

Summary

Natural Gas Situation and LNG Supply/Demand Trends in Asia-Pacific and Atlantic Markets¹

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Since the autumn of 2008, the global LNG supply/demand balance has eased substantially. Demand-side factors including the impact of the financial crisis on global natural gas consumption, and supply-side factors such as launchings of new projects and progress in unconventional natural gas development in North America are behind the LNG supply/demand balance change. For the immediate future, the LNG supply/demand balance is likely to remain easy.

While the LNG situation is changing dramatically, key points to which we should pay attention over a short term with regard to a future LNG supply/demand outlook include LNG demand trends in the United States and China and destinations for exports from new LNG facilities launching operations by 2011. Factors that are expected to have great influences on future LNG supply and demand over a medium to long term may include the impact of the financial market credit crunch on investment in new medium to long-term gas development projects, gas shortages in the Middle East, and industrial nations' ongoing efforts toward a low-carbon society.

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¹ This paper is an excerpt from a FY 2008 survey for the promotion of oil and natural development and utilization as commissioned by the Ministry of Economy, Trade and Industry and has been released with the permission of the ministry. I thank the relevant people at the ministry for their understanding and cooperation.

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1. Natural gas supply and demand situation

Global natural gas reserves totaled 178.9 trillion cubic meters (Tcm) at the beginning of 2008. Of the total, the Middle East accounted for 40% and the former Soviet Union for 30%. Global natural gas output in 2007 came to 2,920 billion cubic meters (Bcm). Of the total production, North America accounted for 26.3%, the former Soviet Union for 27.1%, and Asia and Oceania for 13.1%. Gas consumption in the year was heavy in North America and the former Soviet Union boasting of massive gas production and in Europe with pipeline networks developed for natural gas trade within the region and with Africa and the former Soviet Union. Asian and Oceanic gas consumption totaled 442.2 Bcm, accounting for 15.1% of the global total (see Charts 1 and 2).

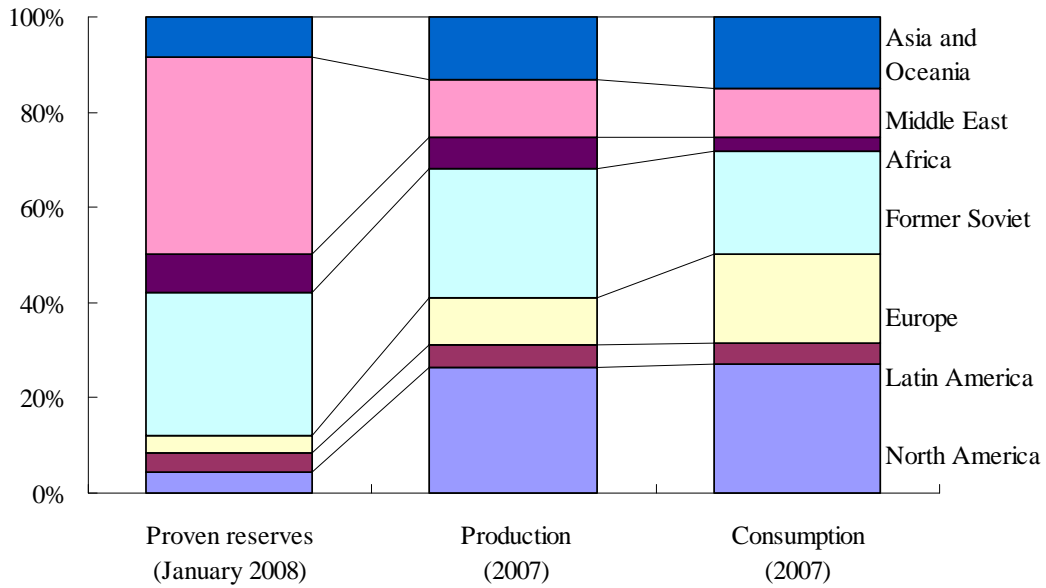
Chart 1 World Natural Gas Reserves, Production and Consumption

Source: *Natural Gas in the World*, Cedigaz

	Proven reserves (January 2008)		Production (2007)		Consumption (2007)	
	(Tcm)	share (%)	(Bcm)	share (%)	(Bcm)	share (%)
North America	8.0	4.5	767.3	26.3	791.5	27.1
Latin America	7.4	4.1	147.0	5.0	128.7	4.4
Europe	6.2	3.5	288.8	9.9	544.4	18.6
Former Soviet Union	53.8	30.1	790.7	27.1	629.7	21.6
Africa	14.6	8.1	191.5	6.6	85.3	2.9
Middle East	73.9	41.3	353.9	12.1	298.3	10.2
Asia and Oceania	15.1	8.4	381.2	13.1	442.3	15.1
Total	178.9	100.0	2920.4	100.0	2920.4	100.0

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Chart 2 Region-by-region Breakdown of World Natural Gas Reserves, Production and Consumption



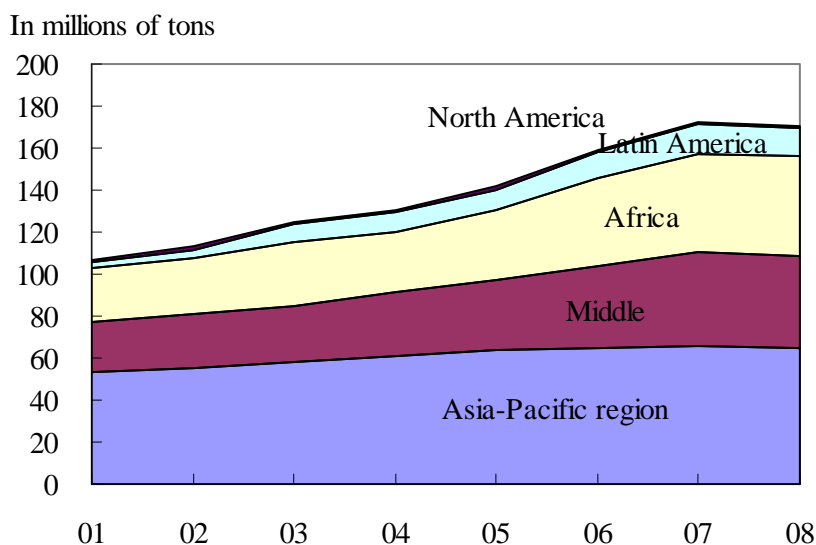
Source: *Natural Gas in the World*, Cedigaz

2. LNG trade

(1) LNG exports and imports

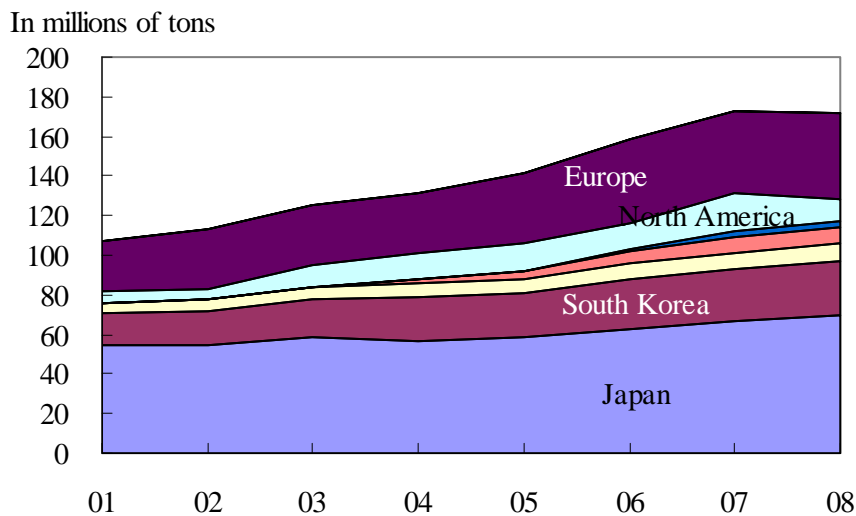
Global LNG transactions in 2008 totaled 171.8 million tons. After continuing to increase until 2007, transactions in 2008 declined by 0.8 million tons from the previous year due to production cuts in such countries as Algeria, Oman, and Trinidad and Tobago, and a demand decline under the financial crisis toward the end of the year. Under Qatari, Russian Sakhalin and other large LNG projects, production launchings were delayed from 2008 to 2009, contributing to limiting transactions further than expected earlier (see Chart 3).

Chart 3 Region-by-region LNG Exports



Sources: GIIGNL, LNG Business Review

Chart 4 LNG Import Trends



Source: GIIGNL, LNG Business Review

Among LNG-importing markets, LNG demand totaled 117.2 million tons in the Asian market in 2008 and 54.5 million tons in the Atlantic market (see Chart 4). Among Asian economies, Japan, South Korea and Taiwan posted steady LNG demand growth in 2008. In the second half of the year, however, demand turned down on the financial crisis that grew more serious in autumn. The sharp change in the LNG supply and demand environment from the first half to the second was a major feature of the 2008 LNG market. Meanwhile, the Americas reduced LNG imports substantially in 2008 as U.S. LNG imports almost halved from 18.9 million tons in 2007 to 11.2

million tons in 2008 on such factors as an increase in unconventional gas production.

(2) Medium to long-term contracts

Although LNG supply under spot and short-term contracts has increased over recent years, LNG transactions have mainly been based on long-term contracts lasting for 20 or more years. At the end of 2008, LNG supply under medium to long-term contracts totaled 195.09 million tons.

Regarding medium to long-term contracts, we must take note of the fact that most contracts for European and U.S. purchases are for Equity LNG that is taken over by gas liquefaction project operators for marketing and Branded LNG that is taken over by project operators or other businesses with no restrictions on sales destinations and subjected to marketing under their respective brands³. Although Equity and Branded LNG contracts for European and U.S. purchases covered less than 10% of all LNG contracts in the world in 2000, their share of all contracts for European and U.S. purchases at the end of 2008 stood at 39% (representing some 38 million tons). The share is expected to increase further as large LNG plants in Qatar and other countries go on stream in the future. Many of these contracts refrain from limiting export destinations. In manners meeting various terms and conditions in contracts, some LNG under these contracts may be diverted to other markets than Europe and the United States in response to supply/demand balance and price conditions.

Japanese companies' long-term LNG-importing contracts existing at the end of 2008 are listed in Chart 5 and their breakdown by year and country is indicated in Chart 6.

³ Typical Equity LNG deals involve ExxonMobil and Total in the Qatargas 2 and RasGas 2 projects, and Shell and Total in the NLNG (Nigerian LNG) project. Typical Branded LNG deals involve British Gas in the EG LNG (Equatorial Guinea LNG) project.

Chart 5 Japanese Companies' Long-term LNG Import Contracts (listed in the order of the 50-character kana syllabary)

Company	Country	Project	Term	Volume (10,000 tons)
Itochu	Oman	Qalhat LNG	2006-2025 (20 years)	70
Osaka Gas	Indonesia	Bontang (contract in 1973)	2003-2010 (10 years)	130
Osaka Gas	Indonesia	Bontang (Badak increase)	2003-2011 (8 years)	44
Osaka Gas	Indonesia	Bontang (Badak IV)	1996-2015 (19 years)	10
Osaka Gas	Indonesia	Bontang (Badak IV)	1994-2013 (19 years)	127
Osaka Gas	Brunei	Brunei LNG	1973-2013 (40 years)	74
Osaka Gas	Malaysia	MLNG	2009-2024 (15 years)	92
Osaka Gas	Malaysia	MLNG II (Dua)	1995-2015 (20 years)	60
Osaka Gas	Malaysia	MLNG III (Tiga)	2004-2024 (20 years)	12
Osaka Gas	Russia	Sakhalin II	2008-2031 (23 years)	20
Osaka Gas	Australia	Gorgon	2010-2035 (25 years)	150
Osaka Gas	Australia	NWS	1989-2009 (20 years)	79
Osaka Gas	Australia	NWS	2009-2015 (6 years)	50
Osaka Gas	Australia	NWS expansion	2004-2034 (30 years)	100
Osaka Gas	Oman	Oman LNG	2000-2024 (25 years)	66
Osaka Gas	Oman	Qalhat LNG	2009-2025 (17 years)	80
Osaka Gas	Qatar	Qatargas	1998-2021 (24 years)	35
Kansai Electric	Indonesia	Bontang (contract in 1973)	2000-2010 (10 years)	257
Kansai Electric	Indonesia	Bontang (Badak increase)	2003-2011 (8 years)	88
Kansai Electric	Malaysia	MLNG II (Dua)	1995-2015 (20 years)	42
Kansai Electric	Australia	NWS	1989-2009 (20 years)	113
Kansai Electric	Australia	NWS	2009-2017 (8 years)	40
Kansai Electric	Australia	NWS	2009-2014 (14 years)	50
Kansai Electric	Australia	NWS	2015-2023 (8 years)	92.5
Kansai Electric	Australia	Pluto	2010-2025 (15 years)	175-200
Kansai Electric	Qatar	Qatargas	1999-2022 (24 years)	29
Kyushu Electric	Indonesia	Bontang (contract in 1973)	2000-2010 (10 years)	156
Kyushu Electric	Russia	Sakhalin II	2009-2031 (22 years)	50
Kyushu Electric	Australia	NWS	1989-2009 (20 years)	105
Kyushu Electric	Australia	NWS	2009-2017 (8 years)	70
Kyushu Electric	Australia	NWS expansion	2004-2026 (22 years)	50
Saibu Gas	Malaysia	MLNG	2013-2028 (15 years)	39
Saibu Gas	Malaysia	MLNG I (Satu)	1993-2013 (20 years)	20
Saibu Gas	Malaysia	MLNG II (Dua)	1993-2013 (20 years)	16
Saibu Gas	Russia	Sakhalin II	2010-2028 (18 years)	0.85

Chart 5 Japanese Companies' Long-term LNG Import Contracts (continued)

Company	Country	Project	Term	Volume (10,000 tons)
Shikoku Electric	Malaysia	MLNG	2010-2025 (15 years)	42
Shizuoka Gas	Malaysia	MLNG II (Dua)	1996-2016 (20 years)	45
Shizuoka Gas	Australia	NWS expansion	2005-2028 (23 years)	13
Nippon Steel	Indonesia	Bongtang (contract in 1973)	2000-2010 (10 years)	62
Japan Petroleum Exploration (JAPEX)	Malaysia	MLNG III (Tiga)	2002-2022 (20 years)	48
Sendai City Gas	Malaysia	MLNG II (Dua)	1997-2017 (20 years)	15
Chugoku Electric	Australia	NWS	1989-2009 (20 years)	111
Chugoku Electric	Australia	NWS	2009-2021 (12 years)	143
Chugoku Electric	Qatar	Qatargas	1999-2022 (24 years)	12
Chugoku Electric	Indonesia	Bongtang (contract in 1973)	2000-2010 (10 years)	215
Chugoku Electric	Indonesia	Bongtang (Badak increase)	2003-2011 (8 years)	165
Chugoku Electric	Malaysia	MLNG	2011-2030 (20 years)	54
Chugoku Electric	Russia	Sakhalin II	2011-2026 (15 years)	50
Chugoku Electric	Australia	Gorgon	2010-2035 (25 years)	150
Chugoku Electric	Australia	NWS	1989-2009 (20 years)	105
Chugoku Electric	Australia	NWS	2009-2016 (7 years)	50
Chugoku Electric	Australia	NWS expansion	2009-2021 (15 years)	60
Chugoku Electric	Qatar	Qatargas	1997-2021 (25 years)	400
Chubu Electric, Kansai Electric, Kyushu Electric, Nippon Steel, Osaka Gas, Toho Gas	Indonesia	Bontang	2011-2015 (5 years)	300
Chubu Electric, Kansai Electric, Kyushu Electric, Nippon Steel, Osaka Gas, Toho Gas	Indonesia	Bontang	2016-2020 (5 years)	200
Tokyo Gas	Indonesia	Bontang (Badak IV)	1994-2013 (19 years)	92
Tokyo Gas	Brunei	Brunei LNG	1973-2013 (40 years)	124
Tokyo Gas	Malaysia	MLNG I (Satu)	2003-2018 (15 years)	260
Tokyo Gas	Malaysia	MLNG II (Dua)	1995-2015 (20 years)	80
Tokyo Gas	Malaysia	MLNG III (Tiga)	2004-2024 (20 years)	34
Tokyo Gas	Russia	Sakhalin II	2007-2031 (24 years)	110
Tokyo Gas	Australia	Darwin	2006-2023 (17 years)	100
Tokyo Gas	Australia	Gorgon	2010-2034 (25 years)	120
Tokyo Gas	Australia	NWS	1989-2009 (20 years)	79
Tokyo Gas	Australia	NWS	2009-2017 (8 years)	53
Tokyo Gas	Australia	NWS expansion	2004-2029 (25 years)	107
Tokyo Gas	Australia	Pluto	2010-2025 (15 years)	150~175
Tokyo Gas	Qatar	Qatargas	1998-2021 (24 years)	35
Tokyo Gas	U.S.A.	Alaska (Kenai)	1989-2009 (20 years)	31

Chart 5 Japanese Companies' Long-term LNG Import Contracts (continued)

Company	Country	Project	Term	Volume (10,000 tons)
Tokyo Electric	Indonesia	Arun II	2005-2010 (5 years)	13
Tokyo Electric	Brunei	Brunei LNG	1973-2013 (40 years)	403
Tokyo Electric	Malaysia	MLNG I (Satu)	2003-2018 (15 years)	480
Tokyo Electric	Australia	Darwin	2006-2023 (17 years)	200
Tokyo Electric	Australia	NWS	1989-2009 (20 years)	118
Tokyo Electric	Australia	NWS	2009-2017 (8 years)	30
Tokyo Electric	Abu Dhabi	ADGAS	1994-2019 (25 years)	430
Tokyo Electric	Qatar	Qatargas	1999-2022 (24 years)	20
Tokyo Electric	U.S.A.	Alaska (Kenai)	1989-2009 (20 years)	92
Tokyo Electric	Russia	Sakhalin II	2007-2029 (20 years)	150
Toho Gas	Indonesia	Bontang (contract in 1973)	2000-2029 (22 years)	25
Toho Gas	Indonesia	Bontang (Badak increase)	2003-2011 (8 years)	55
Toho Gas	Indonesia	Bontang (Badak IV)	1994-2014 (20 years)	12
Toho Gas	Malaysia	MLNG II (Dua)	1995-2014 (20 years)	28
Toho Gas	Malaysia	MLNG III (Tiga)	2004-2024 (20 years)	22
Toho Gas	Malaysia	MLNG III (Tiga)	2007-2027 (20 years)	52
Toho Gas	Russia	Sakhalin II	2009-2033 (24 years)	50
Toho Gas	Australia	NWS	1989-2009 (20 years)	23
Toho Gas	Australia	NWS	2009-2019 (10 years)	76
Toho Gas	Australia	NWS expansion	2004-2029 (25 years)	30
Toho Gas	Qatar	Qatargas	1999-2022 (24 years)	17
Tohoku Electric	Indonesia	Arun II	2005-2009 (5 years)	85
Tohoku Electric	Indonesia	Tangguh	2010-2024 (15 years)	12
Tohoku Electric	Malaysia	MLNG II (Dua)	1996-2016 (20 years)	50
Tohoku Electric	Malaysia	MLNG III (Tiga)	2005-2025 (20 years)	50
Tohoku Electric	Russia	Sakhalin II	2010-2030 (20 years)	42
Tohoku Electric	Australia	NWS	2010-2019 (9 years)	50
Tohoku Electric	Australia	NWS expansion	2005-2020 (15 years)	40
Tohoku Electric	Qatar	Qatargas	1999-2021 (23 years)	52
Nihon Gas	Indonesia	Bontang (Badak IV)	1996-2015 (19 years)	8
Hiroshima Gas	Indonesia	Bontang (Badak IV)	1996-2015 (19 years)	21
Hiroshima Gas	Malaysia	MLNG III (Tiga)	2005-2013 (8 years)	8~16
Hiroshima Gas	Russia	Sakhalin II	2008-2028 (20 years)	21
Mitsubishi Corp.	Oman	Qalhat LNG	2006-2021 (15 years)	80

Sources: Prepared by IEEJ based on company press releases and the like.

Chart 6 Breakdown of Japanese Companies' Long-term LNG Import Contracts

(10,000 tons)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020
UAE	430	430	430	430	430	430	430	430	430	0
U.S.A.	123	123	123	0	0	0	0	0	0	0
Indonesia	1,565	1,565	1,565	1,492	582	582	582	363	319	212
Australia	1,373	1,373	1,357	1,963	2,107	2,107	2,107	2,107	2,112	1,701
Oman	216	216	296	296	296	296	296	296	296	296
Qatar	600	600	600	600	600	600	600	600	600	600
Brunei	601	601	601	601	601	601	150	0	0	0
Malaysia	1,322	1,322	1,414	1,446	1,510	1,510	1,495	1,505	1,348	445
Russia	195	291	389	444	481	494	494	494	494	494
Total	6,425	6,521	6,775	7,271	6,607	6,620	6,154	5,795	5,598	3,747

Note: Contracts for new projects may fail to meet realities because real capacity utilization rates and production launchings may deviate from plans on which these contracts had been based.

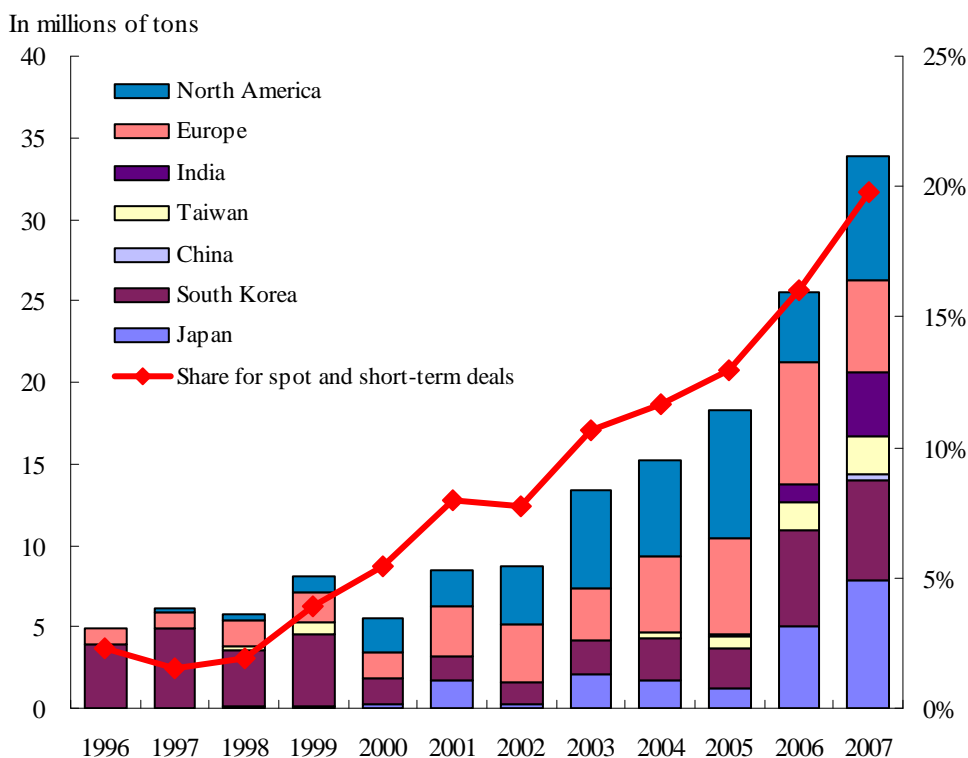
Sources: Prepared by IEEJ based on company press releases and the like

(3) Spot and short-term deals

LNG transactions under spot and short-term contracts in the world totaled 33.83 million tons in 2007⁴. Of the total, 7.55 million tons were destined for the United States, 5.7 million tons for Europe and 20.2 million tons for the Asian market. Transactions under spot and short-term contracts accounted for 19.8% of total global LNG transactions in the year and have increased conspicuously since 2000 (see Chart 7). The conspicuous increase is attributable to an LNG demand expansion mainly in European and U.S. markets. European and U.S. firms that favor flexible contracts have expanded LNG purchases under spot and short-term contracts. North American (U.S. and Mexican) LNG purchases under spot and short-term contracts increased from 0.92 million tons in 2000 to 7.11 million tons in 2007. European LNG purchases under spot and short-term contracts expanded from 1.27 million tons in 2000 to 3.82 million tons in 2007 as Spanish purchases grew substantially. LNG transactions under spot and short-term contracts grew steadily before an apparent sharp decline mainly in spot deals amid the global recession in the second half of 2008. They may not necessarily post any rapid increase that had been seen in the past. Given the planned expansion of Equity and Branded LNG supply and growing LNG demand from European and U.S. companies favoring short-term contracts as noted earlier, however, spot and short-term LNG deals are well expected to increase. Their upward trend is likely to continue.

⁴ Spot and short-term contracts here are those that expire in up to four years.

Chart 7 Spot and Short-term Transactions' Share of Global LNG Deals



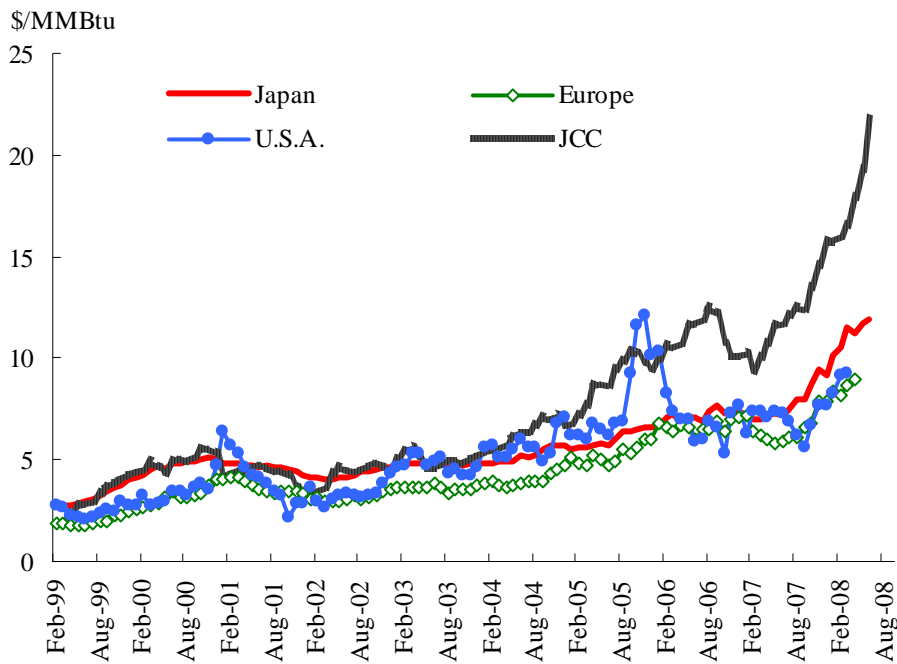
Sources: GIIGNL, Cedigaz

(4) LNG import prices

LNG pricing formulas differ from region to region. In Asia, LNG prices are generally linked to the so-called JCC (Japan crude cocktail) price, which is an average CIF price of crude oil for Japan. LNG prices for the European continent are linked to petroleum product and Brent crude prices. LNG prices for U.S. and British purchases are fixed according to supply/demand balances at domestic natural gas trading points such as Henry Hub in the United States and the NBP (National Balancing Point) in Britain.

Chart 8 indicates LNG price trends for Japan, the United States and Europe. LNG prices for Japan remained higher than those for the United States and Europe until around 2000. As the average JCC price soared on international crude oil price hikes from 2004, LNG prices for Japan continued an upward trend. Due to the pricing formula structure, however, LNG price hikes were slower than JCC price rises. LNG prices for Europe, which are linked to crude oil and petroleum product prices, followed a similar trend. In the United States, LNG prices are based on natural gas supply/demand balances, although natural gas prices are reflected in crude oil prices to some extent. Therefore, moves of LNG prices for the United States have been different from those for Japan and Europe. LNG prices for the United States are more volatile than those for Japan and Europe.

Chart 8 LNG Price Trends in Major Markets



Source: *Energy Prices & Taxes*, IEA

3. LNG chain

(1) Gas liquefaction plants

Global annual LNG production capacity in operation reached 202.6 million tons at the end of 2008. Among regions, the Asia-Pacific region accounted for the largest share at 78 million tons, followed by 58.2 million tons for Africa, 46.1 million tons for the Middle East and 16.1 million tons for the Americas (North and Central Americas) (see Chart 9). LNG for Asia comes mainly from the Asia-Pacific region, North America and the Middle East. LNG for Europe and the United States is supplied mainly from Africa and Central America.

Chart 9 Existing LNG Production Plants (at the end of 2008)

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration
					Gas Field	Liquefaction Plant	
Africa	Algeria	Arzew GLAZ (Train 1-3)	1.1	1964	Sonatrach		GdF(2.5): 1976-2019 GdF(3.7): 1982-2019 GdF(1.3): 1992-2019 Duke(3.2): 1989-2009 Botas(3.0): 1994-2014 ENI(1.4): 1997-2014 Enel(1.15): 1999-2022 DEPA(0.50): 2000-2021 Iberdrola(0.73): 2002-2021 Cepsa(0.45): 2002-2012 Endesa(0.75): 2005-2017
		Arzew GL1Z (Train 1-6)	7.8	1978			
		Arzew GL2Z (Train 1-6)	7.8	1981			
		Skikda GL1K II (Train 4-6)	3.0	1981			
	Libya	Marsa el Brega (Train 1-2)	0.7	1970	Sirte Oil		Gas Natural(1.15): 1981-
	Nigeria	Nigeria LNG (Train 1, 2)	6.4	1999	NNPC, Shell, Total, ENI	NNPC(49), Shell(25.6), Total(15), ENI(10.4)	Enel (2.59): 1999-2019 Gas Natural (1.17): 1999-2021 Botas (0.89): 1999-2021 GdF (0.36): 1999-2021 Transgas (0.31): 2000-2019 Gas Natural (1.99): 2002-2024 Transgas (0.75): 2002-2023 BG (2.5): 2004-2023 Shell (1.1): 2005-2025 Iberdrola (0.36): 2005-2025 Transgaz (1.5): 2005-2025 ENI (1.15): 2006-2028 Total (1.15): 2005-2026 Shell (1.4): 2007-2027 Endesa (0.75): 2005-2025
		Nigeria LNG (Train 3)	3.2	2002			
		Nigeria LNG (Train 4, 5)	8.2	2006			
		NLNG (Train 6)	4.1	2007			
	Egypt	Damietta LNG (Train 1)	5.0	2004	EGPC, EGAS, BP, BG, Petronas	Union Fenosa Gas (80), EGAS (10), EGPC (10)	Union Fenosa (3.3): 2005-2029 BP (1.2): 2005-2025 BG (1.7): 2005-2010
		Egyptian LNG (Train 1)	3.6	2005	BG, Petronas	BG (35.5), Petronas (35.5), EGAS (12), EGPC (12), Gaz de France (5)	GdF(3.6): 2005-2025
Egyptian LNG (Train 2)		3.6	2005	BG (38), Petronas (38), EGAS (12), EGPC (12)		BG(3.6): 2006-2023	
Equatorial Guinea	EGLNG (Train 1)	3.7	2007	Marathon, Sonagas	Marathon(60), Sonagas(25), Mitsui(8.5), Marubeni(6.5)	BG (3.4): 2007-2024	
Sub Total			58.2				
Europe	Norway	Snohvit LNG (Train 1)	4.2	2007	Statoil 33.53%, Petoro 30%, Total 18.4%, Gaz de France 12%, Amerada Hess 3.26%, RWE 2.81%		Statoil (1.75): 2007- Iberdrola (1.2): 2007- GdF/Total (1.24): 2007- GdF/Total (0.50): 2007-
	Sub Total			4.2			

Chart 9 Existing LNG Production Plants (at end of 2008) (continued)

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration
					Gas Field	Liquefaction Plant	
Americas	USA	Kenai (Train 1, 2)	1.3	1969	ConocoPhillips (70), Marathon (30)		Tokyo Electric(0.92): 1989-2009 Tokyo Gas(0.31): 1989-2009
	Trinidad and Tobago	Atlantic LNG (Train 1)	3.0	1999	BP, BG, Chevron, Petromin, ENI, PetroCanada	BP(34), BG(26), Repsol-YPF(20), NGC(10), Tractebel(10)	Gas Natural(1.06): 1999-2018 Gas Natural(0.65): 2002-2023 Repsol YPF(1.19): 2006-2023
		Atlantic LNG (Train 2)	3.3	2002		BP(42.5), BG(32.5), Repsol-YPF(25)	Suez(1.63): 1999-2018 Suez (0.34): 2000-2020 BP(0.8): 2002-2021 BG(2.1): 2003-2023 Marathon(1.2): 2005-2010
		Atlantic LNG (Train 3)	3.3	2003			BP (2.5): 2006-2025 BG(1.5): 2006-2026 NGC(0.58): 2006-2026
		Atlantic LNG (Train 4)	5.2	2005		BP(37.78), BG(28.89), Repsol-YPF(22.22), NGC(11.11)	
Sub Total			16.1				
Middle East	Abu Dhabi	ADGAS (Train 1, 2)	3.1	1977	ADNOC(100)	ADNOC (70), Mitsui(15), BP (10), Total (5)	Tokyo Electric(4.3): 1994-2019
		ADGAS (Train 3)	2.3	1994			
	Oman	Oman LNG (Train 1, 2)	6.6	2000	Oman Government(60), Shell(34), Total(4), Partex(2)	Oman Government(51), Shell(30), Total(5.54), Mitsubishi(2.77), Mitsui(2.77), Partex(2), Itochu(0.92), Korea LNG(5)	Osaka Gas(0.66): 2000-2025 KOGAS(4.06): 2000-2024 Itochu (0.7): 2006-2026 BP(0.77): 2004-2009
		Qalhat LNG (Train 3)	3.7	2005		Oman Government(47), Oman LNG(37), Union Fenosa(7), Mitsubishi(3), Itochu(3), Osaka Gas(3)	Mitsubishi(0.8): 2006-2021 Osaka Gas(0.8): 2009-2026 Union Fenosa Gas (1.6): 2006-2026
	Qatar	Qatargas (Train 1-3)	9.7	1997	QP(65), Total(20), ExxonMobil(10), Mitsui(2.5), Marubeni(2.5)	QP(65), Total(10), ExxonMobil(10), Mitsui(7.5), Marubeni(7.5)	Chubu Electric (4.0): 1997-2022 Tokyo Gas (0.35): 1998-2022 Osaka Gas (0.35): 1997-2021 Tohoku Electric (0.52): 1999-2022 Kansai Electric (0.29): 1999-2022 Chugoku Electric (0.12): 1999-2022 Tokyo Electric (0.2): 1999-2022 Toho Gas (0.17): 2000-2022 Gas Natural (0.66): 2001-2012 Gas Natural (0.66): 2002-2012 Gas Natural (0.75): 2005-2025 Gas Natural (0.75): 2006-2025 Iberdrola (0.88): 2003-2022 PTT (1.0): 2011-
		RasGas (Train 1, 2)	6.6	1999	QP(63), ExxonMobil(25), KOGAS(5), Itochu(4), LNG Japan(3)		KOGAS (4.92): 1999-2024 Petronet (7.5): 2004-2028 Endesa (0.8): 2005-2025 ENI (0.75): 2004-2023
		RasGas II (Train 3)	4.7	2004	QP, ExxonMobil	QP(70), ExxonMobil(30)	Edison (4.7): 2007-2032 Distrigas (2.05): 2007-2027 EdF (3.4): 2007-2011
		RasGas II (Train 4)	4.7	2005	QP, ExxonMobil	QP(70), ExxonMobil(30)	CPC (3.0): 2008-2033 KOGAS (2.10): 2009-2016
		RasGas II (Train 5)	4.7	2007	N.A.	Qatar Petroleum(70), ExxonMobil(30), CPC has a 5% stake.	
	Sub Total			46.1			

Chart 9 Existing LNG Production Plants (at end of 2008) (continued)

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration	
					Gas Field	Liquefaction Plant		
Asia Pacific	Brunei	B runei LNG (Train 1-5)	7.2	1972	Brunei Government(50), Shell (50)	Brunei Government (50), Shel (25), Mitsubishi(25)	Tokyo Electric (4.03): 1973-2013 Tokyo Gas (1.24): 1973-2013 Osaka Gas(0.74): 1973-2013 KOGAS(0.70): 1997-2013	
					Total(37.5), Shell(35), Jasra(22.5), Pg Jaya(5)			
	Indonesia	B ontang I (Train A, B)	5.2	1977	Pertamina, VICO, Total, INPEX, Chevron, Eni, LASMO, BP, CPC, Universal Gas & Oil, etc.	Pertamina(55), VICO(20), JILCO(15), Total(10)	Osaka Gas (1.27): 1994-2013 Tokyo Gas (0.92): 1994-2013 Toho Gas (0.12): 1994-2014 Hiroshima Gas (0.21): 1996-2015 Osaka Gas (0.1): 1996-2015 Nihon Gas (0.08): 1996-2015 Kansai Electric (2.57): 2000-2010 Chubu Electric (2.15): 2000-2010 Kyushu Electric (1.56): 2000-2010 Osaka Gas (1.30): 2000-2010 Nippon Steel (0.62): 2000-2010 Toho Gas (0.25): 2000-2010 Chubu Electric (1.65): 2003-2011 Kansai Electric (0.88): 2003-2011 Osaka Electric (0.44): 2004-2011 Toho Electric (0.55): 2003-2011 KOGAS(2.0): 1994-2014 KOGAS(1.0): 1998-2017 CPC(1.57): 1990-2010 CPC(1.84): 1998-2017 Tohoku Electric (0.85): 2005-2009 Tokyo Electric (0.13): 2005-2009	
		B ontang II (Train C, D)	5.2	1983				
		B ontang III (Train E)	2.8	1989				
		B ontang IV (Train F)	2.8	1993				
		B ontang V (Train G)	2.8	1997				
		B ontang VI (Train H)	3.0	1999				
		A run I (Train 1)	1.5	1978				ExxonMobil(100)
	A run II (Train 4, 5)	3.0	1984					
	A run III (Train 6)	2.0	1986					
	Malaysia	M alaysia LNG I (Satu) (Train 1-3)	8.1	1983	Shell(50), Carigali(50)	Petronas(90), Sarawak Government (5), Mitsubishi (5)	Tokyo Electric (4.8): 2003-2018 Tokyo Gas (2.6): 2003-2018 Saibu Gas (0.2): 1993-2013	
		M alaysia LNG II (Dua) (Train 4-6)	7.8	1995		Petronas(60), Shell(15), Mitsubishi(15), Sarawak Government (10),	Saibu Gas (0.16): 1993-2013 Tokyo Gas (0.8): 1995-2015 Osaka Gas (0.6): 1995-2015 Kansai Electric (0.42): 1995-2015 Toho Gas (0.28): 1995-2015 Tohoku Electric (0.5): 1996-2016 Shizuoka Gas (0.45): 1996-2016 Sendai City Gas (0.15): 1997-2017 KOGAS(2.0): 1995-2015 CPC(2.25): 1995-2015	
		M alaysia LNG III (Tiga) (Train 7, 8)	6.8	2003		Shell(37.5), Nippon Oil (37.5), Carigali(25)	Petronas(60), Shell(15), Nippon Oil (10), Sarawak Government (10), Mitsubishi (5)	JAPEX (0.48): 2003-2023 Tokyo Gas (0.34): 2004-2024 Toho Gas (0.22): 2004-2024 Toho Gas (0.52): 2007-2027 Osaka Gas(0.12): 2004-2024 Hiroshima Gas (0.008-0.016): 2005-2012 Tohoku Electric (0.5): 2005-2025 Toho Gas (0.52): 2007-2027 KOGAS(1.5): 2003-2010 KOGAS(1.5): 2008-2028 CNOOC(3.03): 2009-2034
		M alaysia LNG (Project Unspecified)						Osaka Gas (0.92): 2009-2025 Shikoku Electric (0.42): 2010-2025 Chubu Electric (0.54): 2011-2031 Saibu Gas (0.39): 2013-2028

Chart 9 Existing LNG Production Plants (at end of 2008) (continued)

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration
					Gas Field	Liquefaction Plant	
Asia Pacific	Australia	NWS (Train 1-5)	16.3	1989-2008	Woodside(16.7), Shell(16.7), Chevron(16.7), BHP Billiton(16.7), BP(16.7), MIMI(16.7)	Woodside(16.7), Shell(16.7), Chevron(16.7), BHP Billiton(16.7), BP(16.7), MIMI(16.7)	Tokyo Gas (0.79→0.53): 1989-2009→2017 Tokyo Electric (1.18→0.3): 1989-2009→2016 Toho Gas (0.23→0.76): 1989-2009→2019 Osaka Gas (0.79→0.5): 1989-2009→2015 Kiyusyu Electric (1.05→0.7): 1989-2009→2017 Kansai Electric (1.13→0.4): 1989-2009→2017 Chubu Electric (1.05→0.5): 1989-2009→2016 Chugoku Electric (1.11→1.43): 1989-2009→2021 Kansai Electric (0.50→0.925): 2009-2014→2023 KOGAS (0.50): 2003-2007→2016 Tokyo Gas (1.07): 2004-2028 Toho Gas (0.3): 2004-2028 Osaka Gas (1.0): 2004-2034 Kiyusyu Electric (0.5): 2004-2026 Shell (0.74): 2004-2009 Shizuoka Gas (0.135): 2005-2028 Tohoku Electric (0.4): 2005-2020 Chubu Electric (0.6): 2009-2024 CNOOC (3.7): 2006-2031 Tohoku Electric (1.0): 2010-2019
		Darwin LNG	3.5	2006	ConocoPhillips (5.672), Eni (12.04), Santos(10.63), Inpex (10.53), Tokyo Electric (6.72), Tokyo Gas (3.36)		Tokyo Electric (2.0): 2006-2023 Tokyo Gas (1.0): 2006-2023
	Sub Total			78.0			
Total			202.6				

Sources: GIIGNL, IEEJ-compiled data from company websites and the like

There are many projects to build new LNG bases in addition to bases now in operation. Projects are also underway to expand existing bases. LNG production capacity under construction and for projects subject to SPAs (sale and purchase agreements) or HOAs (heads of agreement) signed with LNG buyers totaled 113 million tons at the end of 2008. The new capacity is expected to become operational by 2015, including 53.5 million tons in the Middle East, 37 million tons in the Asia-Pacific region, 18.1 million tons in Africa and 4.4 million tons in Latin America (see Chart 10).

Chart 10 LNG Production Plants under Construction or with Signed SPAs/HOAs

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration
					Gas Field	Liquefaction Plant	
Africa	Algeria	Skikda	4.5	2011	Sonatrach		Sonatrach
	Nigeria	NLNG (Train 7)	8.4	2012	NNPC, Shell, Total, ENI	NNPC(49), Shell(25.6), Total(15), ENI(10.4)	BG (2.25): 2012-2032 Total (1.38): 2012-2032 ENI (1.38): 2012-2032 Shell (2.0): 2012-2032 Occidental (1.0): 2012-2032
	Angola	Angola LNG (Train 1)	5.2	2012	Sonagas(22.8%), Chevron(36.4%), Eni(13.6%), Total(13.6%), BP(13.6%)		Chevron (1.9): 2012- Sonangol (1.2): 2012- Total (0.7): 2012- BP (0.7): 2012- ENI (0.7): 2012-
	Sub Total		18.1				
Middle East	Qatar	RasGas 3 (Train 6)	7.8	2009	N.A.	QP(70), ExxonMobil (30)	ExxonMobil(7.8): 2008-2034
		RasGas 3 (Train 7)	7.8	2009	N.A.	QP(70), ExxonMobil (30)	ExxonMobil(7.8): 2008-2034
		Qatargas II (Train 4)	7.8	2009	N.A.	QP(70), ExxonMobil(30)	ExxonMobil(10.4): 2007-2032 Total(5.2): 2009-2034
		Qatargas II (Train 5)	7.8	2010	N.A.	QP(65), ExxonMobil (18.3), Total(16.7)	
		Qatargas 3	7.8	2010	N.A.	QP(68.5), ConocoPhillips (30), Mistui (1.5)	ConocoPhillips(7.8): 2009-2034
		Qatargas 4	7.8	2011	N.A.	QP (70), Shell (30)	Shell(7.8): 25 years
	Yemen	Yemen LNG	6.7	2009	Hunt Oil(38.5), ExxonMobil(37), SK(24.5)	Total (39.62), Yemen Gas (16.73), Hunt Oil (17.22), SK (9.55) , Kogas (6) Hyundai (5.88) GASSP(5)	KOGAS (2.0): 2008-2028 GdF Suez (2.55): 2009-2029 Total (2.00): 2009-2029
Sub Total		53.5					
Americas	Peru	Peru LNG	4.4	2010	Hunt Oil(50), SK(20), Repsol YPF(20), Marubeni(10)		Repsol YPF(3.6): 2010-
Sub Total		4.4					

Chart 10 LNG Production Plants under Construction or with Signed SPAs/HOAs (continued)

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors		Buyer (Quantity): Contract Duration
					Gas Field	Liquefaction Plant	
Asia Pacific	Australia	Gorgon (Train 1, 2)	15.0	From 2014	Chevron(50), Shell(25), ExxonMobil(25)		Tokyo Gas (1.2): 2010-2035 Chubu Electric (1.5): 2010-2035 Osaka Gas (1.5): 2010-2035 GS Caltex (0.25): N/A PetroChina (2.0): N/A Petronet (0.5-1.5): N/A
		Pluto-1	4.8	2010	Woodside(90), Tokyo Gas (5), Kansai Electric (5)		Tokyo Gas (1.5-1.75): 2010-2025 Kansai Electric (1.75-2.0): 2010-2025
	Indonesia	Tangguh (Train 1, 2)	7.6	2009	BP(37.16), MI Berau BV(16.3), CNOOC(13.9), Nippon Oil Berau(12.23), KG Berau-KG Wiriagar(10), LNG Japan(7.35) Talisman Energy (3.06)		POSCO(0.55): 2005-2025 K-Power(0.6):2006-2026 CNOOC(2.6): 2007-2032 Sempra(3.7): 2008-2028 Tohoku Electric (0.12): 2010-2025
	Russia	Sakhalin II (Train 1, 2)	9.6	2009	Gazprom(50), Shell(27.5), Mitsui (12.5), Mitsubishi (10)		Tokyo Gas (1.1): 2007-2031 Tokyo Electric (1.5): 2007-2029 Hiroshima Gas (0.21): 2008-2028 Kyushu Electric (0.5): 2009-2031 Toho Gas (0.5): 2009-2033 Tohoku Electric (0.42): 2010-2030 Saibu Gas (0.0085): 2010-2028 Chubu Electric (0.5): 2011-2026 Osaka Gas (0.2): 2008-2028 KOGAS (1.5): 2008-2028 Shell (1.85): 2008-2028
Sub Total			37.0				

Sources: Prepared by IEEJ based on respective corporate websites, etc.

Furthermore, there are many projects still under consideration for commercialization (see Chart 11). But their feasibilities differ widely depending on global LNG demand trends, political and energy supply/demand situations in planned produced sites, environmental constraints and the like. Therefore, these projects may not necessarily be implemented. Even if some are implemented, they may not necessarily meet existing schedules as specified in the following chart. The feasibilities of these projects are thus uncertain. In the United States, particularly, LNG receiving terminal construction is expected to lag behind schedule due to opposition and litigations from residents close to planned LNG terminals, as well as price declines since the summer of 2008. As explained later, LNG demand growth is expected to slacken on the expansion of unconventional gas production in the United States. Some LNG terminal construction plans could be cancelled.

Chart 11 LNG Production Plant Projects under Consideration

Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors	Destinations	
Africa	Algeria	Gassi Touil(Arzew)	4.7	N.A.	Sonatrach	USA, Europe	
	Nigeria	Olokola LNG (Train 1-4)	22.0	2013	NNPC(49.5), Chevron(18.5), Shell(18.5), BG(13.5)	USA, Europe	
		Brass River LNG (Train 1, 2)	10.0	2013	NNPC(49), Total(17), ConocoPhillips(17), ENI(17)	USA, North America	
		Flex LNG	1.5	2011	Flex LNG, Peak Petroleum, Mitsubishi	N.A.	
	Angola	Angola LNG (Train 2)	N.A.	N.A.	Sonangol (40), ENI (20), Gas Natural West Africa (20), Galp (10), Exem (10)	USA, Europe	
	Egypt	Damietta (Train 2)	5.0	2012	Eni, Segas, Egas, EGPC	N.A.	
		Egyptian LNG (Train 3)	N.A.	N.A.	BG, RWE	N.A.	
		West Damietta	4.0	N.A.	Shell, EGPC	N.A.	
	Libya	Marsa el Brega Refurbishment	5.0	N.A.	Libya NOC, Shell	N.A.	
		Mellitah	3.5	N.A.	Libya NOC, ENI	N.A.	
	Equatorial Guinea	EG LNG (Train 2)	4.4	2012	Marathon (35), Sonagas (30), Mitsui (8.5), Marubeni (6.5), Union Fenosa (5), E.On (5), unallocated (10)	N.A.	
	Sub Total			60.1			
	Europe	Russia	Shtokman LNG	7.0	2014	Gazprom (51), Total(25), StatoilHydro(24)	USA, Europe
Norway		Snohvit LNG (Train 2)	4.2	N.A.	Petro, Statoil, Total, GdF, Amerada Hess, RWE	USA, Europe	
Sub Total			11.2				
Middle East	Iran	Pars LNG (Train 1, 2)	10.0	N.A.	NIOC, Total, Petronas	Asia, Europe	
		Persian LNG (Train 1, 2)	16.2	N.A.	NIOC, Shell	Asia, Europe	
		North Pars LNG	20.0	2012	CNOOC	China	
		Iran LNG	10.0	N.A.	NIOC	Asia	
		Qeshm	1.2	2010	LNG Ltd.	N.A.	
Sub Total			57.4				

Chart 11 LNG Production Plant Projects under Consideration (continued)

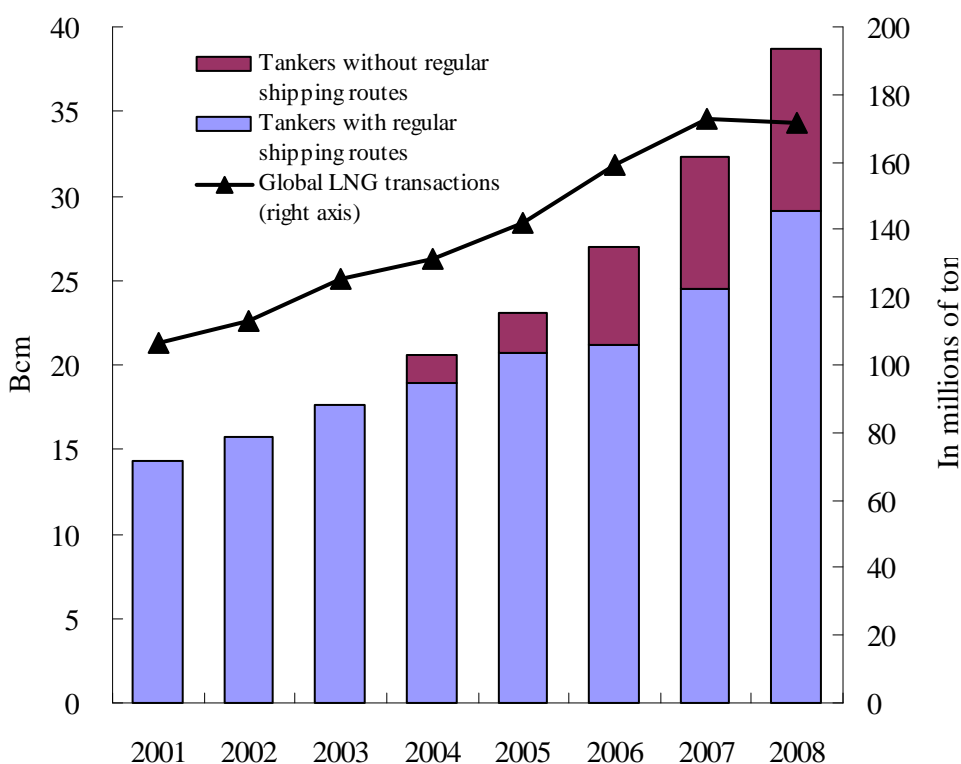
Region	Country	Project (Train)	Capacity (MT/y)	Start Up	Investors	Destinations
Americas	USA	North Slope	9.0	N.A.	Yukon Pacific	USA
	Canada	Kitimat	5.0	2013	Kitimat LNG, Mitsubishi	Asia
	Venezuela	Deltana (Train 1)	4.7	2014	PDVSA (60) , Galp (15) , Chevron (10) , Mitsubishi-Mitsui (5)	USA
		Mariscal Sucre (Train 2)	4.7	2014	PDVSA (60) , Galp (15) , Itochu (10) , Mitsubishi-Mitsui (5)	Atlantic
	Argentina	Bahía Blanca	N.A.	N.A.	ENARSA , PDVSA	N.A.
	Trinidad and Tobago	Atlantic LNG (Train 5)	N.A.	N.A.	N.A.	N.A.
Sub Total			23.4			
Asia Pacific	Australia	Fisherman's Landing	1.5	2012	LNG Limited (40), Golar LNG (40), Arrow Energy (20: option)	N.A.
		Timor Sea LNG (Tassie Shoal)	3.0	2012	Methanol Australia	Asia
		Sun LNG	0.5	2012	Sunshine Gas (70), Sojitz (30)	N.A.
		Queensland Curtis	7.4	2013	QGC (70), BG (30)	N.A.
		Prelude	3.5	2014	Shell (100)	Asia Pacific
		GLNG	3.0	2014	Santos (60) , Petronas(40)	Asia Pacific
		Southern Cross	0.7	2014	LNG Inpel	N.A.
		Australian Pacific	3.5	2014	Origin(50),	N.A.
			3.5	2015	ConocoPhillips (50)	N.A.
		Greater Sunrise	5.3	2015	Woodside(33.44), ConocoPhillips(30), Shell(26.56), Osaka Gas (10)	Asia Pacific
		Ichthys	8.0	2015	INPEX (76), Total(24)	Asia Pacific
		Wheatstone	10.0	2015	Chevron (100)	N.A.
		Pilbara	6.0	2018	BHP Billiton, ExxonMobil	USA
	Browse	7.0	2020	Woodside (50), Chevron, BP, BHP Billiton, Shell	Asia Pacific	
	Pluto-2	5.0	N.A.	Woodside	Asia Pacific	
	Indonesia	Tangguh (Train 3)	N.A.	N.A.	BP(37.16), MI Berau BV (16.3), CNOOC(13.9), Nippon Oil Berau(12.23), KG Berau •KG Wiriagar(10), LNG Japan(7.35) Talisman Energy (3.06)	N.A.
		Sengkang	2.0	N.A.	Energy World cooperation	Asia Pacific
		Natuna	5.0	N.A.	ExxonMobil, Pertamina	Asia Pacific
		Donggi Senoro LNG	2.0	2012	Mitsubishi (51), Pertamina(29), Medco(20)	Asia Pacific
		Masela	4.5	2016	INPEX	Asia Pacific
Papua New Guinea	PNG LNG	5.0	2013	ExxonMobil(41.5), Oil Search(34.0), Santos(17.7), Nippon Oil (5.4), MRDC(1.2) Eda Oil(0.2%)	Asia Pacific	
	Liquid Niugini Gas	4.0	2012	InterOil, Merrill Lynch, Pacific LNG, PNG government	Asia Pacific	
	N.A.	1.5	2012	Rift Oil, Flex LNG	Asia Pacific	
	N.A.	1.3	N.A.	LNG Ltd.	Asia Pacific	
Sub Total			93.2			
Total			245.25			

Sources: Prepared by IEEJ based on respective corporate websites, etc

(2) LNG tankers

The number of LNG tankers in the world stood at 284 with their capacity totaling 39 billion cubic meters at the end of 2008⁵. On the back of the past LNG demand growth, a fast-increasing number of LNG tankers have been being built. LNG transportation capacity has grown faster than LNG demand (see Chart 12). As a result, there have been LNG tankers that are used for spot or short-term deals or that have not been chartered. The LNG tanker supply/demand balance has eased.

Chart 12 Changes in LNG Tanker Capacity



Sources: LNG Japan, LNG Journal

(3) LNG receiving terminals

At the end of 2008, there were 63 LNG receiving terminals in the world, with LNG send-out capacity totaling 628 billion cubic meters. Japan accounted for 27 of the total number, followed by seven in the United States, six in Spain and four in South Korea (see Chart 13).

⁵ LNG One World website

Chart 13 Existing LNG Receiving Terminals (at end of 2008)

Region	Country	Name	Investor(s)	Storage (1,000kl)	Send Out Capacity (Bcm/y)	Start-up	
Asia	Japan	Sendai	Sendai City gas	8	0	1997	
		Higashi Niigata	Nihonkai LNG	72	12	1984	
		Futtsu	Tokyo Electric	111	26	1985	
		Sodegaura	Tokyo Electric, Tokyo Gas	266	38	1973	
		Higashi Ogishima	Tokyo Electric	54	20	1984	
		Ogishima	Tokyo Gas	60	8	1998	
		Negishi	Tokyo Electric, Tokyo Gas	118	16	1969	
		Sodeshi	Shimizu LNG	18	1	1996	
		Chita Kyodo	Chubu Electric, Toho Gas	30	10	1977	
		Chita	Chita LNG	64	16	1983	
		Chita Midorihama	Toho Gas	20	7	2001	
		Yokkaichi LNG Center	Chubu Electric	32	9	1987	
		Yokkaichi	Toho Gas	16	1	1991	
		Kawagoe	Chubu Electric	48	7	1997	
		Senboku 1	Osaka Gas	18	3	1972	
		Senboku 2	Osaka Gas	159	17	1977	
		Sakai	Sakai LNG	42	9	2006	
		Himeji	Osaka Gas	74	6	1984	
		Himeji LNG	Kansai Electric	52	11	1979	
		Mizushima	Chugoku Electric, Nippon Oil	16	1	2006	
		Hatsukaichi	Hiroshima Gas	17	1	1996	
		Yanai	Chugoku Electric	48	3	1990	
		Oita	Oita LNG	46	6	1990	
		Tobata	Kitakyusyu LNG	48	9	1977	
	Fukuoka	Saibu Gas	7	1	1993		
	Nagasaki	Saibu Gas	4	0	2003		
	Kagoshima	Nihon Gas	9	0	1996		
	Japan Total			1,455	238		
		Korea	Pyeong Taek	KOGAS	128	37	1986
			Inchon	KOGAS	248	40	1996
			Tong Young	KOGAS	140	17	2002
			Gwang Yang	POSCO	30	2	2005
			Korea Total		546	96	
	Taiwan	Yung An	CPC	69	23	1990	
	India	Dahej	Petronet	32	7	2004	
		Hazira	Shell, Total	32	3	2005	
	China	Dapeng	CNOOC, BP etc	48	5	2006	
		Sub Total		2,182	372		
Americas	USA	Everett, MA	Suez LNG	16	11	1971	
		Cove Point, MD	Dominion	38	18	1978	
		Elba Island, GA	Southern LNG (El Paso)	35	12	1978	
		Lake Charles, LA	Trunkline LNG	43	21	1982	
		Gulf Gateway, GOM	Excelerate Energy	N.A.	5	2005	
		Northeast Gateway, MA	Excelerate Energy	N.A.	8	2008	
		Freeport, TX	Cheniere Energy	32	15	2008	
		Sabine, LA	Cheniere Energy	48	27	2008	
	Puerto Rico	Penuelas	EcoElectrica	16	2	2000	
	Dominica	Punta Caucedo	AES Andres	16	2	2003	
	Mexico	Altamira	Shell, Total, Mistui	30	7	2006	
		Costa Azul, Bahia California	Shell, Sempra	32	10	2008	
Brazil	Pecem, Ceala	Petrobras	13	7	2008		
Argentine	Bahia blanca	Excelerate Energy	N.A.	N.A.	2008		
		Sub Total		318	146		

Chart 13 Existing LNG Receiving Terminals (at end of 2008) (continued)

Region	Country	Name	Investor(s)	Storage (1,000kl)	Send Out Capacity (Bcm/y)	Start-up
Europe	Belgium	Zeebrugge	Fluxys	24	5	1987
	France	Fos-sur-Mer	Gaz de France	15	7	1972
		Montoir-de-Bretagne	Gaz de France	36	10	1980
	Italy	Panigaglia	GNL Italia (Snam Rete Gas)	10	3	1969
	Spain	Barcelona	Enagas	54	14	1969
		Huelva	Enagas	46	12	1988
		Cartagena	Enagas	29	11	1989
		Bilbao	BP, Respol, Iberdola, EVE	30	7	2003
		Sagunto	Infraestructuras de Gas, Iberdrola, Endesa	30	7	2006
		Reganosa	Enagas, Union Fenosa Gas, Sonatrach, Tojeiro Group, etc	30	4	2007
	Portugal	Sines	Ren Atlantico	24	5	2004
	UK	Isle of Grain	National Grid	20	5	2005
		Teesside GasPort	Excelebrate Energy	N.A.	6	2007
	Greece	Revythoussa	DEPA	13	1	2000
	Turkey	Marmara Ereglisi	Botas	26	6	1994
Aliaga/Izmir		Eregaz	28	6	2006	
		Sub Total		414	109	
		Sub Total		2,915	628	

Sources: Prepared by IEEJ based on respective corporate websites, etc

There are many projects under consideration for construction of new LNG terminals in addition to the existing terminals (see Chart 14). In North America and China where LNG demand has been expected to grow fast, particularly, many LNG terminal construction projects are under planning. But their feasibilities differ widely depending on such factors as gas demand in areas close to planned terminals, the economic efficiency of projects, environmental and social constraints, and national infrastructure development programs.

Chart 14 LNG Receiving Terminals under Planning

Region	Country	Name	Investor (s)	Storage (1,000kl)	Send Out Capacity (Bcm/y)
North America	USA	Hackberry, LA	Sempra Energy	20.3	2009
		Sabine, TX	ExxonMobil, Qatar Petroleum, ConocoPhillips	15.3	2010
		Sabine, LA	Cheniere Energy	19.9	2009
		Elba Island, GA	El Paso, Southem LNG	6.9	2010
		Pascagoula, MS	Gulf LNG	11.5	2011
		Offshore Boston, MA	Tractebel	3.1	2009
		Corpus Christi, TX	Occidental Energy	7.7	2011
		Corpus Christi, TX	Cheniere Energy	19.9	2010
		Corpus Christi, TX	4Gas	8.4	2009
		Fall River, MA	Hess LNG	6.1	2010
		Port Arthur, TX	Sempra Energy	12.3	2010
		Logan Township, NJ	BP	9.2	2013
		Cameron, LA	Cheniere Energy	25.3	2011
		Freeport, TX	Freeport LNG Deveopment	19.2	N.A.
		Pascagoula, MS	Chevron	10.0	N.A.
		Port Lavaca, TX	Gulf Coast LNG Partners	7.7	2010
		Long Island Sound, NY	TransCanada, Shell	7.7	2010
		Bradwood, OR	Northern Star Natural Gas	7.7	N.A.
		Baltimore, MD	AES Corporation	11.5	2012
		Port Pelican, LA (Offshore), LA	Chevron	12.3	N.A.
		Robbinston, ME	McMoRan	7.7	N.A.
		Calais, ME	Kestrel Energy	3.8	2013
		(Offshore), NY	BP	11.5	N.A.
		(Offshore), GOM	ASIC	15.3	2014
		(Offshore), FL	TORP	10.7	2009
		(Offshore), FL	Suez	14.6	2009
		(Offshore), FL	Port Dolphin Energy	9.2	2011
	Coos Bay, OR	Jordan Cove Energy Project	7.7	2010	
	Astoria, OR	Oregon LNG	7.7	2013	
	(Offshore), CA	Clearwater Port	10.7	N.A.	
	Canada	St. John, NB	Canaport LNG	7.0	2009
		Quebec City, QC	Enbridge, Gaz Met, Gaz de France, Gazprom	3.7	2010
		Riviere-du-Loup, QC	TransCanada, PetroCanada	3.8	2010
	Goldboro, NS	Keltin Petrochemichals, Petroplus	7.7	2010	
	Prince Rupert, BC	WestPac LNG	3.8	2011	
	Point Tupper, NS	Venture Energy	7.7	N.A.	
	Energie Grande-Anse	N.A.	7.7	N.A.	
	Mexico	Puerto Libertad, Sonora	DKRW Energy	10.0	2011
		Manzanillo	CFE, PEMEX	3.8	2011
		Dorado LNG	Tidelands	7.7	N.A.
		Costa Azul (expansion)	Shell, Sempra	12.3	N.A.
		Topolobampo	Undecided	3.8	N.A.
Latin America	Bahama	Bahamas	AES Ocean Express	6.4	N.A.
		Bahamas	Calypson Tractebel	6.4	N.A.
	Brazil	Guanabara Bay	Petrobras	3.7	2009
		Rio Grande	Gas Energy	1.6	N.A.
	Chile	Quintero Bay	BG (40), ENAP (20), Endesa (20), Metrogas (20)	2.5	2009
		GNL Mejillones	Suez, Codecco	2.5	2009
Uruguay	Montevideo	N.A.	2.6	2013	

Chart 14 LNG Receiving Terminals under Planning (continued)

Region	Country	Name	Investor (s)	Storage (1,000kl)	Send Out Capacity (Bcm/y)
Europe	France	Fos-Cavaou	GdF-Suez; Total	6.0	2009
		Le Havre	Power; Eon-Ruhrgaz;	6.6	2012
		Bordeaux	4Gas	6.6	2013
		Dunkirk	EdF	6.6	2013
		Fos-Faster	Shell	5.8	2015
	Italy	Rovigo (Adriatic LNG)	ExxonMobil, Qatar Petroleum, Edison, Italiana Gas	5.8	2009
		Pangaglia (Expansion)	GNL Italia (Snam Rete Gas)	3.3	2013
		Brindisi	BG	5.8	2010
		Livorno	Endesa, Amga, CrossGas	2.9	N.A.
		Syracuse	Shell, ERG	5.8	N.A.
		Rosignano	Edison, Solvay, BP	5.8	N.A.
		Gioia Tauro	CrossGas	8.8	N.A.
		Trieste	Gas Natural	5.8	N.A.
		Taranto	Gas Natural	5.8	N.A.
		Porto Empedocle	Nouve Energie	5.8	2011
		Rada di Augusta	ERG, Shell	5.8	N.A.
		Sicily	Enel	5.8	N.A.
		Ravenna	Enel	5.8	N.A.
	Spain	Gran Canaria	Endesa	1.0	2009
		El Musel	Enagas	6.6	2010
	UK	Dragon	4Gas, BG, Petronas	8.8	2009
		South Hook	ExxonMobil, Qatar Petroleum	14.0	2009
		Canvey	Caor Gas, LNG Japan, Osaka Gas	4.0	2012
		Teesside	ConocoPhillips	N.A.	N.A.
		Gateway	Stag Energy	N.A.	N.A.
	Ireland	Shannon LNG	Hess LNG	N.A.	N.A.
	Netherlands	Rotterdam (Gate)	Gasunie, Vopak, EON	6.6	2011
Eemshaven		ConocoPhillips	7.3	2010	
Germany	Wilhelmshaven	E.ON Ruhrgas	N.A.	N.A.	
Cyprus	Vasilikos	State Electricity Authority	N.A.	2009	
Poland	Swinoujscie	PGNiG	N.A.	2013	
Croatia	Krk	E.ON, Total, OMV, RWE, Geoplin	7.3	2012	
Latvia	Baltic Coast	Itera Latvija	0.4	N.A.	
Middle East	Kuwait	Persian Gulf	KPC	1.4	2009
	UAE	Dubai	Dubai Supply Authority	3.0	2010
	Israel	Construction planned in waters off the Mediterranean coast	Israeli Ministry of National Infrastructure	2.9	2014
Africa	South Africa	Mossel Bay	Petro SA	0.5	2010

Chart 14 LNG Receiving Terminals under Planning (continued)

Region	Country	Name	Investor (s)	Storage (1,000kl)	Send Out Capacity (Bcm/y)
Asia	China	Fujian	CNOOC	2.6	2009
		Shanghai	Shanghai LNG (CNOOC; Shenergy)	3.0	2009
		Rudong, Jiangsu	PetroChina	3.5	2011
		Dalian, Liaoning	PetroChina	3.0	2012
		Qingdao, Shandong	Sinopec	3.0	2012
		Tangshan, Hebei	PetroChina, Beijing Enterprise Group, Hebei Construction	3.5	2013
		Zhuhai, Guangdong	CNOOC	2.0	2013
		Ningbo, Zhejiang	CNOOC, Zhejiang Energy Group, Ningbo Electric	3.0	N.A.
		Tianging	Sinopec	N.A.	N.A.
		Haikou, Hainan	CNOOC, Hainan Government	2.0	N.A.
		Shenzhen, Guangdong	CNOOC	2.0	N.A.
		Shantou, Guangdong	CNOOC	N.A.	N.A.
		Guangxi Zhuang Autonomous Region	Sinopec	N.A.	N.A.
	Macao	Sinopec	N.A.	N.A.	
	India	Dabhol	Petronet, NTPC, Gail	5.0	2009
		Kochin	Petronet	2.5	2011
		Ennore	IOC, Petronas	5.0	N.A.
		Mangalore	HPCL, Petronet, MRPL	2.5	N.A.
		Haldia	Spice Energy	N.A.	N.A.
	Japan	Naoetsu	INPEX	N.A.	2014
		Omaezaki	Chubu Gas, Tokai Gas,	N.A.	N.A.
		Sakaide	Shikoku Electric	0.4	2010
		Nakagusuku	Okinawa Electric	0.7	2010
		Joetsu	Chubu Electric, Tohoku	N.A.	2012
		Wakayama	Kansai Electric	N.A.	N.A.
		Ishikari	Hokkaido Gas, 8 gas firms in Hokkaido	N.A.	2012
		Kitakyushu Hibikinada	Saibu Gas	N.A.	2015
		New Sendai Thermal Power Station	Tohoku Electric	N.A.	2016
	Hitachi	Tokyo Electric	N.A.	2017	
	Korea	Samcheok	KOGAS	N.A.	2019
	Taiwan	Taichung	CPC	3.0	2009
	Philippines	Bataan	GN Power	N.A.	N.A.
	Singapore	Singapore	Gas Supply Pte, PowerGas, GdF	3.0	2012
Thailand	Map Ta Phut	PTT, EGAT, EGCO	5.0	2011	
New Zealand	N.A.	Contact Energy, Genesis	0.9-1.08	2011	

Sources: Prepared by IEEJ based on respective corporate websites, etc.

4. LNG supply/demand balance

(1) LNG demand outlook

This section indicates the results of a quantitative analysis of global LNG demand projected through 2030 based on assumptions including economic growth, population and energy prices. The assumptions for the quantitative analysis in this fiscal year's survey build on the "Asia/World Energy Outlook 2007" prepared by the IEEJ in 2007 and reflect recent economic growth drops and domestic gas production conditions in relevant countries (see Chart 15 for economic growth assumptions).

Chart 15 Real Economic Growth Assumptions

Economic growth (average annualized rate)			
	'07-'10	'10-'20	'20-'30
Japan	0.0%	1.4%	1.1%
South Korea	3.7%	3.4%	2.9%
Taiwan	4.3%	3.6%	2.6%
India	6.8%	5.9%	5.3%
China	8.7%	6.0%	4.5%
Other Asian countries	5.0%	4.3%	4.2%
France	1.0%	2.3%	2.3%
Italy	0.5%	1.8%	1.8%
Spain	1.0%	2.3%	2.2%
Britain	0.9%	2.3%	2.3%
Other European countries	4.3%	4.6%	2.9%
U.S.	0.7%	2.8%	2.7%
Canada	0.8%	2.7%	2.7%
Mexico	2.1%	3.5%	3.0%
Others in Americas	1.7%	3.1%	3.0%

Source: IEEJ

Chart 16 World LNG Demand Outlook

In millions of tons per year	Actual imports in 2008 (reference)	2010	2020	2030	
Asia-Pacific	Japan	69	66	67	70
	South Korea	27	30	39	41
	Taiwan	9	9	12	14
	India	8	8	20	26
	China	3	5	21	28
	Others	0	0	13	18
	Subtotal	117	117	173	197
Europe	France	10	11	15	19
	Italy	2	6	14	16
	Spain	22	18	23	28
	Britain	1	6	18	37
	Others	9	13	18	26
	Subtotal	43	55	88	126
Americas	U.S.	8	19	52	66
	Canada	-	0	4	7
	Mexico	3	3	8	16
	Others	1	2	5	12
	Subtotal	11	25	69	102
Total	172	197	330	425	

Source: IEEJ

The analysis results are shown in Chart 16. LNG demand growth is expected to decelerate over a short term as global demand for gas mainly for industrial users slows on the financial crisis that grew more serious in the autumn of 2008. Global LNG demand in 2010 is projected to increase from 171.8 million tons in 2008 to 197 million tons, far less than the 209.5 million to 241.5 million tons as estimated in the IEEJ survey in the previous fiscal year. In fact, some countries were expected as of February 2008 to post lower economic growth than assumed for this outlook. LNG demand in 2010 could thus be even lower than projected here.

(2) LNG supply potential

The world's LNG production capacity at the end of 2008 totaled 202.6 million tons including 125.4 million tons in the Asia-Pacific region, North America and the Middle East. Production capacity for the Asian market at the end of 2008 can be estimated at 102 million tons by excluding capacity for Europe and the United States and assuming Indonesia's capacity at the same level as its exports in 2008. In fact, production in Indonesia has been declining.

Including LNG production capacity of facilities under construction and projects with SPAs or HOAs signed with buyers that can be expected to launch production in the future, capacity for Asia in 2015 can be projected at 132 million tons. Furthermore, projects under consideration without SPAs or HOAs are expected to launch production in or after 2012. If these projects, though

with different feasibilities, are assumed to be implemented as planned, LNG production capacity for Asia in 2015 may be projected at the maximum 181 million tons (see Chart 17)⁶.

In addition, some Equity and Branded LNG for European and U.S. markets could flow into the Asian market as European and U.S. LNG demand growth is likely to become slower than earlier planned due to the global financial crisis. As far as Equity and Branded LNG is classified as destined for European and U.S. markets, it may not be appropriate to add any of such LNG to capacity for the Asian market. But some Equity and Branded LNG is certain to play a key role in increasing supply to the Asian market.

Chart 17 LNG Supply Potential for Asian Market

In millions of tons per year	2008	2009	2010	2011	2012	2013	2014	2015	2020	2030
Existing and SPA/HOA-signed plants	102	116	120	121	117	119	119	132	141	141
Plants under planning	0	0	0	0	3	15	25	49	108	108
Supply potential for Asia	102	116	120	121	120	134	144	181	249	249

Note: Existing facilities other than those in Indonesia and Alaska are assumed to maintain the present capacity. Projects that are under consideration with no target years given for launching production are assumed to start production by 2020.

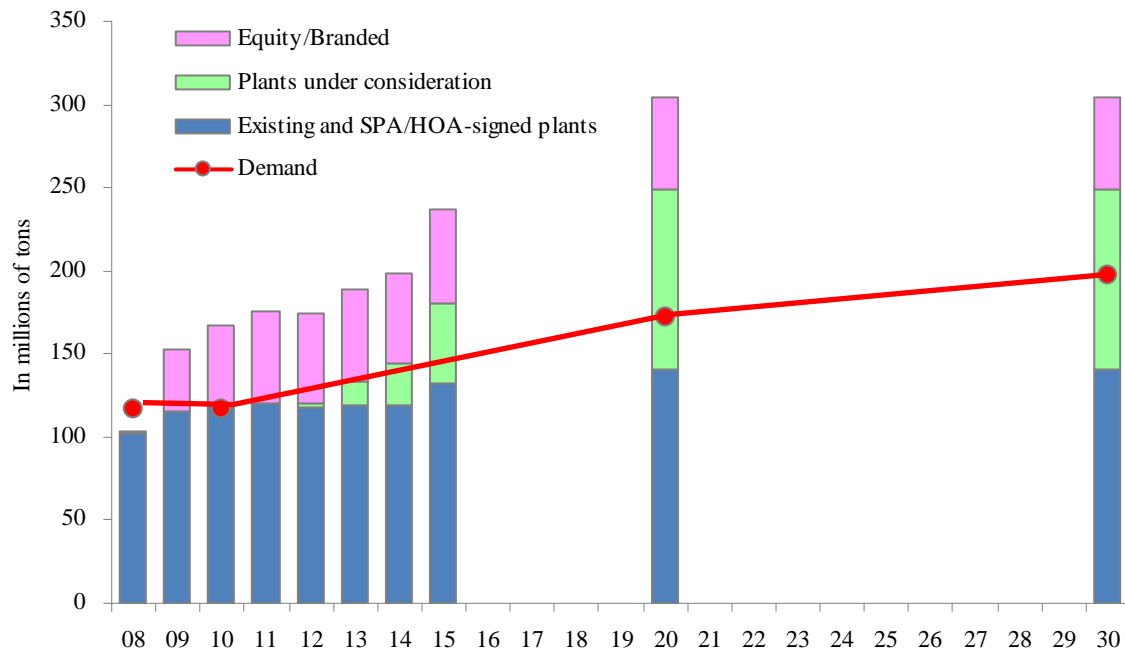
Sources: Prepared by IEEJ based on respective corporate websites, etc.

(3) LNG supply/demand balance

Based on the above LNG supply/demand outlook, the Asian LNG supply/demand balance through 2030 is projected as follows (see Chart 18). The polygonal line in the chart indicates projected Asian LNG demand, and the bars show Asian LNG supply potential from Chart 17. Asian LNG demand in 2010 is projected to level off from 2008. Therefore, LNG demand in the coming year may slip somewhat below the supply potential for existing contracts, SPAs and HOAs. Asian demand through 2030 may be fully met if some Equity and Branded LNG flows into the Asian market as noted above and if new projects under consideration without SPAs or HOAs launch production smoothly.

⁶ As a matter of course, this maximum estimate may exceed the real capacity level because not all projects under consideration are likely to be implemented on schedule.

Chart 18 Asian LNG Supply/Demand Balance Outlook

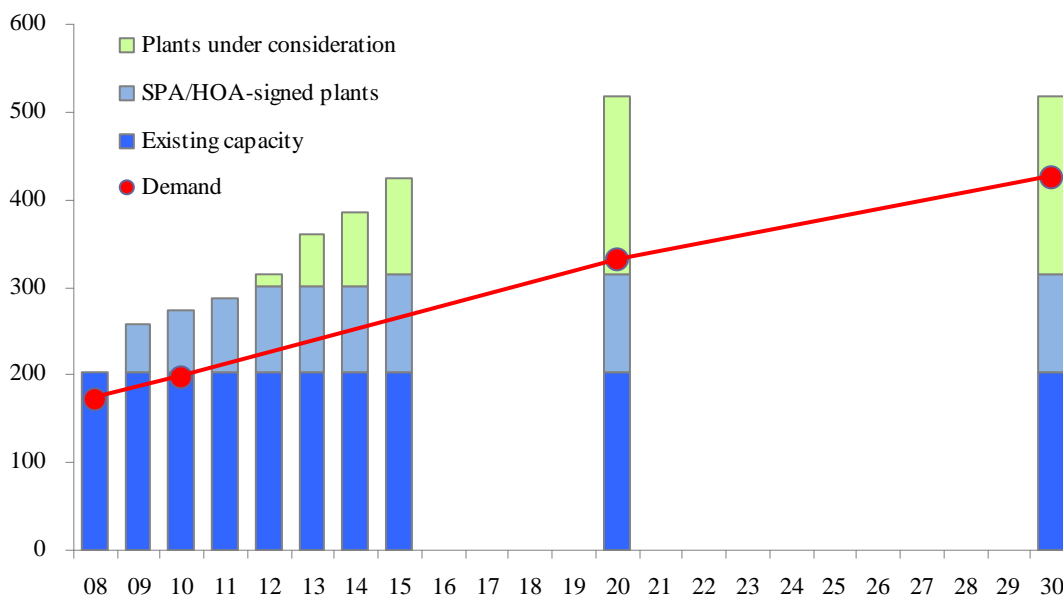


Note: The supply/demand gap in 2008 might have been covered by UQT (upward quantity tolerance) under existing contracts and spot purchases.

Source: IEEJ

The chart below indicates the world’s LNG supply/demand balance outlook. Existing LNG production capacity can be expected to cover demand until 2010. If projects now under consideration are implemented smoothly, global LNG production capacity in and after 2020 may easily cover global demand.

Chart 19 Global LNG Supply/Demand Balance Outlook



Note: Projects that are under consideration with no target years given for launching production are assumed to start production by 2020.
Source: IEEJ

(4) Key points in future supply/demand outlook

As the LNG situation is changing greatly, the following can be cited as key points for the future natural gas supply/demand outlook:

- A. U.S. LNG demand
- B. Chinese LNG demand
- C. Supply from new projects
- D. Gas-producing nations’ enhanced cooperation
- E. Medium to long-term impacts of the financial market credit crunch
- F. Middle East gas shortages
- G. Impacts of efforts toward a low-carbon society

A. U.S. LNG demand

The first key point is U.S. LNG demand. The financial crisis that began to grow more serious in the autumn of 2008 has affected the real U.S. economy through financial institutions’ credit crunch, casting a shadow over U.S. natural gas demand. According to the U.S. Energy Information Administration, the natural gas demand estimate for 2010 was lowered by 3% from

23.25 trillion cubic feet (651 billion cubic meters) per year in early 2008⁷ to 22.46 tcf (629 Bcm) in December 2008⁸. Meanwhile, the United States has proceeded with unconventional gas development and production, expanding domestic gas output. Therefore, LNG imports have become difficult to expand as earlier expected. Particularly, unconventional gas output is expected to increase smoothly on technology innovation and production cost cuts. The EIA in the previous year projected unconventional gas output to expand from 248 Bcm in 2007 to 253 Bcm in 2010 and 262 Bcm in 2020⁹. Slackening U.S. LNG demand is expected to greatly affect the fate of LNG projects in plant construction and planning stages for the U.S. market.

B. Chinese LNG demand

Chinese market trends are equally important on the demand side. Earlier, China had been expected to take more time before purchasing LNG on a full-fledged basis as gas prices had been controlled by the government at lower levels than international LNG prices. From 2007 to 2008, however, China National Petroleum Co. (CNPC), or Petrochina, as well as the China National Offshore Oil Corporation (CNOOC) that earlier joined the international LNG market, began to aggressively buy LNG at international prices. Chinese national oil corporations have thus emerged as rivals for traditional LNG buyers and as new potential customers for LNG sellers. They are emerging as players important for anticipating the future Asia-Pacific natural gas market. In the southern China market that includes the Pearl River Delta and that has been seen as a leading Chinese LNG market, however, the recent global financial crisis has begun to affect export-oriented industries that have driven the region's economic growth. Furthermore, China has been developing domestic natural gas resources at a fast pace. Therefore, some people forecast that Chinese LNG imports would not expand as much as expected earlier. Future relevant developments in China should be watched closely.

C. Supply from new projects

On the supply side, we must pay attention to how LNG would be supplied from new LNG plants going on stream in 2009 and 2010. Launching production in 2009 are Qatargas 2 (fourth train), Rasgas 3, Yemeni LNG, Indonesian Tangguh and Russian Sakhalin 2 projects that are expected to bring about 55.2 million tons in additional LNG supply. Of the new supply, Equity and Branded LNG accounts for 28.8 million tons. Whether the additional Equity and Branded LNG supply would go to European and U.S. markets as originally planned or be diverted partially to the Asia-Pacific market would be significant for anticipating the Asia-Pacific LNG supply/demand

⁷ Annual Energy Outlook 2008, EIA

⁸ Annual Energy Outlook 2009 Early Release, EIA

⁹ Annual Energy Outlook 2009 Early Release, EIA

balance over the coming few years. As for the Qatargas 2 project, particularly, LNG has already been sold out to international oil majors participating in the project. Although LNG from this project is destined for European and U.S. markets, some people are uncertain about whether these markets could absorb all supply from the project. Given the large scale and flexibility of the U.S. market, other people expect most of the supply from the Qatari project to flow into the U.S. market if Qatari LNG can be sold at Henry Hub netback prices.

The fate of supply from these new projects may depend on various factors such as actual production launchings under these projects that have been vulnerable to delays, changing natural gas prices in European and U.S. markets, and relevant producers' medium to long-term sales strategies and is difficult to anticipate. Undoubtedly, however, this is one of key points for forecasting the LNG supply/demand balance over a short term.

D. Gas-producing nations' enhanced cooperation

The next key point linked to the previous one is the fast progress in the enhancement of cooperation between gas-producing countries in 2008 (see Chart 26). In September, the world's three largest holders of gas reserves – Russia, Iran and Qatar – at their meeting in Tehran formed the so-called “Gas Troika” framework to have regular meetings for exchanges of views on the global natural gas market. In December 2008, the Gas Exporting Countries Forum held a ministerial meeting in Moscow and decided to upgrade itself to an international organization with a permanent secretariat in Doha, Qatar. The development has prompted gas consuming countries to grow concerned that a gas-version OPEC could be organized. Although whether the new international organization could become as influential as OPEC is still uncertain, gas-producing countries are certain to step up their exchange of information. Their future moves must be watched closely.

Behind the series of moves to enhance cooperation between gas-producing countries have been Qatar's moves. Qatar is interested in close exchanges of information between gas-producing countries on the easing LNG supply/demand balance for the immediate future as discussed earlier and in developing arrangements to collect information on both Pacific and Atlantic gas markets in a bid to effectively implement its strategy as “swing player” over a medium to long term. Qatar has apparently played a key role in developing the Gas Troika and the new organization. Such natural gas strategy of Qatar is one of the key points that should be watched closely.

Chart 20 Developments Regarding Cooperation between Gas-producing Countries

Month/year	Major developments
March 2001	The Gas Exporting Countries Forum holds its first ministerial meeting in Tehran, agreeing to share information and implement talks between gas-producing countries to their mutual advantage.

February 2002	The GECF holds its second ministerial meeting in Alger to discuss such topics as the development of databases on gas development projects, and contractual terms and conditions.
February 2003	The GECF holds its third ministerial meeting in Doha, agreeing to ask the World Trade Organization to consider gas as an environment-friendly good and discussing such topics as the development of natural gas supply/demand models.
July 2004	The GECF holds its fourth ministerial meeting in Cairo, discussing how to link gas prices to crude oil prices.
April 2005	The GECF holds its fifth ministerial meeting in Port of Spain, Trinidad and Tobago, discussing the development of gas supply and demand models. Oman, Libya and Indonesia are absent from the meeting in which participants are limited.
March 2006	The GECF cancels its sixth ministerial meeting in Venezuela and sets the meeting for April 2007 in Doha.
January 2007	Iranian Supreme Leader Ayatollah Ali Khamenei sounds out Igor Ivanov, secretary of the Security Council of the Russian Federation, about forming a cartel of gas exporting countries during Ivanov's Iran visit. Then Russian President Vladimir Putin describes the proposal as an interesting idea, while indicating a negative view about any cartel formation.
April 2007	The GECF holds its sixth ministerial meeting in Doha. No major developments are seen, although the meeting had been expected to focus on a gas-version OPEC.
October 2008	The "Gas Troika" countries of Russia, Iran and Qatar hold a ministerial meeting in Tehran. After the meeting, Iranian Oil Minister Gholam-Hossein Nozari indicates discussions on a gas-version OPEC.
December 2008	The GECF holds its seventh ministerial meeting in Moscow, agreeing to upgrade the forum to a full-fledged international organization with a permanent secretariat (in Doha).

Sources: Prepared by IEEJ based on press reports

E. Medium to long-term impacts of the financial market credit crunch

Impacts of the financial market credit crunch on the LNG market are important. As noted frequently earlier, the latest financial crisis has worked to ease the LNG supply/demand balance over a short term and may help tighten the balance by affecting progress in new LNG projects. Large LNG projects undertaken by international oil majors may remain almost unaffected on the strength of majors' creditworthiness and financial power. But smaller LNG projects and unconventional LNG programs, taken up in Chapter 3 of this research paper, may be vulnerable to the impacts of the credit crunch. LNG projects tend to take much time before launching production. If the financial crisis prompts investors to put off their final investment decisions on or cancel LNG development projects, it may affect the LNG supply/demand balance in five or 10 years. We must closely follow up on new LNG projects in anticipating LNG supply and demand in and after 2015.

F. Middle East gas shortages

The problem of natural gas shortages in Persian Gulf countries other than Qatar is growing more serious and attracting our attention, though falling short of exerting any major impact on the present LNG supply/demand balance. Kuwait, where summer electricity shortages have become a major problem on short fuel gas supply, plans to start LNG import in 2009. In the UAE including

Dubai, gas shortages are emerging as a serious problem. The UAE began in 2007 to import gas from Qatar via pipeline. Dubai is considering importing LNG. Natural gas shortages have grown more serious in Middle East countries over the past two to three years. Adding fuel to the problem has been a decline in output of associated gas that has come on OPEC members' concerted crude oil production cuts since the second half of 2008.

Factors behind the gas shortages include cheap domestic subsidized gas prices and a fast increase in demand for electricity and petrochemical materials. In the face of such problem, Middle East countries have given priority to projects for expanding domestic gas supply capacity and introducing nuclear and coal thermal power generation, rather than to suppressing gas demand as the fundamental cause of the gas shortages. Depending on lack of progress in these projects, the gas supply/demand balance in the Middle East could tighten further.

This problem may have no direct impact on long-term LNG-purchasing contracts for the Asia-Pacific region. But Middle East countries are now expected to design their new gas development projects for domestic supply rather than exports. In this sense, the gas shortages in the Middle East can be expected to have some spillover impacts on the Asia-Pacific LNG supply/demand balance in the future.

G. Impacts of efforts toward a low-carbon society

Efforts toward a low-carbon society mainly in Europe may not necessarily affect short-term natural gas supply and demand. But we cannot ignore their future impacts on natural gas supply and demand. Natural gas, though being a fossil fuel, had been considered cleaner than coal or oil and an energy source subject to proactive introduction for the prevention of global warming. But Europe has proactively stepped up the introduction of non-fossil energy sources such as solar and wind power. Particularly, the European Union has adopted a target to raise renewable energy sources' share of final energy consumption to 20% by 2020. Amid such efforts toward a low-carbon society, arguments have emerged to emphasize the fossil fuel aspect of natural gas that had been considered clean energy. Whether Europe could achieve the renewable energy introduction target by 2020 is still uncertain. In fact, however, new arguments have emerged on the position of natural gas in the overall energy mix. In this sense, we may have to closely watch how progress in efforts toward a low-carbon society would affect the global natural gas market.

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