5.0	5.6	6.0	8.0-10.0	10.0-12.0	8.0	10.0-12.0	13.0-16.0
India	-	-	-	-	5.0	5.0-7.5	5.0-10.0	7.5	7.5-10.0	10.0-15.0
China	-	-	-	-	0.0	3.0	5.5	0.0	5.0	10.0
Total	61.9	63.1	68.6	71.9	80.0	87.92	101.108	86.5	99.103	123.131

CONCLUSIONS

The future success for LNG depends upon continuation of good safety, reliability and environmental protection records of natural gas plants and pipelines, LNG ships, and facilities at the loading and receiving terminals for LNG. At the same time, natural gas prices need to stay competitive with other forms of energy. In some markets, natural gas is priced significantly lower than petroleum on BTU basis because of the supply and demand considerations and because the environmental benefits of natural gas are not yet fully recognized in tax policies.

ACKNOWLEDGEMENT

I would like to express my gratitude and sincere appreciation to Dr. Mohammad Tamim for his valuable comments and suggestions in preparing this paper. I sincerely acknowledge the contributions of Monsof Ali in writing this paper.

ACRONYMS

Bcfd	: Billion cubic feet per day
bcmpy	: Billion cubic meter per year
Btu	: British thermal unit
boe/d	: Barrel of Oil Equivalent per day
EPC	: Engineering, Procurement and Construction
LNG	: Liquefied Natural Gas
m ³	: Cubic Meter
mmtpy	: Million ton per year
tpy	: Ton per year
OECD	: Organization of Economic Co-operation Development
OPEC	: Organization of Petroleum Exporting Countries

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