

The 3rd Qatar-Japan Joint Seminar On Technical and Economic Energy Issues

A light gray silhouette of a world map serves as the background for the central text.

LNG

- Influence of Global Recession and Future Prospect -

March 21, 2010
Doha, Qatar

Koji Morita

Director and Senior Research Fellow, IEEJ

Outline of the Presentation

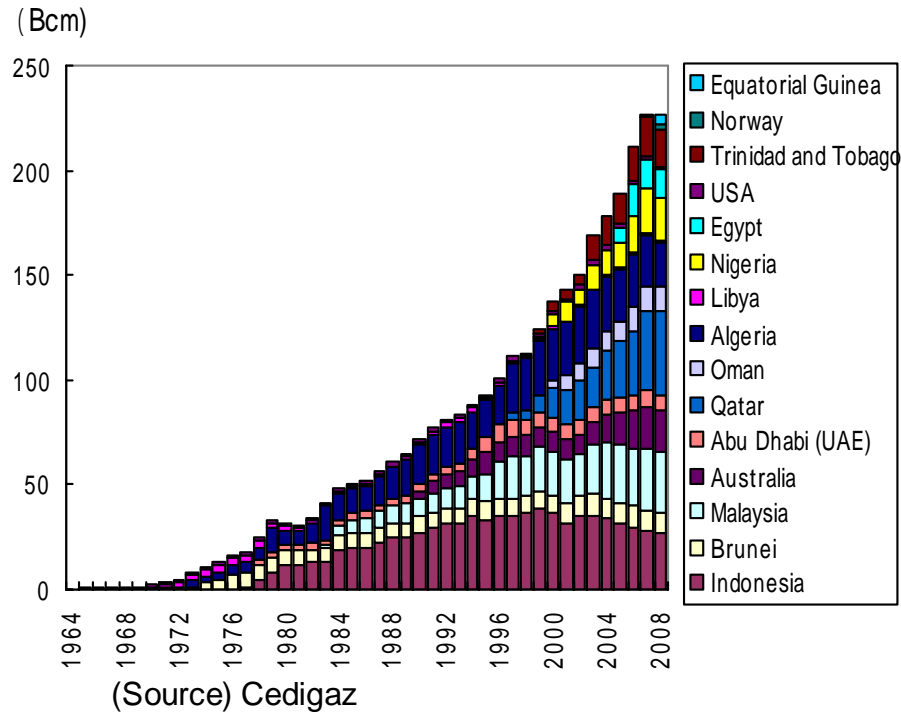
1. Recent Trend of LNG Market in the World
2. Influence of Global Economic Recession
3. Long-Term Supply & Demand

Outline of the Presentation

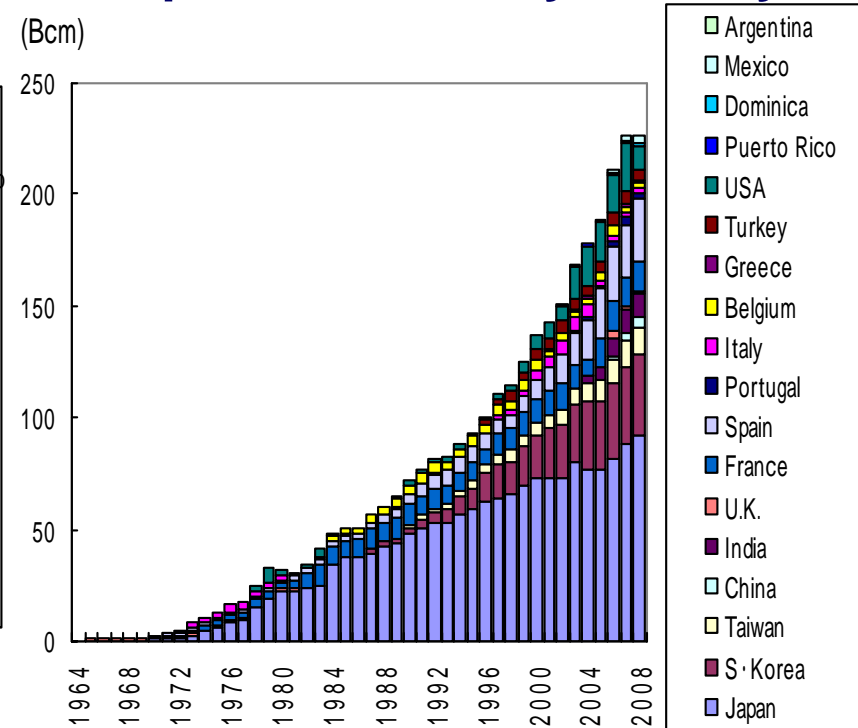
1. **Recent Trend of LNG Market in the World**
2. Influence of Global Economic Recession
3. Long-Term Supply & Demand

Recent trend 1: Increase of players

Export volumes by country

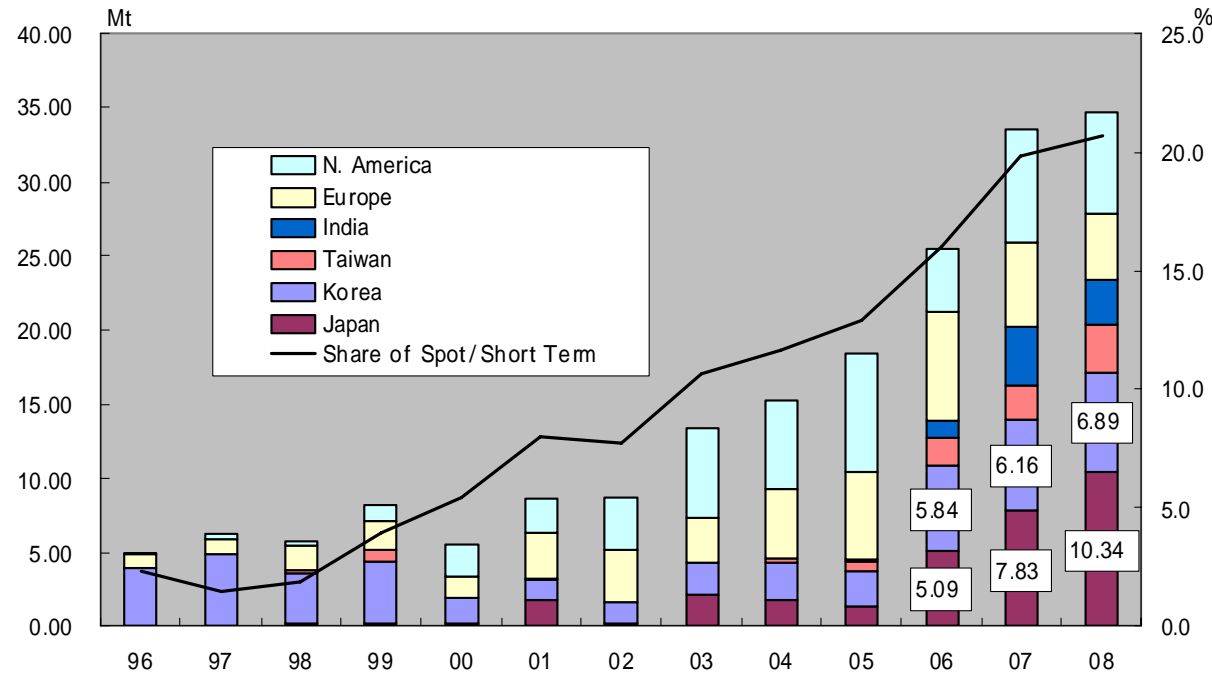


Import volumes by country



- The traded volume of LNG had been on the increase until 2007.
- However, the traded volume decreased in 2008 by 0.42Bcm from the previous year (226.93 Bcm in 2007).
- New player entered into the market. Some of them are from west Africa, which are located far from consuming regions.
- Commercial trade of LNG started in 1964. Since then, the LNG export market has expanded especially in Asia.
- In 2008, 41% of traded volume were bound for Japan (62% for North East Asia).
- New players come into market in 2000s. They are not necessary economically developed countries.

Recent trend 2: Increase of spot transactions



(Source) **The LNG industry, GIIGNL**

- ▶ After 2000, spot-style transactions expanded in the world. The increase came mainly from Africa and other newly built projects.
- ▶ Spot LNG gave great contribution to the S/D balancing in 2006, 07 and the previous half of 2008. But few spot transactions are done in these days.
- ▶ Current spot price is lower under the dull market, comparing to that of long-term contracted trade in Asia-Pacific.

Spot/short term transaction volumes by source

(Unit: Mil tons)	2006	2007	2008
Egypt	6.15	7.2	6.42
Qatar	4.43	5.52	5.87
(for Japan)	1.03	1.73	1.67
Nigeria	2.01	3.68	5.35
Trinidad & Tobago	3.98	5.8	3.53
E. Guinea	-	0.77	2.99
Oman	3.02	3.04	2.59
Algeria	1.88	3.76	2.05
UAE	0.53	0.69	0.58
Australia	0.75	0.75	0.58
Malaysia	2.17	2.33	0.29
Norway	-	-	0.12
Brunei	0.18	0.24	0.06
USA	-	-	-
Indonesia	-	-	-
Libya	-	-	-
Others	0.35	0.07	0.26
Total	25.47	33.84	30.7

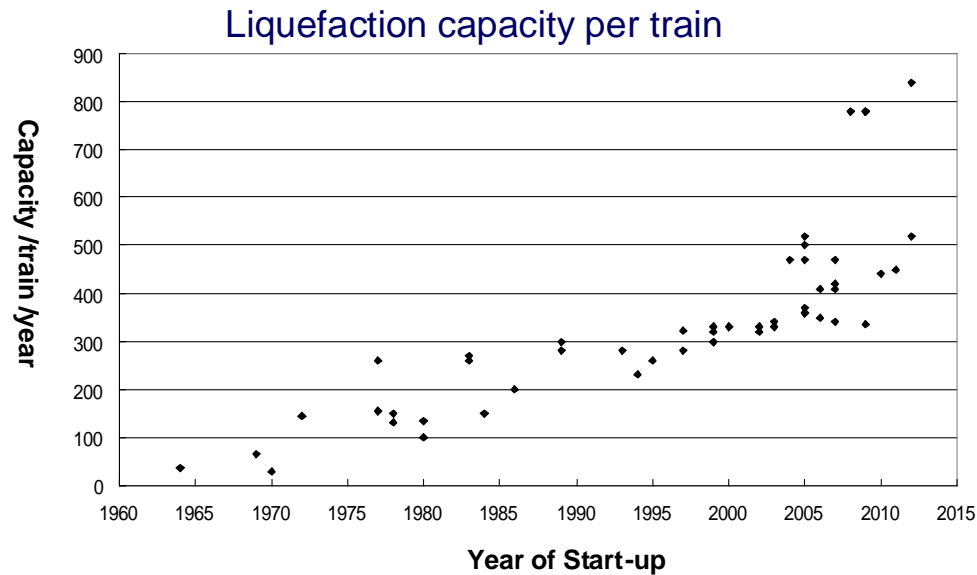
■ Qatar exported 5.87 mil. tons in 2008, which is the second largest to Egypt.

■ Spot transactions contributed much to the balancing of S/D but the price was high.

■ No data is available about 2009, but the volume for Asia should be much lower than the previous years.

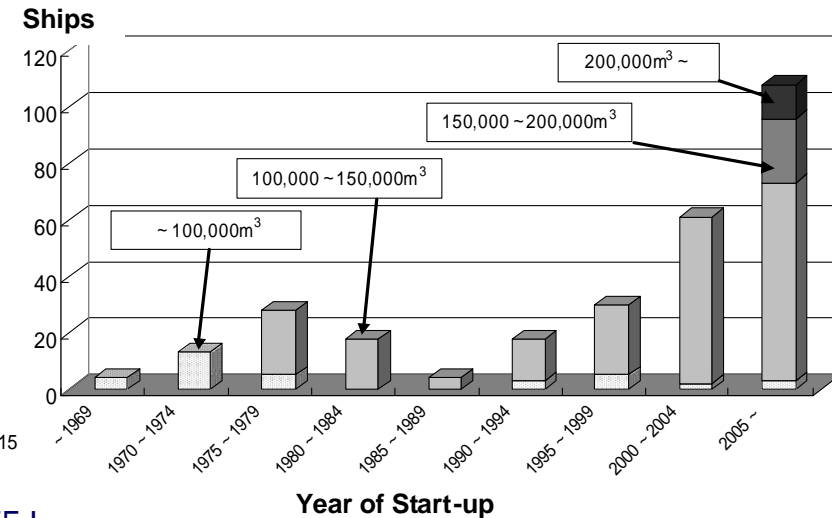
(Source) The LNG industry, GIIGNL

Recent trend 3: Enlargement of liquefaction plant & LNG vessel



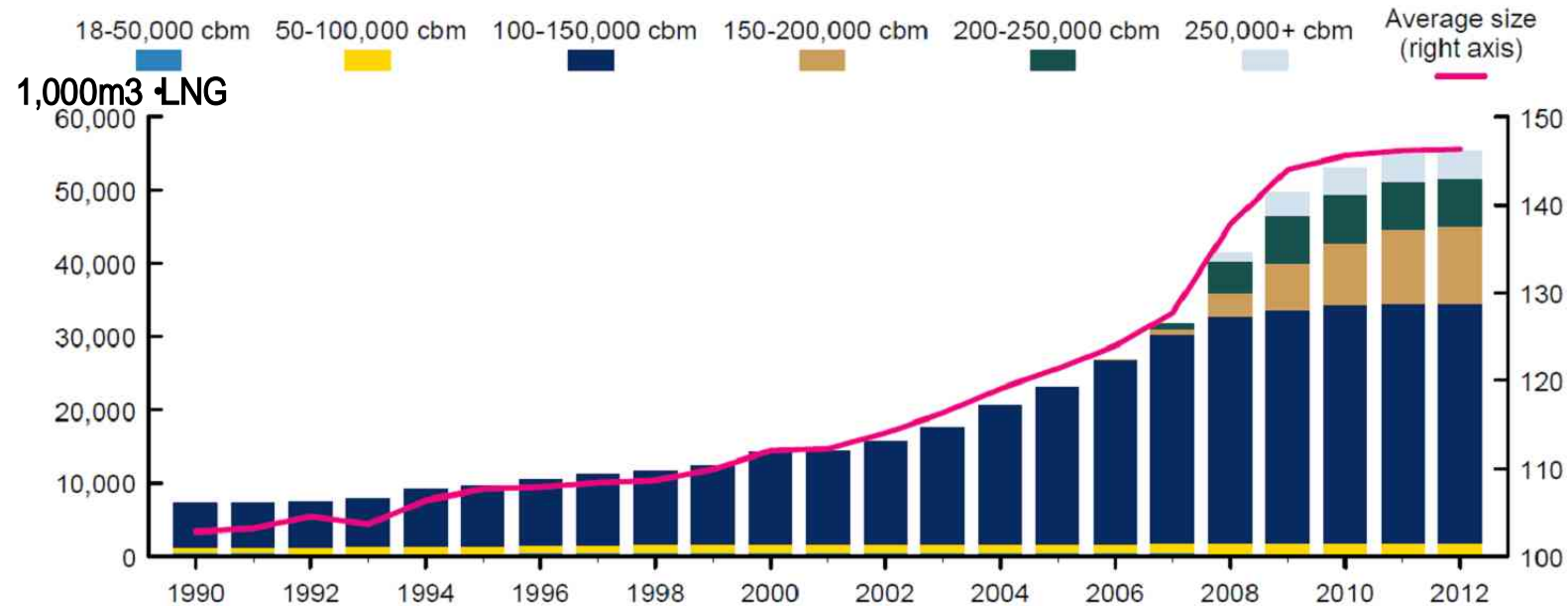
(Source) IEEJ

The Number of LNG vessels operating by scale
As of March 2007



- The capacity of the first liquefaction train in Algeria was only 0.5 mil. tons per year. But the latest one in Qatar is 7.8 mil. tons.
- The first vessel to Japan in 1969 was 700-800,000m³. The current standard size is **145,000m³**.
- Qatar introduced Q-flex and Q-max of **200-270,000m³**.
- Higashi-Niigata Receiving Terminal (Tohoku-Electric), Futsu (Tokyo Electric), Ogijima (Tokyo Gas), Higashi-Ogijima, Sodegaura, Chita can accept Q-flex.

LNG fleet development



(Source) Drewry Shipping Consultants, LNG Shipping Market Review and Forecast 2 009

- **The number and the size of LNG carrier has been increasing.**
- **Q-flex LNG carrier with over 210,000 m³ tank capacity emerged in 2007 and Q-max with over 260000 m³ tank capacity in 2008. As at the end of August 2008, 278 LNG carriers were in operation and 101 were under construction .**
- **Attention on the Safe passage of LNG vessels through bottleneck like Strait of Malacca, Lombok should be put. And environmental restriction on the navigation of LNG vessels would be strengthened.**

Recent trend 5: Loosely Balanced S/D

- Simultaneous come up of Global Economic Recession and Start-up of several New Projects

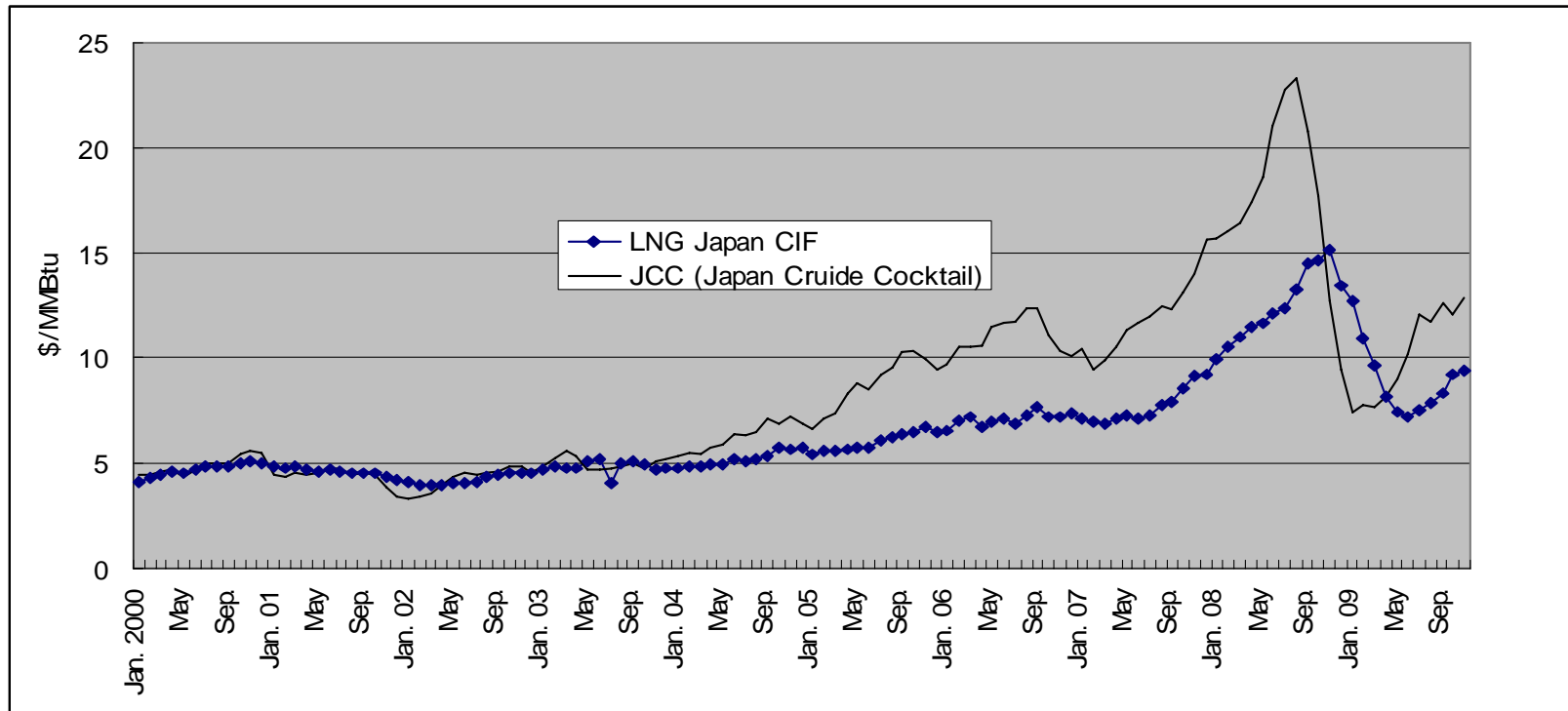
LNG projects, which start operation between 2005 and 2010

Region	Country	Project name (Train#)	Liq. capacity (MMt/y)	Start-up date	Promoter		Buyer (MMt): duration
					Gas Field	Liq. Plant	
Asia-Pacific	Australia	NWS (Train 5)	4.4	4th Qtr. 2008	Woodside, BHP Billiton, BP, Chevron, Shell, MIMI (1/6 each), CNOOC	Woodside, BHP Billiton, BP, Chevron, Shell, MIMI (1/6 each)	Possible common contact with NWS Train 1-4
		Pluto (Train 1)	4.8	End 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(16.96), Nisseki Berau(12.23), KG Berau · KG Wiriagar(10), LNG Japan(7.35)		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	Feb. 2009	Gazprom(50), Shell(27.5), Mitsui(12.5), Mitsubishi(10)		Tokyo Gas(1.1): 2007-2031 Tokyo Electric(1.5): 2007-2029 Hirosima Gas(0.21): 2008-2028 Kyusyu 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): 2011-2025 Osaka Gas(0.2): 2
	Sub Total			26.4			

Region	Country	Project name (Train#)	Liq. capacity (MMt/y)	Start-up date	Promoter		Buyer (MMt): duration
					Gas Field	Liq. Plant	
Middle East	Qatar	RasGas 3 (Train 6)	7.8	End 2008	N.A.	Qatar Petroleum (70), ExxonMobil(30)	ExxonMobil(7.8): 2008-
		RasGas 3 (Train 7)	7.8	End 2009	N.A.	Qatar Petroleum(70), ExxonMobil(30)	ExxonMobil(7.8): 2009-
		Qatargas II (Train 1)	7.8	2008	N.A.	Qatar Petroleum(70), ExxonMobil(30)	ExxonMobil(10.4): 2007-2032 Total(5.2): 2009-2034
		Qatargas II (Train 2)	7.8	2009	N.A.	Qatar Petroleum(65), ExxonMobil(18.3), Total(16.7)	
		Qatargas 3	7.8	2009	N.A.	Qatar Petroleum(68.5), ConocoPhillips(30) , Mitsui(1.5)	ConocoPhillips(7.8): 2009-
	Qatargas 4	7.8	End 2009	N.A.	Qatar Petroleum (70), Shell (30)	Shell(4.8): 2009- PetroChina(3.0): 2009-	
	Yemen	Yemen LNG (Train 1, 2)	6.9	2nd Qtr. 2009	Hunt Oil(38.5), ExxonMobil(37), SK(24.5)	Total(42.9), Yemen Gas(23.1), Hunt Oil(18), SK(10), Hyundai(6)	KOGAS(1.3): 2008-2028 Suez(2.5): 2009-2029 Total(1.5): 2009-2029
	Sub Total		53.7				
M-S America	Peru	Peru LNG	4.4	2nd Qtr. 2010	Hunt Oil(50), SK(20), Repsol YPF(20), Marubeni(10)		Repsol YPF(3.6): 2010-
	Sub Total		4.4				
Africa	Algeria	Skikda	4.5	2011	Sonatrach		Sonatrach
	Nigeria	NLNG (Train 7)	8.4	2012	NNPC(49), Shell(25.6), Total(15), ENI(10.4)		BG(2.25): 2012- Total(1.38): 2012- ENI(1.38): 2012-
	Angola	Angola LNG (Train 1)	5.2	2012	Sonagas(22.8%), Chevron(36.4%),		Chevron(1.9): 2012- Sonangol(1.2): 2012-
	Sub Total		18.1				
Total			102.6				

Recent trend 6: High LNG price under dull S/D Balance

Transition of LNG Price



(Source) **LNG One World**

- Price difference between oil and LNG after 2004 accelerated the demand growth of city gas for industrial users.
- In the latter half of 2009, LNG price went up in association with the hike of crude oil even under the dull market.

Outline of the Presentation

1. Recent Trend of LNG Market in the World
2. Influence of Global Economic Recession
3. Long-Term Supply & Demand

Natural Gas Balances in OECD Regions and Countries

Million cubic metres

	2007	2008	1Q2009	2Q2009	3Q2009	Nov2009	%Change Current Month ¹	%Change Year to Date ²
Total OECD								
Indigenous Production	1123856	1165149	308272	278163	273045	98237	-2.2	-0.4
+Imports	699692	717601	183269	156782	162335	62172	3.2	-4.8
-Exports	330286	342431	98910	74458	75639	30273	-3.3	-0.4
-Stock Changes	-22732	-8603	-74179	51036	48947	-452	x	x
=Gross Consumption ³	1507033	1533675	465195	305230	303200	126484	-4.4	-4.5
Italy								
Indigenous Production	9713	9100	2075	2028	1986	662	-6.2	-11.5
+Imports	73951	76866	18316	15912	15372	6527	0.7	-10.4
-Exports	68	176	69	12	8	11	-8.3	-33.1
-Stock Changes	-1319	1026	-6442	4638	3219	-645	x	x
=Gross Consumption ³	84913	85448	26764	13290	14131	7823	2.5	-10.0
Japan								
Indigenous Production	3708	3736	1038	785	794	297	-7.5	-5.5
+Imports	93547	96970	23710	20530	23000	7253	-1.1	-8.1
-Exports	-	-	-	-	-	-	-	-
-Stock Changes	350	295	-281	-437	361	270	x	x
=Gross Consumption ³	95955	100375	24929	21806	23547	7985	-1.1	-6.7
Korea								
Indigenous Production	226	216	-	107	78	27	-18.2	65.4
+Imports	31940	35954	10873	6214	4519	3334	3.5	-12.0
-Exports	-	-	-	-	-	-	-	-
-Stock Changes	-1093	2001	-230	221	-810	-	x	x
=Gross Consumption ³	33246	34402	11123	6113	5517	3604	13.0	-6.0
=Gross Consumption ³	4375	4747	1075	1182	1223	367	-	-4.5
Spain								
Indigenous Production	19	17	4	3	3	1	-50.0	-25.0
+Imports	34497	38649	8667	8348	8979	3072	-5.7	-10.9
-Exports	177	182	68	312	309	105	5150.0	459.2
-Stock Changes	-347	393	-265	99	321	95	x	x
=Gross Consumption ³	34392	38170	8983	8241	8271	2671	-18.4	-11.8
United States								
Indigenous Production	542005	578447	148894	149530	149496	49237	1.6	3.7
+Imports	130473	112821	28508	24566	27127	7647	-15.7	-7.0
-Exports	23276	28464	9052	6320	6759	2371	-11.6	5.3
-Stock Changes	-5397	-1099	-33523	31025	25208	726	x	x
=Gross Consumption ³	652236	656422	202879	134942	140089	49857	-5.2	-2.4

1. Percentage change over corresponding month of previous year.

2. Percentage change over corresponding period (beginning of year to current month) of previous year.

3. Gross consumption includes statistical differences, which are not shown.

x: Not applicable

(Source) IEA

Decrease of LNG import volume by N.E. Asian countries (09/08)

Comparison of 2009 with 08 in import volumes and price

	Jan. - Jun. 2009				Jan. - Jun. 2008			
	Volume(MT)	09/08(%)	CIF·Price (US\$/MT)	08/07(%)	Volume(MT)	08/07(%)	CIF·Price (US\$/MT)	08/07(%)
Japan	31,599,091	-8.9	487.7	-15.1	34,675,603	6.17	574.54	56.7
China	2,040,170	32.6	197.31	-27.5	1,538,344	51.1	272.13	51.1
Korea	13,898,614	-8.6	606.44	-5.6	15,208,771	14.3	642.63	38.1
Taiwan	3,933,183	-8.8	449.75	-35.7	4,313,656	12.5	699.39	52.3

(Source) **TEX Report**

- Imported volume decreased in three countries but China.
- Price was down.
- Few are reported about spot transactions.

Changes from favorable conditions to depression

Transition of LNG import in the world

(Unit: mil. tons)

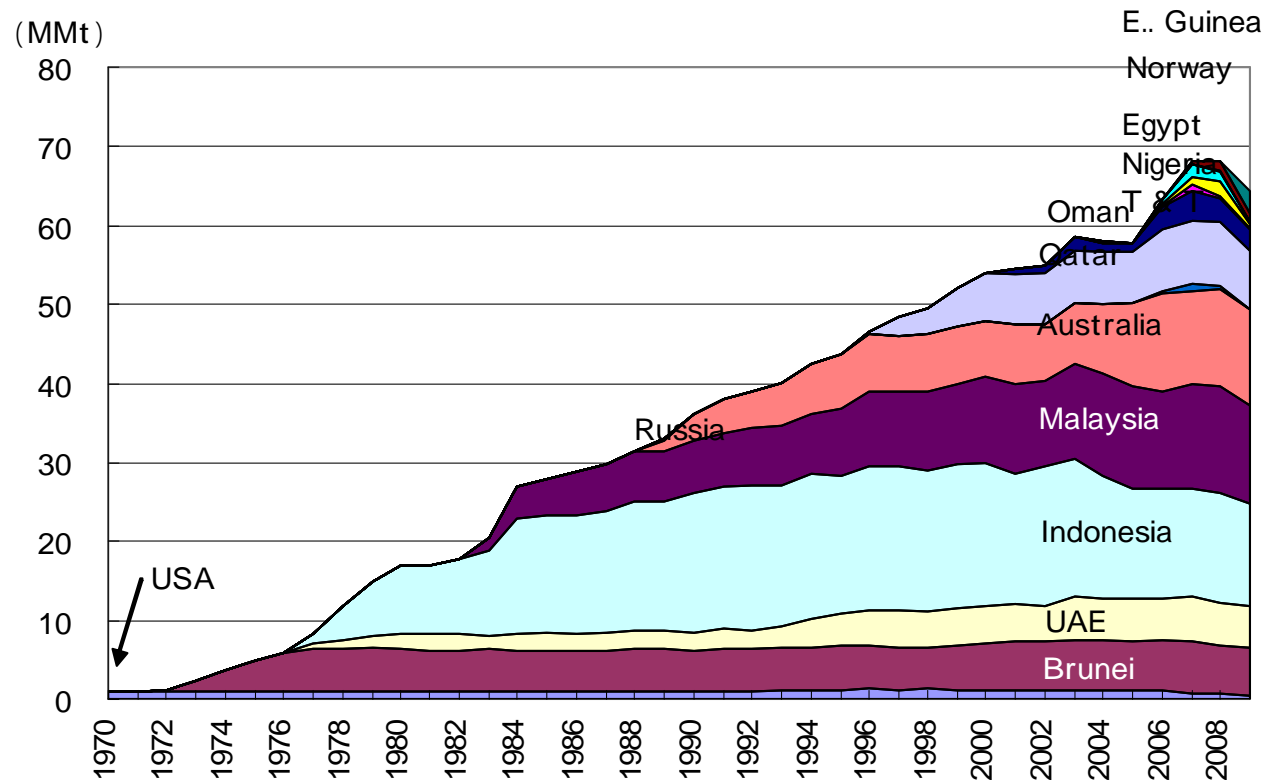
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Japan	53.32	54.99	54.25	58.51	56.84	58.11	62.65	66.90	69.30	64.49
Korea	14.31	16.12	17.84	19.41	22.29	22.49	25.48	26.00	27.30	24.64
Taiwan	4.37	4.75	5.36	5.59	6.89	7.19	7.79	8.20	9.10	n.a.
India					1.97	4.60	6.18	8.40	8.20	n.a.
China							0.75	3.00	3.30	5.53
Total Asia	72.00	75.86	77.45	83.51	87.99	92.39	102.86	112.50	117.20	
N. America	5.08	5.51	5.30	11.31	13.49	13.38	12.92	18.90	11.20	13.64
Europe	24.74	25.28	30.19	30.37	29.74	35.97	43.16	41.20	43.30	n.a.
Total World	101.81	106.65	112.94	125.19	131.22	141.74	158.94	172.60	171.70	

(Source) Ministry of Finance and others

- In 8 years from 2000 to 2008, LNG trade volume had increase by 70 mil. and 45 mil tons % in the world and Asia respectively.
- Japan increased its import by 11 mil. tons in 3 years from 2006-08, but lost 5 mil. In a year of 2009.



Import volumes by Japan by source



(Source) Ministry of Finance

- Import volume Fy2007:68.31, Fy2008: 68.14, Ca2009: 64.49 mil. tons
- In 2009, Russia started export.
- All countries decreased its export volumes except E. Guinea in 2009.

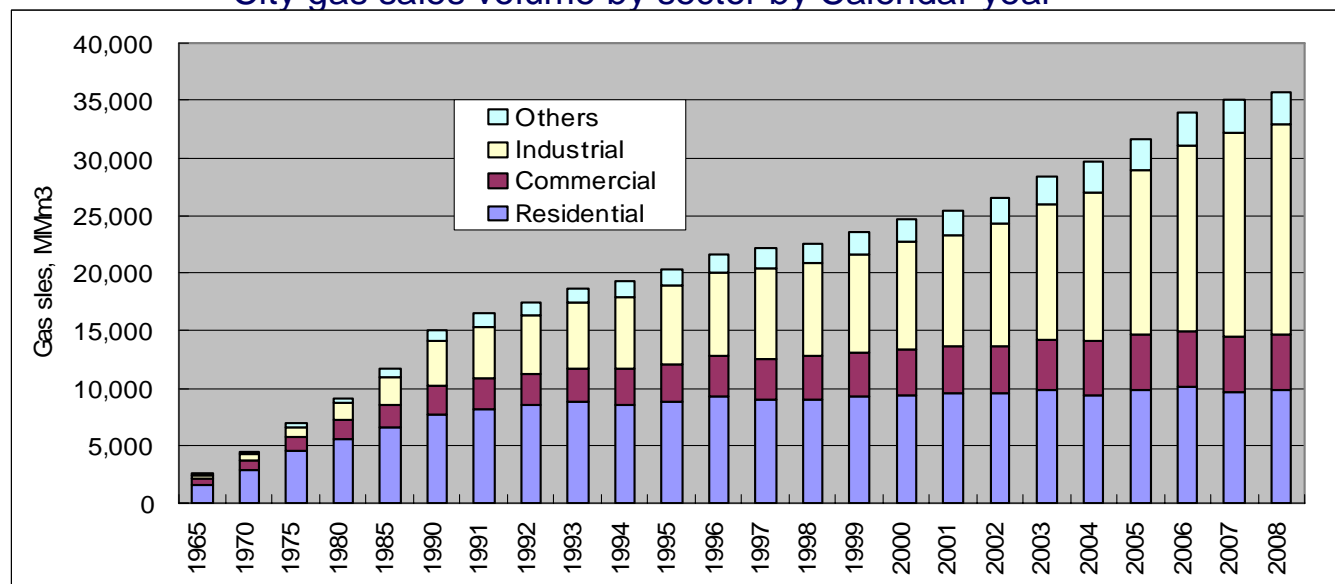
Behind the changes

Import volumes of LNG by sector

Year	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	CA 2009
City Gas Use	15.99	15.08	16.65	17.63	18.88	20.54	21.51	22.50	21.60	n.a.
Power Use	37.84	38.18	37.91	39.06	37.17	34.64	38.18	42.11	41.03	41.24

(Source) METI

City gas sales volume by sector by Calendar year



(Source) Japan Gas Association

■ City gas increased its import for industrial users in 2000s because of price competitiveness to oil.

■ LNG for power use jumped in 2006 and 2007 because of the damage on nuclear power plants by big earthquake. But some of the stopped stations began operation in early 2010.

Transition of increase of electricity and city gas sales volume, comparing to the previous year

Electricity sales volume for large customers (%)

Fy	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Year-to -date
1999	-3.8	-3.6	-0.6	-1.5	2.6	2.8	1.0	3.3	3.6	2.6	6.4	4.9	
2000	3.5	4.7	4.2	5.2	5.0	1.5	2.6	2.8	2.6	3.8	-1.7	-0.3	
2001	-0.4	-1.0	-2.3	-1.2	-4.5	-6.0	-4.7	-5.5	-6.0	-6.3	-5.2	-4.9	
2002	-1.8	-0.4	-1.4	0.4	2.2	2.9	2.4	3.1	4.0	5.2	3.2	4.2	
2003	2.7	1.8	0.8	-4.3	-2.6	0.8	-0.6	-0.1	-0.4	0.4	3.2	1.3	
2004	2.2	1.3	4.6	7.6	4.5	2.8	2.3	2.3	1.8	1.6	-0.1	1.7	2.8
2005	1.0	-0.8	0.5	-1.6	1.7	1.9	2.7	2.3	4.6	3.7	2.8	2.9	1.8
2006	3.1	4.9	4.0	4.7	5.6	3.1	5.5	6.7	5.4	4.5	5.0	6.1	4.9
2007	4.6	5.1	4.1	3.0	4.8	5.8	4.0	2.8	2.8	3.8	8.0	2.2	4.2
2008	3.3	3.8	2.2	6.5	-0.0	0.6	-0.5	-5.2	-13.0	-18.7	-26.4	-24.4	-5.9
2009	-20.5	-19.4	-17.0	-16.3	-14.1	-13.7	-11.2	-6.2	1.9	10.8			

(Source) The Federation of Electric Power Companies

City gas sales volume for industrial users (%)

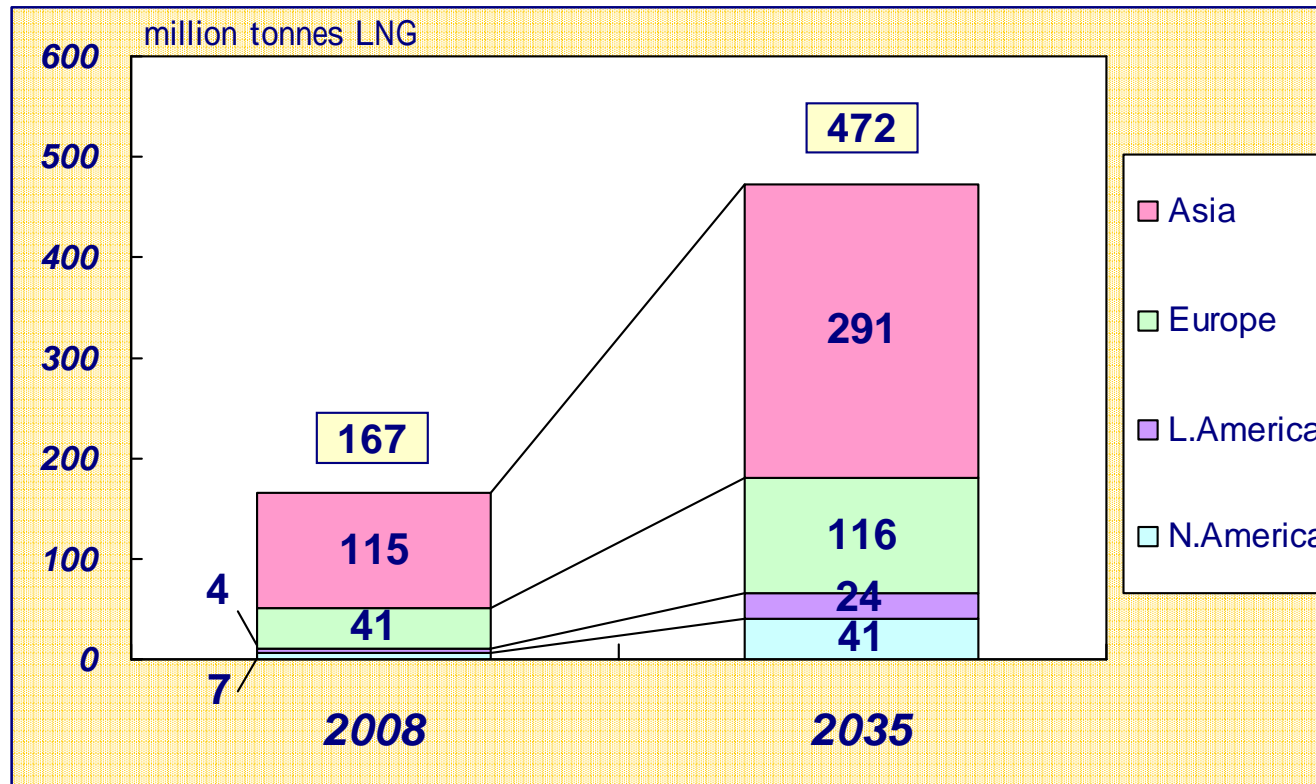
Fy	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Year-to -date
1999	4.0	9.8	3.8	5.5	8.3	10.6	8.9	11.0	13.0	11.9	11.7	10.9	8.8
2000	10.3	12.5	7.7	8.2	5.0	2.7	3.7	2.1	4.2	4.0	2.7	2.1	5.3
2001	-0.4	1.3	1.7	7.5	6.8	0.8	7.9	2.1	5.0	5.8	8.0	6.4	4.5
2002	14.1	11.8	8.2	9.0	7.1	13.8	5.8	13.5	16.7	18.5	16.0	20.4	12.9
2003	12.3	5.0	10.6	9.2	8.6	12.3	12.1	5.6	9.7	12.0	4.6	9.1	9.1
2004	9.6	14.3	12.8	6.0	16.1	10.6	7.6	15.9	6.7	6.6	10.5	10.2	10.4
2005	14.7	7.2	9.1	9.7	8.9	8.4	8.5	8.7	18.0	13.6	12.5	15.1	11.3
2006	8.5	16.0	12.8	12.0	11.1	10.4	19.4	13.9	9.3	8.0	7.0	8.7	11.3
2007	14.0	12.2	10.0	12.1	12.0	7.8	7.9	11.3	8.9	8.4	13.7	7.1	10.3
2008	6.8	4.1	5.0	4.6	-3.5	6.0	-1.7	-7.0	-8.6	-13.7	-23.8	-23.8	-5.0
2009	-18.3	-19.5	-14.6	-11.5	-7.2	-11.9	-10.1	0.2	3.1	13.2			

(Source) Japan Gas Association

Outline of the Presentation

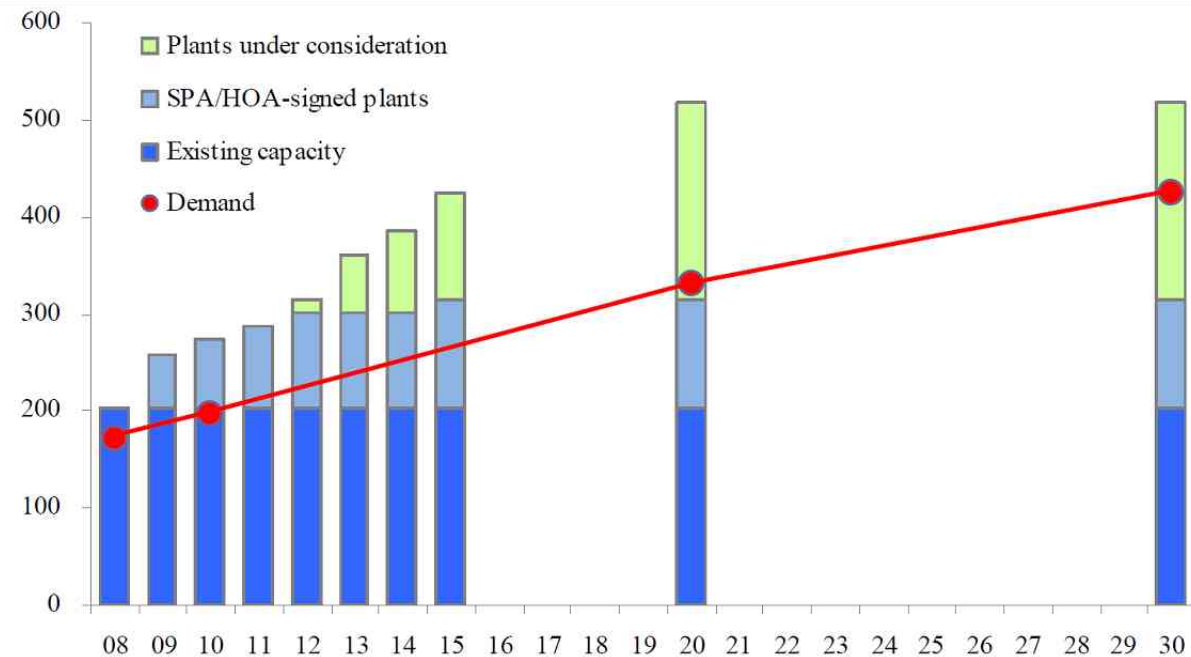
1. Recent Trend of LNG Market in the World
2. Influence of Global Economic Recession
3. Long-Term Supply & Demand

LNG Demand Outlook ; World



- World LNG demand will expand from 167 million ton in 2008 to 472 million ton in 2035, achieving 2.8-fold growth. LNG demand in Asia-pacific region continues to be dominant throughout 2035.
- The development of LNG project is major challenge in order to ensure world LNG market.

Global LNG Supply/Demand Outlook (at the end of March 2009)



(Source) IEEJ

- LNG Demand will cross 400mil.t in 2030.
- The challenge is the development of new LNG projects.
- There are many projects waiting to be developed, including Asia-Pacific region.
- To be balanced, facilities under construction, plants with SPA/HOA signed and plants under consideration should be launched timely.
- Continuous efforts for the investment are expected.

Production capacity of Existing / Under planning and considering

World	Train	Capacity (mt/y)
Existing	92	259
Under const, and planned	95	405
		664

Qatar	Train	Capacity (mt/y)
Existing	12	61.6
Under const, and Planned	2	15.6
		77.2

Production capacity of Qatar

Country	Project	Owned	Train	Capacity (10,000 ton/y)	Start Year	
Qatar	Qatargas (Train 1-3)	Qatargas (Qatar Petroleum 65%, ExxonMobil 10%, Total 10%, Mitsui 7.5%, Marubeni 7.5%)	3	970	1997	Operation
Qatar	Qatargas (Train 4)	Qatar Petroleum 70%, ExxonMobil 30%	1	780	2009	Operation
Qatar	Qatargas (Train 5)	Qatar Petroleum 65%, ExxonMobil 18.3%, Total 16.7%	1	780	2009	Operation
Qatar	Qatargas 3	Qatar Petroleum 68.5%, ConocoPhillips 30%, Mitsui 1.5%	1	780	2010 (planned)	Construction
Qatar	Qatargas 4	Qatar Petroleum 70%, Shell 30%	1	780	2011 (planned)	Construction
Qatar	RasGas (Train 1, 2)	RasGas (Qatar Petroleum 63%, ExxonMobil 25%, KOGAS 5%, Itochu 4%, LNG Japan 3%)	2	660	1999	Operation
Qatar	RasGas (Train 3)	Qatar Petroleum 70%, ExxonMobil 30% CPC have acquired 5% in T5, but breakdown is unknown,	1	470	2004	Operation
Qatar	RasGas (Train 4)		1	470	2005	Operation
Qatar	RasGas (Train 5)		1	470	2007	Operation
Qatar	RasGas3 (Train 6)	Qatar Petroleum 70%, ExxonMobil 30%	1	780	2009	Operation
Qatar	RasGas3 (Train 7)	Qatar Petroleum 70%, ExxonMobil 30%	1	780	2010	Operation

(Source) IEEJ

Summary ...

1. Current trends in LNG market is characterized largely by Qatar.
2. Loosely balanced S/D in LNG market is expected to continue.
3. Japanese electricity and gas sales are recovering, but it will take some time to surpass the amount of 2007.
4. In the longer run, great potential is expected for LNG to be introduced especially in Asia.
5. To balance well in S/D, gradual start up of newly built projects on good timing is important.
6. However, enlargement of production capacity by Qatar in these days greatly is contributing to the stability of the market in the world.

Thank you for your attention.

شكرا جزىلا