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STUDY REPORT
ON
LNG MARKET IN JAPAN
(REVISION III)

June, 1983

Marubeni
CORPORATION
TOKYO, JAPAN

Marubeni
MARUBENI CORPORATION
C.P.O. BOX 595, TOKYO 100-91, JAPAN
CABLE: MARUBENI TOKYO

July 20, 1983

The Honorable Walter J. Hickel
Co-Chairman of Governor's Economic Committee
On North Slope Natural Gas
P.O. Box 1700
Anchorage, Alaska 99510
U.S.A.

Dear Mr. Hickel,

Herewith I wish to enclose our study report on the LNG market in Japan; which is the third revision of our annual report and is to replace the previous report, if at your hand.

This report incorporates the latest official forecasts and plans by MITI and the Japanese utility companies on the long-term energy supply-demand in Japan.

The conditions surrounding Japan's economy and energy has apparently turned face about: The economic growth, assumed to be 5% p.a. throughout 1980's by MITI last year, could not be achieved and the recent governmental view is that it will fall into "a higher part of a 3-4% bracket".

In the meantime, the price rollback of crude oils, which made the crude import price of Japan below the $30 mark in this May for the first time in three years and four months, is believed to delay the development of oil substitute energies and thus to change the assumed future energy picture.

Under such circumstances we, Marubeni, have made a sweeping revision on our study report edited in 1982.

I sincerely hope that our report is of some reference and assistance to you and look forward to the opportunity of meeting with you in the near future.

Yours faithfully,

Marubeni Corporation

I. Hiroe
Senior Managing Director
Energy Division

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Marubeni

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FOREWORD

In 1982, Japan's nine major electric utilities generated 492.6 billion kWh of electricity, up only 1.1% over 1981, according to the Federation of Electric Power Companies.

This small growth in power generation was due primarily to two factors:

One, industrial demand for electricity remained weak throughout the year because of stagnant economic activity. Two, electricity demand from the commercial and residential sectors also remained sluggish because of a cool summer and a warm winter.

In Japan, it is expected that economic growth will slow down further and that a shift will be seen in the industrial structure from the materials industries, which consume large amounts of energy, to the fabrication and assembly industries, which use relatively little energy.

On the supply side, to cope with the expected slowdown in demand growth, construction of power stations is likely to be postponed. Three sources of energy -- nuclear power, LNG and coal -- are planned to be tapped to meet the future increase in electric power demand, but priority will now be given to nuclear power plants because they generate electricity most cheaply and also to LNG-fired plants because long-term LNG import commitments have been made. Thus, coal will likely bear the brunt of the postponement of power-station construction.

The Long-Term Energy Supply and Demand Outlook announced last year by the Advisory Committee for Energy of the Ministry of International Trade and Industry (MITI) put Japan's aggregate energy demand for fiscal 1990 at 590 million kl oil equivalent.

However, conditions surrounding Japan's economy and energy has apparently turned face about: The economic growth, assumed to be 5% p.a. throughout 1980's in the last year's Outlook, could not be achieved and the recent governmental view is that it will fall into "a higher part of a 3-4% bracket". The growth of energy would be restrained by the faster change in industrial structure into fabrication/assembly industries including high-tech electronics industry. In addition, the price rollback of crude oils is believed to make the development of oil substitute energies delayed and thus to make the assumed future energy picture changed.

MITI's Advisory Committee for Energy is to set out re-examination of Japan's energy outlook in an aim to complete its deliberations in the coming September, 1983. A revised energy demand in 1990 is reportedly to be set at 491 million kl, about 17% less from the last year's Outlook.

Under such circumstances we, Marubeni, have made a sweeping revision on all chapters of our study report edited in 1982.

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INTERNATIONAL NATURAL GAS TRADE

Natural gas is an important source of the world energy, which contributes about 20 per cent of total energy requirement. Crude Oil, still the primary energy source in the remaining 20th century, will not be available indefinitely, the maximization of use of gas energy to reduce consumption of oil is essential for energy importing countries. Trade of natural gas is thus believed to play an even larger important role in the future.

IEA's outlook (May '82) on the contribution of each energy in OECD countries in the year 1900 and 2000 shares as follows:

	1990	2000
Oil	36.7-39.7%	26.0-34.7%
Coal	24.2-26.7%	29.3-34.2%
Gas	18.8-20.2%	15.2-18.8%
Nuclear	9.1-10.1%	10.9-11.9%
Hydro and Others	7.4- 7.6%	9.0- 9.4%

The expansion of the international natural gas trade, in terms of trillion cubic feet (Tcf), is demonstrated in the following figures:

Year	Pipeline Trade	LNG Trade	Total
1973	3.1 Tcf	0.3 Tcf	3.4 Tcf
1974	3.7	0.4	4.1
1975	4.0	0.5	4.5
1976	4.4	0.6	5.0

1977	4.5	0.7	5.2
1978	5.0	1.0	6.0
1979	5.7	1.2	6.9
1980	6.0	1.1	7.1

The marketed natural gas volume in the world in 1980 was 53.8 Tcf, of which only 3.2 Tcf was marketed by OPEC Countries.

The traded natural gas volume in the world in 1980 exceeded 7 Tcf and corresponded to about 13% of the total marketed volume.

The volume of pipeline trade increased by 0.3 Tcf in 1980 due to an increase of the Soviet Union's deal with European Countries, while the volume of LNG trade was decreased by 0.1 Tcf in 1980 due to Algeria's price argument with the United States of America.

	Marketed Volume (Rate)	Domestic Use	Exported	Imported
N & S America	24.8 Tcf (46%)	24.9 Tcf	1.0 Tcf	1.1 Tcf
(U.S.A.	20.1 (37%)	21.0	0.1	1.0)
West Europe	6.8 (13%)	7.9	2.9	4.0
Africa	0.6 (1%)	0.3	0.3	-
Asia & Pacific	2.9 (5%)	2.9	0.8	0.8
Middle-East	1.5 (3%)	1.4	0.1	-
Communist	17.2 (32%)	16.4	2.0	1.2
(U.S.S.R.	15.4 (29%)	13.5	2.0	0.1)
Total	53.8 Tcf(100%)	53.8 Tcf	7.1 Tcf	7.1 Tcf
(OPEC Countries	3.2 (6%)	2.4	0.8	-)

The United States of America was the world's largest gas market (21.0 Tcf) while the production of natural gas was also the largest in the world. The Soviet Union was the second largest market (13.5 Tcf) besides it exported 2.0 Tcf to European countries.

The largest gas exporter in 1980 was the U.S.S.R. (2.0 Tcf), which increased the export volume of natural gas remarkably every year, followed by Netherlands (1.8 Tcf), Norway (0.9 Tcf), Canada (0.8 Tcf), Indonesia (0.4 Tcf), Brunei (0.3 Tcf), Algeria (0.2 Tcf) and W. Germany (0.2 Tcf).

The major gas importers then were West Germany (1.7 Tcf), the U.S.A. (1.0 Tcf), Japan (0.8 Tcf), France (0.6 Tcf), Italy (0.6 Tcf), Belgium (0.4 Tcf), United Kingdom (0.4 Tcf), Czechoslovakia (0.3 Tcf) and East Germany (0.2 Tcf).

In the long run, natural gas production in the U.S.A. is forecast to decrease substantially and the shortfall is to be offset by additional gas supplies from Alaska, Mexico and Canada through pipelines. Dependence on gas import by Western Europe is also expected to increase considerably to reflect both diminishing reserves and increased consumption.

The agressive gas exporters for Western Europe are U.S.S.R. and Algeria. U.S.S.R. is now constructing a new natural gas pipeline from Western Siberia which will export 40 billion cubic meters of natural gas yearly to Western Europe. W. Germany is expected to, as the large importer of the Siberian natural gas, import 10.5 billion cubic meters

yearly. The other expected importers are France, who concluded a natural gas supply contract of 8 billion cubic meters yearly with U.S.S.R., Italy, Netherlands, Austria and Switzerland. The supply will be commenced in 1984.

In February, 1982 Algeria agreed with France on the yearly gas supply of 5 billion cubic meters in the form of LNG, by which the volume of supply from Algeria to France was increased to 9 billion cubic meters yearly, following the LNG supply contract of 5 billion cubic meters per year between Algeria and Belgium in April, 1981. The latest natural gas supply contract of Algeria was agreed with Italy in March, 1983. The Trans-Mediterranean Pipeline Project is expected to start its gas supply, which will be some 12 billion cubic meters yearly, in June 1983.

Another agressive gas exporter is Indonesia, the largest LNG supplier in the world, who is aiming at the LNG market in Asia. In 1982 Indonesia concluded two new LNG supply contracts with Japan, the aggregated volume of which is 6.5 million tons yearly for 20 years, and firmly agreed with Republic of Korea to supply 2 million tons of LNG annually.

In 1980, six countries were supplying the LNG with Indonesia being the largest supplier followed by Brunei, Algeria, Abu Dhabi, Libya and the U.S.A. (Alaska) while also six countries imported with Japan being the largest followed by the U.S.A., France, Spain, Italy and U.K.

The traded volume of LNG in 1980, in terms of thousand tons, is total

23,246, of which Japan, the largest LNG importer, imported 16,841 (72%).

The traded volume of LNG between U.S.A. and Algeria, which was 5,371 thousand tons and corresponded to about 22% of the total traded volume in the world in 1979, remarkably decreased to 1,842 thousand tons (8%) due to the price argument.

(Importing Country)	Exporting Country: Algeria	Indonesia	Brunei	Lybia	Abu Dhabi	Alaska	Total
(Japan)	-	8,504	5,549	-	1,929	859	16,841
(U.S.A.)	1,842	-	-	-	-	-	1,842
(France)	1,456	-	-	1,103	-	-	2,559
(Italy)	857	-	-	572	-	-	1,429
(Spain)	575	-	-	-	-	-	575
Total	4,730	8,504	5,549	1,675	1,929	859	23,246

(LNG 1,000 tons = 1.4 million m3 = 49.42 million cubic feet; LNG 23.2 million tons roughly equals 1.1 Tcf)

Japan with little domestic reserves is expected to try to secure long-term supplies of LNG as detailed in the following sections.

JAPAN'S LNG IMPORT

Japan produces small volume of natural gas at several locations, mainly in Niigata but all the supplies are consumed locally. This means that Japan imports almost all of its natural gas needs and, because Japan is an island country, the natural gas should be imported in a form of liquefied natural gas which is a most convenient form for transportation across oceans.

In 1982, Japan imported about 17.5 million tons (0.86 Tcf) of LNG while the domestic natural gas production is only about 0.07 Tcf which has been virtually the same during this ten years.

Five countries are currently supplying the LNG to Japan; Alaska, Brunei, Abu Dhabi, Indonesia and Malaysia (Sarawak), and the volume of LNG Japan is yearly to receive on a long term contract basis is as follows:

Alaska	960,000	tons yearly
Brunei	5,140,000	
Abu Dhabi	2,060,000	
Indonesia	14,672,000	
(Badak 1st	3,000,000)	
(Arun 1st	4,500,000)	
(Excess	672,000)*	
(Badak 2nd	3,200,000)	... starting in Aug. 1983
(Arun 2nd	3,300,000)	... starting in 1984

Malaysia	6,000,000	... started in Feb. 1983
	28,832,000	

* In 1983	1,344,000	tons
1984-86	896,000	tons yearly
1987	784,000	tons
1988 onward	672,000	tons yearly

To recover heavy investment in the liquefaction plant, LNG tankers and the receiving terminal, the contract must be long-term and be rigidly tied to final consumers, mainly utility companies. The following list shows the development of LNG import and LNG consumption of each fiscal year (from April to March), in terms of thousand tons, from the year LNG import started until 1982:

Year	Supply						Consumption		
	Alaska	Brunei	Abu Dhabi	Indonesia	Sarawak	Total	Electric	Gas & Others	Total
FY 1969	182					182	92	75	167
1970	977					977	717	241	958
1971	969					969	714	251	965
1972	872	196				1,068	677	278	955
1973	989	1,375				2,364	1,379	959	2,338
1974	961	2,816				3,777	2,475	1,300	3,775
1975	1,017	3,988				5,005	3,326	1,614	4,940
1976	934	4,969				5,903	3,937	1,972	5,909
1977	1,013	5,262	706	1,266		8,247	5,723	2,501	8,224

1978	958	5,297	1,185	4,245		11,685	8,614	2,905	11,519
1979	958	5,543	1,462	6,895		14,858	10,850	3,719	14,569
1980	872	5,418	2,001	8,674		16,965	12,909	3,870	16,779
1981	1,006	5,157	2,018	8,817		16,998	12,937	3,972	16,909
1982	1,014	5,197	2,163	9,210	109	17,693	13,329	4,255	17,584

More than 75 per cent of total imported LNG is consumed by electric power companies for power generation and the LNG power stations had in fiscal 1982 a share of 14.7% of total capacity of electric power generation. Since petroleum is to be limited to consume for electric power generation the LNG is more and more expected to play an important role for that purpose.

Following is the source-consumer matrix of LNG in Japan at the time when the supply from two definitely planned projects, Canada and Australia, have started:

SOURCE-CONSUMER MATRIX IN JAPAN

Source / Consumer	ALASKA	BRUNEI	ABU DHABI	INDONESIA					SARAWAK	CANADA	AUSTRALIA	TOTAL
					(1st)	(Excess)	(Badak* 2nd)	(Arun* 2nd)				
TOHOKU ELECTRIC POWER CO.				2.90				(2.90)				2.90
TOKYO ELECTRIC POWER CO.	0.72	3.45	2.06	0.40				(0.40)	4.00		0.90	11.53
CHUBU ELECTRIC POWER CO.				3.648	(1.70)	(0.448)	(1.50)			1.60	0.90	6.148
KANSAI ELECTRIC POWER CO.				3.368	(2.40)	(0.168)	(0.80)				0.90	4.268
CHUGOKU ELECTRIC POWER CO.										0.30	0.90	1.20
KYUSHU ELECTRIC POWER CO.				1.556	(1.50)	(0.056)				0.30	0.90	2.756
(SUB-TOTAL)	(0.72)	(3.45)	(2.06)	(11.872)	(5.60)	(0.672)	(2.30)	(3.30)	(4.00)	(2.20)	(4.50)	(28.802)
TOKYO GAS CO.	0.24	1.06							2.00		0.58	3.88
TOHO GAS CO.				0.50			(0.50)			0.15	0.18	0.83
OSAKA GAS CO.		0.63		1.70	(1.30)		(0.40)			0.55	0.58	3.46
(SUB-TOTAL)	(0.24)	(1.69)		(2.20)	(1.30)		(0.90)		(2.00)	(0.70)	(1.34)	(8.17)
NIPPON STEEL				0.60	(0.60)							0.60
TOTAL	0.96	5.14	2.06	14.672	(7.50)	(0.672)	(3.20)	(3.30)	6.00	2.90	5.84	37.572

(million tons yearly)

* FOB contract

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SUPPLY PROJECTS FOR JAPAN

(OPERATING)

ALASKA

Japan's first supplier of LNG was Alaska, which began shipments in November, 1969 at a rate of 960,000 tons a year. The contract calls for delivery of 720,000 tons yearly to Tokyo Electric Power Co. and 240,000 tons yearly to Tokyo Gas Co. over a period of 15 years.

The project is a development of Phillips Petroleum Co. (70%) and Marathon Oil Co. (30%). These two companies and Union Oil had discovered gas reserves in a remote part of Alaska and exporting gas to Japan as LNG appeared to be a logical move. The gas is divided between two fields: North Cook Inlet (Phillips) and Kenai (Union Marathon) in a rough proportion of 70:30. Each producing group bore its own investment costs up to the point of delivery of the gas at the liquefaction plant and a joint venture was formed to own the liquefaction plant, Kenai LNG Corporation, with Phillips as operator. Each partner financed his share of the $55 million cost through normal corporate borrowing, and the construction of the plant was undertaken by a joint venture of Phillips and Bechtel employing a cascade process.

The supply terminal is at Port Nikiski and all deliveries are made to the Tokyo Gas Negishi terminal on Tokyo Bay. Haulage of 3,280 nautical miles or about 6,000 km is undertaken by two tankers (Polar Alaska and Arctic Tokyo), each of 71,500 m^3 capacity. The tankers, of the Gaz-Transport membrane type (36% nickel-steel) were built by Kockums

(Sweden) at a cost of US$85 million.

Phillips and Marathon each sells their share of production on a CIF basis to their Japanese customers. Two Liberian flag companies, Polar LNG Shipping Corp. and Arctic LNG Transportation Corp., own the ships and the shareholding in each company is on the basis of 70:30. The ships are bareboat chartered to the two participants and operated by Marathon. Financing for the ships was raised by Phillips and Marathon and guaranteed by them.

The 13th Amendatory Agreement which provides a new price formula, with a price linkage to the average price of the top 20 oils imported into Japan in 1981, effective from April, 1982 was signed in March, 1982.

According to published reports the CIF price per million BTU now stands at $4.89 as of May, 1983.

In April, 1982 the both parties of the Alaska LNG contract agreed to extend the LNG delivery for an additional period of five years from and after June, 1984 and accordingly the new price formula will apply to LNG deliveries prior to June. 1989.

Composition of the LNG from this project is 99.8% of methane, 0.1% of ethane and 0.1% of others and the LNG has a calorific value of 13,300 Kcal/kg.

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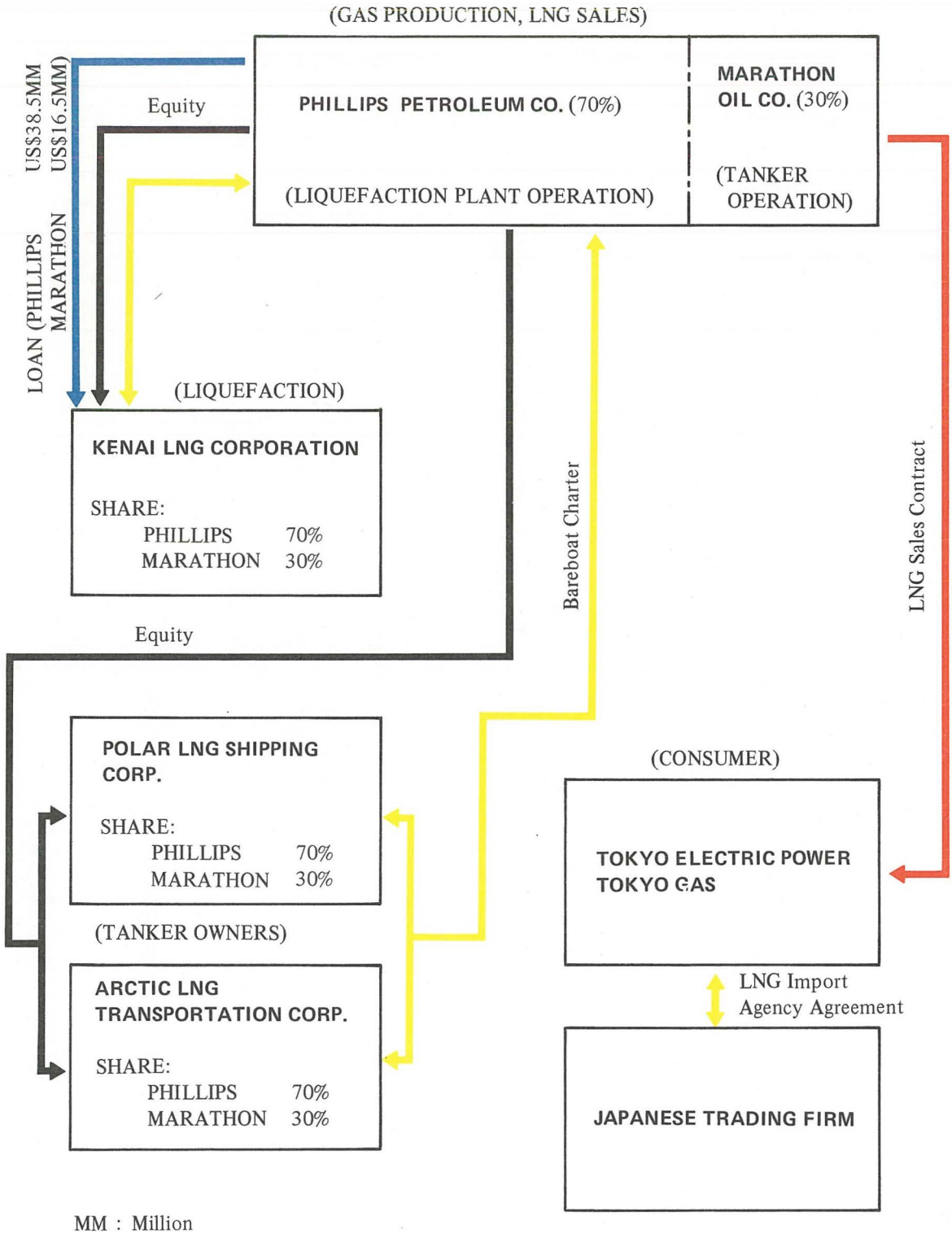
ALASKA LNG PROJECT (Business Structure)



MM : Million
: Equity Participation
: Loan
: Service Agreement
: Title of Gas/LNG

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BRUNEI

The Brunei project came on stream in 1972 and shipments, exclusively to Japan, began the same year in December. Expansion in 1976 raised the annual production capacity from 3.65 million tons to 5.14 million tons.

However, in 1980 some 5.5 million tons were shipped. Both contracts are in effective until 1992 with Tokyo Electric scheduled to take 3.45 million tons yearly, Tokyo Gas 1.06 million tons per year and Osaka Gas 0.63 million tons per year.

Developed by Shell Petroleum, the project features a liquefaction company (Brunei LNG Limited), which is independent of the other phases of the system in that it buys the gas at plant gate and sells the LNG in terms of FOB Brunei. The shareholders in the plant are Shell, Brunei Government and Mitsubishi Corp., each with 33-1/3 per cent. In 1977, the Brunei Government increased its holding from 10 per cent to its present share. Project cost was US$270 million, financed by the following means:

	U.S. $ Million
Equity capital of Brunei LNG	40
Loan from Shareholders	120
Outside Financing (including Loan from U.S. EXIM Bank)	110

A Bermuda company, Brunei Coldgas Trading Ltd., with the equal ownership by the same shareholders, acts as the link between the liquefaction company and the Japanese buyers. It buys FOB Brunei and sells CIF Japan as well as time charters the LNG carriers from Shell Tankers (U.K.) Ltd. According to published reports the CIF price per million BTU has escalated from 48.6 cents at time of closing the first contract to $4.91 as of May, 1983.

Seven 75,000 m^3 tankers ply 4,400 km as 2,500 nautical miles between the loading port of Lumut and three receiving terminals in Japan - Negishi and Sodegaura, services both Tokyo Electric and Tokyo Gas, and Senboku of Osaka Gas. All ships are of the membrane type but built by three French shipyards - Ch. de l'Atlantique (4), CNIM (2) and La Ciotat (1) at an estimated cost of $32 million each for the first four, and $40 million each for the other three.

Composition of the LNG is 89.6% of methane, 5.2% of ethane, 3.6% of propane and 1.6% of butane and the LNG has a calorific value of 13,200 Kcal/kg.

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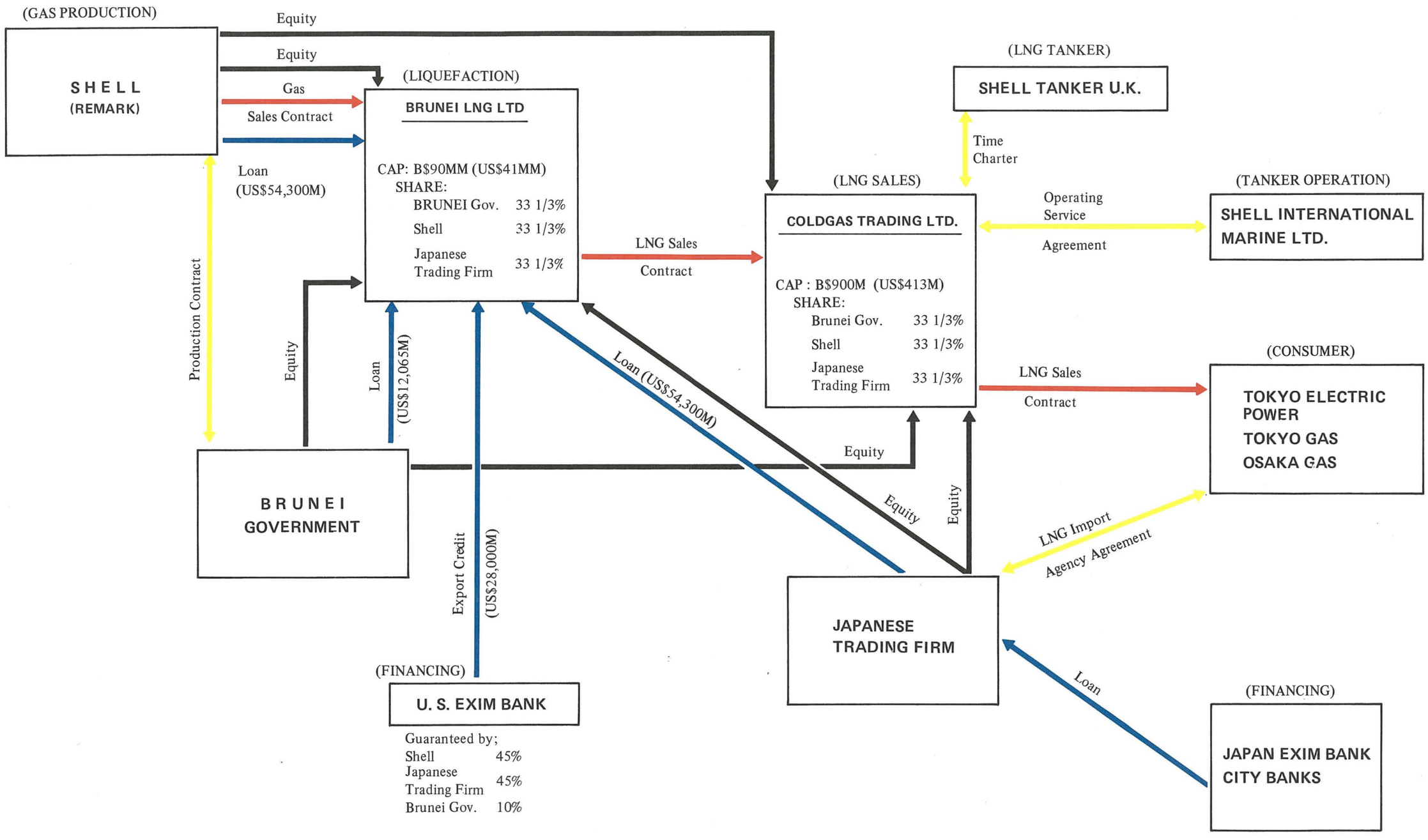
BRUNEI LNG PROJECT (Business Structure)



Guaranteed by;

Shell	45%
Japanese Trading Firm	45%
Brunei Gov.	10%

(REMARK)
Shell's functions are performed through its subsidiaries

- Gas Production: Brunei Shell Petroleum (Brunei Government : 50%)
- Equity Participation and Loan to
  Brunei LNG Co. : Shell Petroleum N.V.
- Equity Participation To Coldgas
  Trading : Shell Overseas Trading

MM : Million
M : Thousand
: Equity Participation
: Loan
: Service Agreement
: Title of Gas/LNG

ABU DHABI

Abu Dhabi began shipments to Japan, its exclusive market, in May 1977. This is the first Middle East country to develop LNG for export despite the availability of large quantities of natural gas in this area, but because of the transportation distance of about 12,000 km, the economics of transportation are not comparatively favourable. The Abu Dhabi contract with Tokyo Electric, the only consumer, calls for a shipment of 2.06 million tons of LNG and 800,000 tons of LPG over a period of 20 years (to 1996). The products are shipped separately.

Abu Dhabi Gas Liquefaction Company (ADGLC), formed to operate the liquefaction facilities, has five partners: Abu Dhabi National Oil Company (ADNOC) with 51%, Mitsui & Co. with 22.05%, British Petroleum and Cie Francaise de Petroles (CFP), both gas producers, with 16.33% and 8.17%, respectively, and Mitsui Liquefied Gas, from Japan, with 2.45%. British Petroleum is the project manager and operator onshore.

The gas to be utilized is associated with production of crude oil at three fields around Das Island and is sold to ADGLC by Abu Dhabi Marine Area (ADMA) and ADNOC.

The cost of the Abu Dhabi facilities amounted to US$530 million, financed according to the following method:

	U.S.$ Million
Equity capital from ADGLC	105
Loan from Mitsui & Co.	250*
Loan from ADNOC	78
Loan from a syndicate (with guarantee by ADNOC)	75
Sub-loan from ADGLC shareholders	22

* Mitsui borrowed 80% from the Japan Ex-Im Bank and 20% from Japanese city banks.

The shipping arrangements for the Abu Dhabi project has a different format than for Brunei in that there is no transfer of ownership of product at the commencement of the sea journey: ADGLC in addition to operating the liquefaction plant, sells CIF to Japan. However, a separate company with the same shareholding was formed to act as a transporter under a contract of affreightment, time-chartering four ships from independent owners. All four ships (three 125,000 m^3 and one 87,600 m^3) are of the Moss Rosenberg independent spherical type, all constructed in Norway.

Composition of the LNG is 82.0% of methane, 16.0% of ethane, 1.5% of propane and 0.5% of others, and the LNG has calorific value of 13,100 Kcal/kg.

The latest statistics of import indicates the CIF price of the Abu Dhabi LNG is $5.12 per million BTU in May, 1983 escalated from $0.96 when contracted.

It is reported that the shareholders of ADGLC have an expansion plan of

the Das LNG Project. This expansion plan calls for a third liquefaction train and increase a liquefaction capacity of LNG plants to some 3 million tons yearly. No decision, however, will be made on expanding the Das LNG operation until ADGLC has completed construction of new LNG tankage to replace existing storage. Seven new steel and concrete bunded storage tanks with a total capacity of 240,000 tons of LNG and 200,000 tons of LPG are under construction. Work is expected to be completed by 1984.

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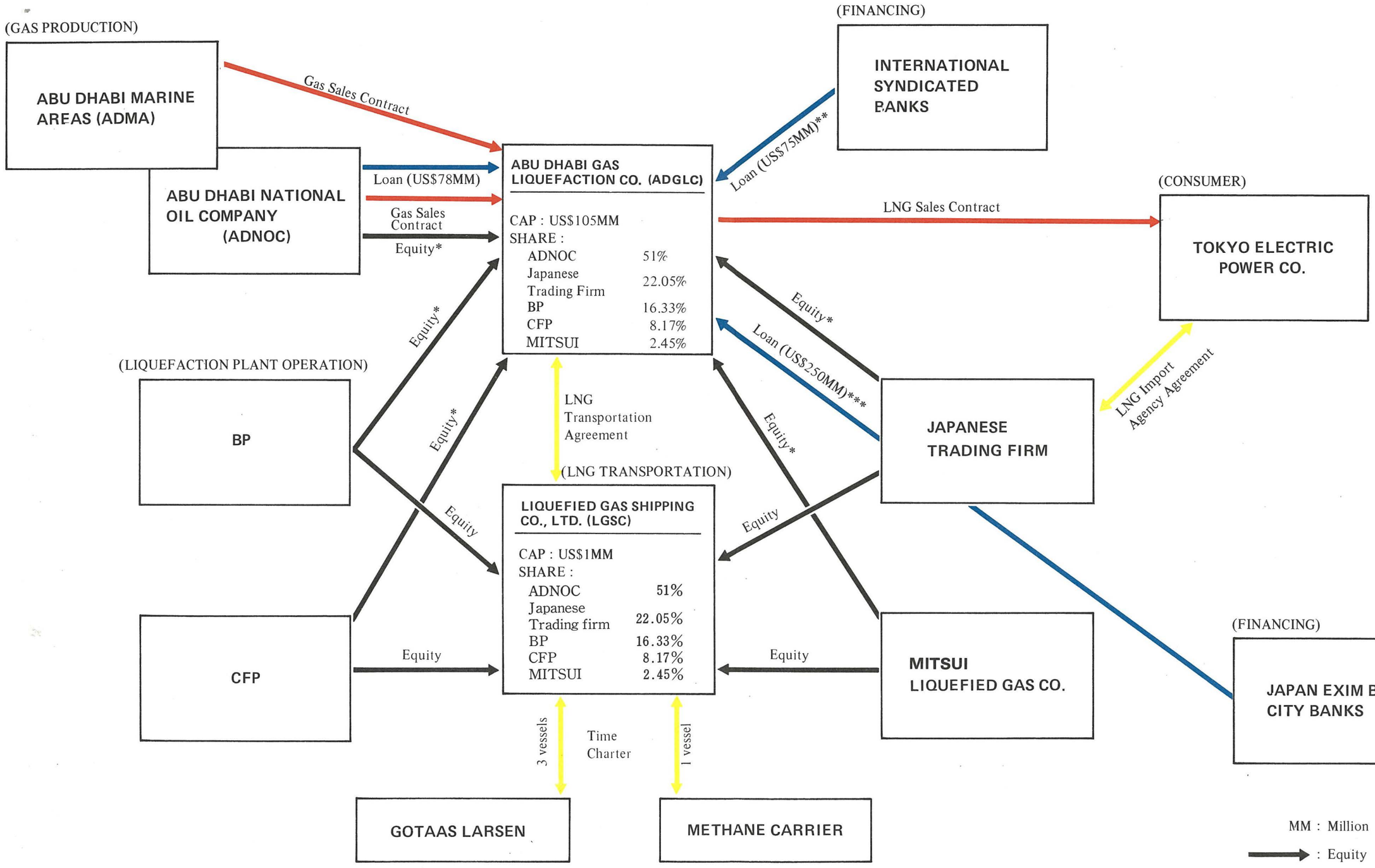
ABU DHABI LNG PROJECT (Business Structure)



* Each shareholder supply subordinated loan (US$22MM)

Share:		
	ADNOC	51%
	Japanese Trading Firm	22.05%
	BP	16.33%
	CFP	8.17%
	MITSUI	2.45%

** Guaranteed by ADNOC, BP and CFP

*** Guaranteed by ADNOC

MM : Million

: Equity

: Loan

: Service Agreement

: Title of Gas/LNG

INDONESIA

Indonesia is the fourth supplier to Japan. Shipments began from its Bontang, East Kalimantan project in August 1977 and from a second plant at Lho Seumawe in northern Sumatra in September 1978. When the two projects reach full capacity in 1980, shipments totals 8.5 million tons, while conracts call for an annual delivery of 7.5 million tons over a period of 23 years (to 1999), with spot contracts.

Japan is Indonesia's exclusive market and five users are supplied through four terminals: Senboku and Himeji (to supply Kansai Electric with 2.4 million tons yearly and Osaka Gas with 1.3 million tons per year), Chita (to supply Chubu Electric with 1.7 million tons per year) and Tobata (Kyushu Electric with 1.5 million tons yearly and Nippon Steel Corp. with 0.6 million tons per year).

The liquefaction plant at Bontang has two 1.6 million-ton-a-year gas processing trains. Partners in the project include the state-owned oil Perusahaan Pertambangan Minyak dan Gas Bumi Negara (PERTAMINA) (55%), the gas producer Huffington Oil Co. (30%) and the Japan Indonesia LNG Co. (15%). The Badak field, a gas/oil reservoir, which contains about 6 trillion cu.ft. of reserves owned by the Roy M. Huffington Group, supplies gas to Bontang by means of a 60-km pipeline.

The liquefaction facilities at Lho Seumawe, having three 1.5 million-ton-a-year gas processing trains, is owned by PERTAMINA (55%), Mobil Indonesia (30%) and Japan Indonesia LNG Co. (15%). Gas is being pipelined 38 km to the plant from the Arun field of Mobil that has reserves

estimated at 19 trillion cu.ft.

Ownership of JILCO is: Kansai Electric (16%), Chubu Electric (11.4%), Kyushu Electric (10%), Osaka Gas (8.6%), Nippon Steel (4.0%), Nissho-Iwai (10%), coordinator of project, 6 other trading firms (Mitsui, Mitsubishi, Sumitomo, C. Itoh, Tomen, Marubeni, each 1.6%), 16 commercial banks (10.4%) and Far East Oil Trading (20.0%).

The cost of the five processing trains (two at Bontang and three at Lho Seumawe), which will eventually produce 7.5 million tons annually for the Japanese contract, is now officially quoted at U.S. 1,638 million dollars. The larger portion is for the Mobil facilities ($847 million) and the remainder for the Huffco plant ($691 million). Financing was provided mainly in the form of loans by JILCO, the Japanese consortium of consumers, trading companies and banks:

Original JILCO financing (1974)	$898 million*
Additional JILCO Financing to support cost overruns ($231 million** was raised through Ex-Im of Japan and Commercial Banks, and $91 million directly from JILCO) (1976)	$322 million
OECF (Overseas Economic Cooperation Fund) Original Japanese to Indonesia, government-to-government loan (1974)	$187 million
European syndicated bank loan (1977)	$50 million
Bank Indonesia loan (1977)	$90 million
Direct Indonesian Government support (1977)	$91 million

* JILCO borrowed 80% of this amount from Japan EXIM Bank with guarantee by Japan Petroleum Development Corp. (name changed to

Japan National Oil Corp. in July 1978) and Japanese end-users on a 50-50 basis; and 20% from Japanese commercial banks with guarantee by JPDC.

** EXIM Bank Loan (60%) guaranteed by JPDC (1/3) and end-users (2/3), and commercial banks loan (40%) guaranteed by JPDC.

The seven 125,000 M^3 LNG tankers of the self-supporting type are being built by General Dynamics in the U.S. These will be bareboat chartered to Burmah Oil group and being operated by the group. PERTAMINA sells CIF at each customer's or customer group's terminal. Distance to Japan are 6,100 km from Arun and 4,600 km from Badak.

Indonesian LNG, priced in U.S. dollars, escalates on the basis of 90% of the Indonesian crude oil price change and 10% on an assumed inflation effect of three per cent per year. According to published reports, the contractual price was U.S.$1.29 per million BTU (Dec. 1973), but now stands at $4.99 CIF as of May, 1983.

Composition of the LNG from both the sources and calorific value of the LNG are as follows:

Composition:

	Methane	Ethane	Propane	Others
ARUN	87.0%	8.4%	3.7%	0.9%
BADAK	89.9%	5.4%	3.2%	1.5%

Calorific value: 13,100 kcal/kg for Arun, 13,200 kcal/kg for Badak.

These five processing trains (two at Bontang and three at Lho Seumawe)

have reserves of production capacity and PERTAMINA has supplied LNG beyond and in addition to the contracted volume from 1979. In 1982 74 cargos (9,267,311 m^3 of LNG) were delivered from Badak and 86 cargos (10,755,607 m^3 of LNG) from Arun.

In this connection, it is reported that the Japanese users and PERTAMINA have agreed to increase the contracted LNG volume with the following delivery schedule for same period as existing 7.5 million tons supply to Japanese users.

	Chubu Electric	Kansai Electric	Kyushu Electric	Total
1983	0.896*	0.336	0.112	1.344
1984-86	0.56	0.168	0.168	0.896
1987	0.56	0.168	0.056	0.784
1988-1999	0.448	0.168	0.056	0.672

Unit: million tons

* (including 0.336 million tons divided for Toho Gas, a newly coming buyer in the 2nd Badak LNG contract concluded in 1981)

Marubeni

INDONESIA LNG PROJECT (Business Structure)

(GAS PRODUCTION)

(N. Sumatra)
MOBIL

(E. Kalimantan)
HUFFCO GROUP

Equity

Equity

(LIQUEFACTION PLANT OPERATION)

P.T. ARUN NATURAL GAS LIQUEFACTION CO.

CAP.: Rp. 83 MM

SHARE:

PERTAMINA	55%
Mobil	30%
JILCO	15%

P.T. BADAK NATURAL GAS LIQUEFACTION CO.

CAP.: Rp. 41.5 MM

SHARE:

PERTAMINA	55%
HUFFCO, Group	30%
JILCO	15%

Gas Sales Contract

Gas Sales Contract

P/S Contract

Equity

Equity

Service Agreement

Service Agreement

Equity

Loan (US$1,129MM)

(FINANCING)

JAPAN INDONESIA LNG CO. (JILCO)
(REMARK)

Loan

(FINANCING)

JAPAN EXIM BANK/
CITY BANKS

Loan Guarantee

Loan Guarantee

JAPAN NATIONAL OIL CORP.

LNG Import Agency Agreement

(CONSUMER)

(FINANCING)

JAPAN CITY BANKS
US CITY BANKS

Loan
(US$50MM)

(LIQUEFACTION & LNG SALES)

PERTAMINA

LNG Sales Contract

Loan (US$90.9MM)

KANSAI ELECTRIC POWER
CHUBU ELECTRIC POWR
KYUSHU ELECTRIC POWER
OSAKA GAS
NIPPON STEEL CORP.

LNG Transportation Agreement

(LNG TRANSPORTATION)

BURMAH GAS
TRANSPORTATION LTD.

INDONESIA
GOVERNMENT

Loan (US$186.7MM)

(FINANCING)

OVERSEAS ECONOMIC COOPERATION FUND (OECF)

(REMARK)

SHARE: LNG Consumers 63.3%
Japanese Trading Firms 19.6%
Others 17.1%

MM : Million
M : Thousand
: Equity Participation
: Loan
: Service Agreement
: Title of Gas/LNG

MALAYSIA (SARAWAK)

Malaysia is the fifth and newest supplier to Japan. The first shipment began in February, 1983 for Tokyo Electric and Tokyo Gas from Bintulu, Sarawak State to Sodegaura receiving terminal.

Malaysia will supply yearly 6 million tons beyond 1986 over a period of 17 years (to 2003), with the following schedule, however, it is reported that due to cool-down of the Japanese energy demand, Tokyo Electric and Tokyo Gas are requesting Malaysia to postpone its supply schedule.

Supply Schedule:

Unit: million tons

FY	Tokyo Electric	Tokyo Gas	Total
1982(Feb.-Mar.)			0.11
1983	1.0	0.75	1.75
1984	2.0	1.5	3.5
1985	3.0	1.5	4.5
beyond 1986	4.0	2.0	6.0

Sarawak Shell BHD developed offshore natural gas resources under a production - sharing contract with PETRONAS. The liquefaction company, Malaysia LNG Ltd. has been established at Bintulu under the full responsibility of Shell for the engineering, start-up and operation of the liquefaction plant. The shareholders of the Malaysia LNG Ltd. are PETRONAS (65%), Mitsubishi and Shell (each with 17.5%).

Three-train liquefaction plant was constructed by a group of Japan Gasoline Co. and Kellog. Necessary total fund is estimated at $1,240 million for which financing is provided as follows:

Equity	$270 million
U.S. Ex-Im Bank	120
Japan Ex-Im	200
Euro Syndicate Loan	550
Local Finance	100
	$1,240 million

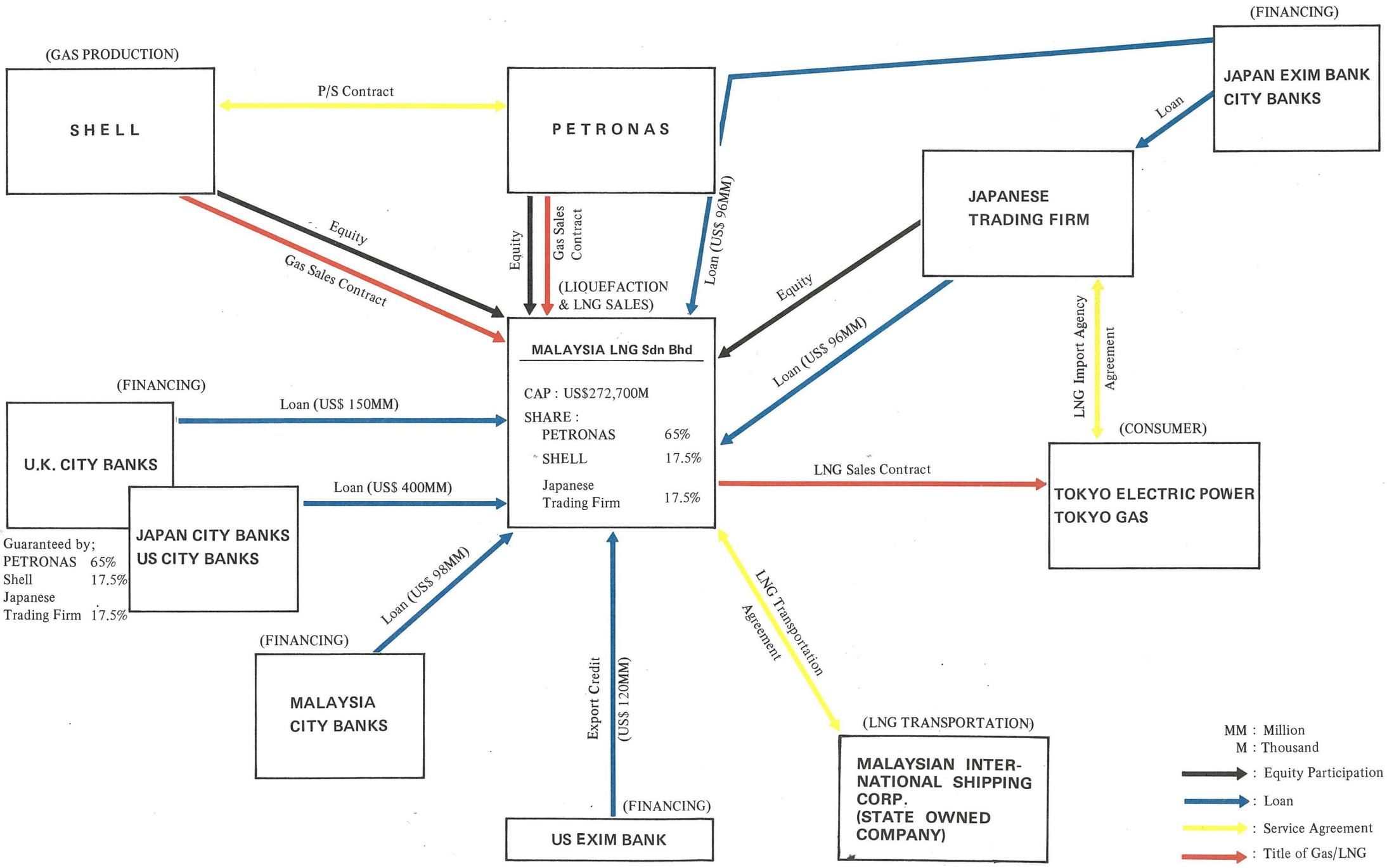
Malaysia LNG Ltd. also undertake all transportation from Bintulu to Sodegaura with five chartered tankers (130,000 m^3 of membrane type) from Malaysian International Shipping Corporation which have ordered construction of the tankers to France-Dunkerque (3 ships) and CNIM (2 ships) of France at an estimated cost of 140 million dollars a ship.

The distance to Japan is 4,300 km from Bintulu and according to published reports, the CIF prices per million BTU is $5.96 as of May, 1983.

Composition of the LNG is 91.6% of methane, 4.1% of ethane, 2.7% of propane, 1.5% of butane and 0.1% of others and the LNG has a calorific value of 13,200 Kcal/kg.

Marubeni

SARAWAK LNG PROJECT (Proposed Business Structure)



(DEFINITELY PLANNED)

INDONESIA (2nd Project)

The new two LNG supply contracts between PERTAMINA and Japanese users were concluded in April 1981.

One is from Bontang and the other is from Lho Seumawe.

The LNG supply from Bontang will start in the third quarter of 1983 and produce, reaching full capacity, 3.2 million tons yearly for 4 Japanese users (Chubu Electric with 1.5 million tons yearly, Kansai Electric with 0.8 million tons yearly, Toho Gas with 0.5 million tons yearly and Osaka Gas with 0.4 million tons yearly). Chubu Electric and Toho Gas will be supplied through Chita Receiving Terminal and Kansai Electric and Osaka Gas will be supplied through Senboku and Himeji Receiving Terminals.

The LNG supply from Lho Seumawe will start in 1984 and produce, reaching full capacity, 3.3 million tons yearly for Tohoku Electric and Tokyo Electric. Tohoku Electric will be supplied with 2.9 million tons yearly through Higashi-Niigata Receiving Terminal and Tokyo Electric will be supplied with 0.4 million tons yearly.

A new feature of the new two projects is that LNG tankers will be Japanese flags. Seven LNG tankers (125,000 M^3 of Moss Rosenberg type) will be built by three Japanese shipyards (Kawasaki Heavy Industry, Mitsubishi Heavy Industry and Mitsui Engineering & Shipbuilding) and

six Japanese shipping companies (Nippon Yusen Kaisha, Mitsui O.S.K. Lines, Kawasaki Kisen Kaisha, Japan Line, Yamashita-Shinnihon Steamship and Showa Line) will own with co-ownership. Probably LNG tankers will be operated by new-established company with ownership of shipping companies, users and other Japanese companies. Therefore PERTAMINA will sell the LNG FOB at each Indonesian terminal.

It is reported that the new F.O.B. base price for Badak field LNG is $5.87 per million and will be increased by the unweighted average percentage rise in prices of the 19 Indonesian crude oils. It is reported also that the F.O.B. base price for the more distant LNG from the Arun field is set 9¢ lower at $5.78 per million Btu to take into account the additional cost of shipping to Japan.

CANADA

In early 1979, Dome Petroleum Ltd. of Canada made their first approach to Japanese market proposing the supply of liquefied ethane gas and LPG in package; however, Dome's idea later changed to LNG reflecting Japanese users' preference. Four Japanese LNG users and Dome agreed basically on a long-term supply of LNG to Japan from Canada in October 1980.

Under the agreement, the Japanese LNG users - Chubu Electric Power Co., Kyushu Electric Power Co., Osaka Gas Co., Toho Gas Co., expressed clearly their intents to import 2.6 million tons of LNG annually for 20 years, starting in 1985, from the provinces of British Columbia and Alberta after processing at a liquefying plant to be built at Grassy Point on the Pacific Coast of Canada. Of the annual import, 1.6 million tons will be delivered to Chubu Electric, 0.3 million tons to Kyushu Electric, 0.55 million tons to Osaka Gas and 0.15 million tons to Toho Gas Co.

In September 1981, an LNG sales contract was made between Dome and NIC Resources Ltd., wholly owned subsidiary of Japan's Nissho Iwai Corp., on the one part and four Japanese Users on the other.

In addition to above Japanese LNG users, Chugoku Electric Power Co. reached an agreement with Dome on 20 years purchase of 300,000 tons a year of LNG in October 1981. Accordingly, the total volume of Dome's LNG project has increased to 2.9 million tons a year.

The total construction cost will be $2.8 billion of which half will be spent on building four 125,000 cubic meters capacity ships.

Following the decision made by British Columbia provincial government as a preferred LNG project, a consortium led by Dome obtained approval in January, 1983 from National Energy Board (NEB). The NEB granted provisional approval to Dome to export 2.28 trillion cubic feet as LNG to Japan during 1986-2001 subject to a number of conditions. Major conditions set by the NEB require Dome to:

- Obtain agreement from Alberta and British Columbia on prices for its gas supplies.
- Execute a proposed loan agreement with its Japanese buyers, providing it with a low interest $2.5 billion loan to build a liquefaction plant near Prince Rupert, B.C.
- Submit its proposed liquefaction tariffs to an NEB hearing for approval.

According to the present schedule, the first shipment is to be made in April, 1986.

AUSTRALIA

An unincorporated joint venture, North West Shelf Joint Venture, formed by Shell, BHP, BP, Woodside Petroleum, Socal plans to export LNG to Japan utilizing natural gas being produced from three offshore gas fields in the north westcoast of Western Australia: North Rankin, Angel and Goodwyn. The gas will flow to shore in a submarine pipeline 130 km long and about 1 meter diameter. The offshore operation is to be handled by Woodside Offshore Petroleum Pty., a new wholly owned subsidiary of Woodside Petroleum with technical cooperation of Dutch Shell International Petroleum (SIMP). Woodside Offshore Petroleum Pty., was formed to take over operation of exploration and development work on the North West Shelf from Woodside Petroleum Development.

Withnell Bay, about 10 km north-east of Dampier, is selected as site for onshore facilities which will treat gas for domestic markets and liquefy it for export. The onshore operation be handled by Woodside LNG Pty., also 100% subsidiary of Woodside Petroleum.

In May, 1978 the final feasibility study was completed by Woodside and in October eight Japanese utility companies issued letters of intent for annual supply of 6.5 million tons yearly of LNG starting in 1985 (1 million tons each for Tokyo, Kansai, Chubu, Chugoku, Kyushu Electric Power Companies, 0.65 million tons each for Tokyo Gas and Osaka Gas, and 0.2 million tons for Toho Gas) for 20 years.

However, in November, 1979 the Joint Venture noticed the customers to reduce the supply volume to 6.0 million tons at the loading point per

year for 14 years with option of 5 years which is subject to future discovery of more reserves and to delay the first shipment to April, 1986 because they found lesser reserves and received a request from the Government to deliver more LPG to domestic market.

Woodside announced in March, 1982 that sales of North-West Shelf gas to Japan would be delayed by one year, until April, 1987. However, they have emphasized that rescheduling of LNG deliveries is a necessary adjustment due to changing circumstances and does not indicate a lessening of their intention to bring the LNG project into fruition.

According to the Australian news sources, Woodside have been making approaches to both Mitsui and Mitsubishi since October, 1982 to take up a joint one-sixth interest in part of the project. Meanwhile, BHP and Shell are said to have indicated a willingness to double their direct stakes to one-sixth interests.

If these negotiations are successful, six groups -- Woodside, Shell, BHP, BP and the two Japanese companies -- will have equal interests in the natural gas liquefaction as well as LNG shipping and marketing aspects of the project.

Ownership of the offshore gas fields, production facilities and domestic gas supply phase of the project will remain Woodside (50%), Shell and BHP (8.3% each), BP and Socal (16.6% each).

Reflecting the adverse economic climate and international recession, the Japanese electric power companies and the gas companies announced

in May, 1983 that they had reached an agreement with the sellers to delay the project another one year, making the initial delivery of LNG from Australia in April, 1988. The annual supply volume at receiving terminals in Japan was also announced to be 5.84 million tons of LNG: 0.9 million tons each for Tokyo, Kansai, Chubu, Chugoku, Kyushu Electric Power Companies, 0.58 million tons each for Tokyo and Osaka Gas Companies and 0.18 million tons for Toho Gas Co.

The shipments of the LNG are to be carried out, across a distance of 5,900 km, by seven 125,000 m^3 class LNG tankers.

Total capital expenditure was estimated at 2.5 billion in 1977 Australian dollars, details of which are as follows:

Offshore platform & pipeline	$900 million
Domestic Gas processing plant	$100 million
Liquefaction plant	$700 million
Shipping	$800 million

(PLANNED)

U.S.S.R. (SAKHALIN)

The development project of oil and natural gas, which is to be produced at island shelf of the Sakhalin Island, is one of the most important projects jointly promoted by Japan and Soviet Union.

At the 5th Joint Meeting of the Japan-USSR Business Cooperation Committee held in February, 1972, the joint exploration and development of oil and gas at offshore Sakhalin Island was proposed by the U.S.S.R. and followed by a negotiation in Tokyo between these two countries in November, 1972, a protocol was signed in April, 1974 when principle was agreed upon by both countries.

In October , 1974, "Sakhalin Oil Development Cooperation Co., Ltd." (SODECO) was founded to promote the project on the Japanese side.

The shareholders of SODECO are as follows: (as of March, 1983)

Japan National Oil Corp. (a government-owned organization)	43.1%
Overseas Petroleum Corp.	10.4%
Japan Petroleum Exploration	10.4%
C. ITOH	7.6%
MARUBENI (including MARUBENI's subsidiary)	7.4%
Gulf Oil	5.7%
Others	15.4%

An exploration work was commenced in 1976 and exploratory drillings at wells in Odoptu structure and Chaivo structure located at northeast area of offshore Sakhalin have been succeeded.

Following credits were provided from Japan to the U.S.S.R.:

Credit	Amount	Fund raised by
SODECO-1	$185 million	Japan National Oil Corporation (JNOC) and shareholders of SODECO
SODECO-2	¥6,740 million (approx. $22.5 mil)	Commercial banks
SODECO-3	¥8,910 million (approx. $30 mil)	JNOC and commercial banks

SODECO-1: Exploration cost --- credit to be remunerated on success

SODECO-2: Credit for permanent equipment for exploration

SODECO-3: Credit for necessary expenses at site

A typical composition of natural gas obtained through drill stem tests at Chaivo is as follows: C_1 (91.9%), C_2 (4.3%), C_3 (1.9%), C_4 (0.8%), C_{5+} (0.3%), CO_2 (0.5%), N_2 (0.3%) and GHV was 9,701 Kcal/Nm^3.

The U.S.S.R. committed at talks held in September, 1980 to supply 5 billion cubic meters of natural gas a year for a period of 20 years, if necessary supplemented by onshore gas which is already discovered around Dagi.

Detailed and elaborated study has been conducted how to import the natural gas into Japan; as a form of raw gas through pipeline, as an LNG, or as a form of methanol expecting new market at time of impor-

tation. The domestic demand within Hokkaido, northernmost island of Japan, only amounts to several hundred million cubic meters a year and the fuel methanol market is not clear enough to proceed the project; thus the importation of the natural gas as a form of LNG seems reasonable as a result of the study and 3 million tons yearly LNG supply for 20 years is expected to start from 1990.

Approximately 210 km pipeline is to be laid from the Chaivo gas field to Dekastri, crossing Nevelsk Strait by sub-sea pipeline. A liquefaction plant is to be located at Dekastri. Shipping distance between Dekastri and Tokyo is 2,227 km or 1,202 nautical miles and ocean shipment by small carriers of 45,000 m^3 class and by large carriers of 125,000 m^3 class are both being studied.

In February and March, 1982 a trial voyage under the iced winter sea conditions was carried out successfully between Kholmsk and Dekastri, the proposed site for a liquefaction plant. From this experience, both Japanese and U.S.S.R. specialists have obtained meteorological data as well as information on ice sea conditions of Tartar Strait which will be studied further for the safe voyage of LNG carrier.

The Soviet National Commission on the Reserves of Natural Resources authorized in August, 1982 a recoverable reserves of the Chaivo structure which completed its explanatory wells in 1981 as hereunder:

Oil: 19.4 million tons

Gas: 140.5 billion m^3

Condensate: 10.1 million tons

THAILAND

In 1981 DeGolyer & McNaughton submitted a report on natural gas reserves of the "B" structure in the Gulf of Thailand to Texas Pacific Oil Co., a subsidiary of The Seagram Co., Ltd., who is the concessionaire of the "B" structure. According to the report, the gas volume of proven reserves is estimated at 1.8 TCF and the aggregated gas volume of proven and probable reserves is estimated at 7.2 TCF.

The composition of the natural gas found through drill stem tests is as follows:

C_1	65.60%
C_2	5.82%
C_3	2.87%
C_4	1.29%
C_5^+	0.55%
CO_2	23.06%
N_2	0.81%

The Government of the Kingdom of Thailand, which had been studying the possibility of natural gas export, announced its policy in June, 1982 and declared that the Government would grant the permission to export natural gas for sale to foreign countries. At the same time the Government ordered the formation of a high-level committee, "National LNG Export Development Committee" headed by the Prime Minister Gen. Prem Tinsulanonda, to work out new measures for a pilot company held by Thai nationals which will enter into a joint venture with foreign investors to implement the liquefaction project of the natural gas in Texas Pacific's "B" structure.

The most possible market for the Thai LNG considered by the Thai Government is Japan. Following the Goverment's decision on the export policy of natural gas, Finance Minister Mr. Sommai Hoontrakul, who is a member of the "National LNG Export Development Committee", visited Japan to request to buy 2-3 million tons of liquefied natural gas a year. During his stay in Japan, Mr. Sommai had meetings with Mr. Zenko Suzuki, then Japanese Prime Minister, and other officials of the Japanese Government.

In October, 1982 the pilot company ("Thai LNG Co., Ltd.") of the Thai LNG Project was registered officially in Bangkok and it was decided that the evaluation of the proposals on the participation to a joint venture of natural gas liquefaction which was submitted by Japanese firms in reply to the Thai Government's request will be executed by the pilot company.

On the other hand it is essential for the Thai Government to agree on the gas price from the "B" structure with Texas Pacific. After the discussion between the Thai Government and Texas Pacific last November, the Prime Minister Prem Tinsulanonda ordered Minister Flt.-Lt. Sulee Mahasanthana to form a committee (the "Natural Gas Price Committee") which will hold talks with Texas Pacific on the matter of natural gas price. The other job of the Committee is to first determine the deliverable gas volume from Thailand to foreign countries other than domestic use in Thailand. The Thai Government is considering seriously to dedicate a part of onshore gas discovered by EXXON's subsidiary in the northern area of Thailand to the LNG project.

QATAR

The gas reserves of North Field which was discovered by Shell Qatar Company (Shell's share: 80%) are put at a minimum 100 trillion cubic feet and generally estimated at over 300 trillion cubic feet of natural gas. It shows that North Field will occupy some 10% of total proven gas reserves in the world and some 30% in the OPEC countries when the appraisal of its gas reserves is finalized.

Qatar government considers gas of North Field as an effective coming substitute for crude oil as a source of energy and takes great interest in the exploitation of it. Shell finished a feasibility study on using the huge reserves in the North Field at Qatar Government's request in 1980.

The technical jobs, like plant construction, onshore pipeline, drilling and production will go to foreign firms. Four consultant companies -- Bechtel Corporation, Flour Corporation, Ralph M. Parsons Company and M.W. Kellogg Company -- have already been invited to prepare tenders for the construction of the project.

In June, 1981 Qatar General Petroleum Corporation (QGPC), a state-owned oil company, issued invitation letters requesting qualified western oil companies to submit a proposal for participation to a gas liquefaction company in Qatar.

In reply to QGPC's request six western oil companies respectively entered into discussions on the possibility of forming a joint venture

with QGPC to develop the North Field. The companies were the Royal Dutch/Shell Group, British Petroleum (BP), Companie Francaise de Petroles (CFP), EXXON, Roy M Huffington and Wintershall consortium, which includes Veba Oel and Deutsche Schachtban, both of West Germany; Koch Oil of the U.S., and Gulfstream Resources Canada.

After a series of negotiations with oil companies QGPC announced in February, 1983 that they selected BP and CFP as partners of the proposed joint venture. It is reported that QGPC, BP and CFP will establish a new company, Qatar Gas Corporation, to carry out the North Field Project in the later half of 1983 and QGPC is expected to hold some 80% of the new company's equity.

According to QGPC's plan on development of North Field, the construction of the LNG plant will start by 1985-86 after a formulation of the strategy on the field development and a study of the world gas market for two-and-a-half years, thereafter, about seven years will be taken to build the plant until the commencement of the LNG export in 1992. The site for a liquefied natural gas plant is expected to be Umm Said an industrial zone about 40 kilometers south of Doha.

Regarding the export of LNG, Japan is most probable market, but France and the United Kingdom also have expressed interests in importing LNG from Qatar respectively.

ALASKA (Prudhoe Bay)

In 1968, the largest single discovery of oil and natural gas ever found on the North American continent was made at Prudhoe Bay on the North Slope of Alaska. The Prudhoe Bay field contains over 26 trillion cubic feet, or 700 billion m^3, of recoverable natural gas, or approximately 13% of the proven U.S.A. gas reserves.

The Alaska Natural gas Transportation System (ANGTS):

In order to bring the Prudhoe Bay gas to the market in the lower 48 states, the Alaska Natural Gas Transportation System, ANGTS, were formed.

The pipeline begins at Prudhoe Bay and will move southeasterly along the Alaska Highway to the Alaska/Yukon border. From the border, the pipeline will continue southeasterly to a point near James River, Alberta, Canada. At this point, the gas pipeline divides into the eastern and western legs. The eastern leg will transport approximately 70% of the Prudhoe Bay gas to consumers in the midwest, south and eastern U.S. The western leg will extend into California to serve the western U.S.

The ANGTS comprises nearly 4,800 miles of pipeline with diameters ranging from 36 to 56 inches. Initially approximately 1.4 million hp will be installed to transport 2 bcfd of gas.

Study on alternatives for ANGTS:

In 1977, when the project was conceived, it was scheduled for completion in 1982 at a cost of 10 billion U.S. dollars. However, the pro-

ject began to stall due to the combination of increasing costs and a surplus of natural gas supplies. At present, the project is shelved and the pipeline is expected to complete by 1989.

Under the such circumstances, Alaska Governor, Jay Hammond has appointed a committee -- the Governor's Economic Committee on North Slope Natural Gas -- to begin studying alternatives if the ANGTS failed to materialize. The committee is co-chaired by former Alaska Governor and former Interior Secretary, Walter J. Hickel and another former governor, William A. Egan.

The Trans-Alaska Gas System (TAGS):

In January, 1983 the Alaskan State committee unveiled what it claims a better plan to build a shorter and less costly pipeline to Alaska's Pacific Coast, convert the gas to liquid and ship it to Japan.

According to the study, liquefying Alaskan North Slope natural gas at tidewater and shipping it to Japan would be economically feasible at a cost of about 25 billion U.S. dollars and a better choice to market the gas than the 40 billion U.S. dollars ANGTS.

TAGS line would parallel the Trans-Alaska crude oil pipeline to Fairbanks, then veer southwest along the Alaska railroad corridor past Willow, and cross Cook Inlet to the existing refining/liquefaction center at Nikiski.

Gas, CO_2 and liquids would be conditioned and processed at Nikiski. Capacity would be about 1 billion cfd in the first stage. A second

stage would boost throughput to about 1.8 billion cfd. The final stage would entail about 14 compressors and a throughput of about 3 billion cfd.

If design engineering gets under way in 1983, construction could begin in about 3 years, with completion scheduled for 1988. Total initial capital cost of the pipeline, conditioning plant, and liquefaction plant would be about 14.294 million in 1982 U.S. Dollars. Taking into account inflation, interest costs, tariffs, and return on equity, the final project cost would be about 25 billion in 1988 as-spent dollars.

Estimated Cumulative Construction
and Organization Costs in 1982 Dollars
(Millions)

	Phase I	Phase II	Phase III
Pipeline	$4,608	$ 6,276	$ 8,243
Conditioning Facilities	702	982	1,423
Liquefaction Facilities	1,863	2,995	4,628
Totals	$7,173	$10,253	$14,294
Expected completion date	1988	1990	1992
LNG available, million metric tons per year	4.8	8.9	14.5

The issue of exporting North Slope natural gas to Japan is now being studied by the special working group formed by government officials of Japan and the U.S. The U.S. administration and the Japanese government are said to be attracted to the idea of North Slope hydrocarbon exports to Japan but big political barriers to export Alaskan gas first must be overcome.

INDONESIA (NATUNA)

In 1968 Italian state company AGIP SpA. found out huge gas reservoir consisting of four zones in Natuna D- field which is located in South China Sea about 200 Km northeastward from Natuna Island. Following the expire of the P/S contract between AGIP and PERTAMINA and as a result of a re-tender of 1979 Esso Exploration and Production Natuna, Inc. entered into a new P/S contract with PERTAMINA in January 1980.

The reason AGIP gave up the development of the huge gas was a gas composition containing considerable CO_2, however, it is said Esso is confident of its success in disposing the CO_2.

According to AGIP's survey the composition of natural gas and the estimated reserves are as follows:

Composition:	CO_2	72.8%
	$C_1 + C_2$	26.2%
	H_2S	0.4%
	N_2	0.6%

Reserves: 122 TCF

($C_1 + C_2$ = 122 x 26.2% = 32.0 TCF)

Presuming the recovery factor of Natuna gas field is one-third effective hydrocarbon gas volume is over 10 TCF.

In November 1980 Esso spudded the first well nearby AGIP's AL-IX well and succeeded in finding gas reserves. It is said in March 1981 Esso offered PERTAMINA the recommendation choosing LNG as a product of the gas in comparison with fuel methanol and synthesized gasoline.

Esso also spudded other two wells in 1981 by a semi-submersible rig "Hakuryu III".

The most probable consumer of Natuna LNG is Japan and 10 TCF natural gas makes it possible to supply some 8 million tons of LNG yearly for 20 years. It is reported that PERTAMINA and Esso have agreed recently to commence an operation of liquefaction plant in 1992 which will likely be located at the north-tip of Natuna Island.

BURMA

Burma Petroleum Development Company (BPDC) was established in January, 1982 by 12 Japanese firms to promote oil and gas exploration project offshore Martaban in Burma. Along with 12 private companies, Japan National Oil Corporation (JNOC) has also participated in the project.

Following the establishment of BPDC, Petroleum Exploration and Development Agreement, and Exploration Loan Agreement were signed in February, 1982 between BPDC and Myanma Oil Corporation (MOC), a national oil corporation of Burma.

Under the Exploration-Development Agreement and Loan Agreement, Japanese consortium will provide MOC with 3.7 billion Yen loan (equivalent to 15 million U.S. dollars) and technical assistance necessary for drilling 2 wells.

The first well, began drilling in November, 1982 at 3DA structure, was drilled to 2,076 m and flowed gas rate of 1,110,000 m^3/day in tests of 3 zones in a 1,300 m limestone formation. It was the first potentially commercial offshore gas discovery in Burma while some 30 wells drilled there in past years failed to establish production.

The gas was also found at the second well, 3CA structure, but the quantity was not enough to proceed for commercial production.

The BPDC will submit to MOC before the end of June, 1983 a report of the evaluation on the result of the exploration operation together with

the recommendation on the work program to be conducted thereafter relating to the Martaban offshore area.

In the event that both Japanese and Burmese parties agree that the result of the exploration operation conducted warrants the delineation operation, both parties intend to conclude before the end of 1984, a product sharing contract or to establish a mutually beneficial economic cooperation for the purpose of the delineation and the development of the gas field.

Marubeni

(OTHER POSSIBLE SOURCES)

ABU DHABI - ONSHORE

ALGERIA

BANGLADESH

CAMEROUN

CHILE

CHINA

IRAN - KALINGAS

MALAYSIA - WEST MALAYSIAN PENINSULAR

MEXICO

NIGERIA

PAPUA NEW GUINEA

U.S.S.R. - YAKUTSU

OCEAN FREIGHT OF LNG TRANSPORTATION

Marine transportation costs tend to be high and to form an important part of the total costs associated with an LNG export project being a key variable in deciding the project viability. The ocean transportation therefore must be carefully examined during a feasibility study to the deepest possible.

Ocean freight should vary in each particular case of an LNG project of course but it should be worthwhile having some idea about correlation between ocean freight and transportation distance. For this purpose the figure next page will provide the idea for those who are interested in this area, although calculations were made on many simplified assumptions; not taking into account the specific conditions such as for example shallow seabed in the Bay of Bengal and floating ices in northern seas, to grasp the tendency of the correlation.

Major assumptions used here were as follows:

(1) LNG Carrier

130,000 m^3 TECHNIGAS Mark III membrane carrier

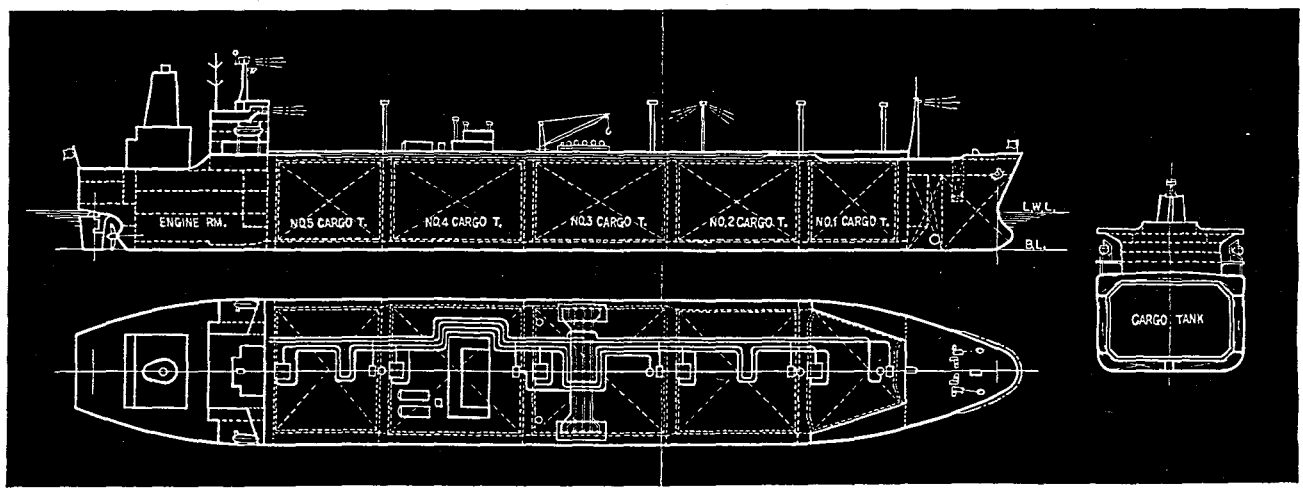
Overall length	272.5 meters
Breadth moulded	42.0 meters
Depth moulded	28.2 meters
Draught	11.0 meters
Dead weight	66,600 tons
Gross tonnage	90,000 tons
Service speed	19.3 knots (Loaded 18.8 knots, Ballast 19.8 knots)

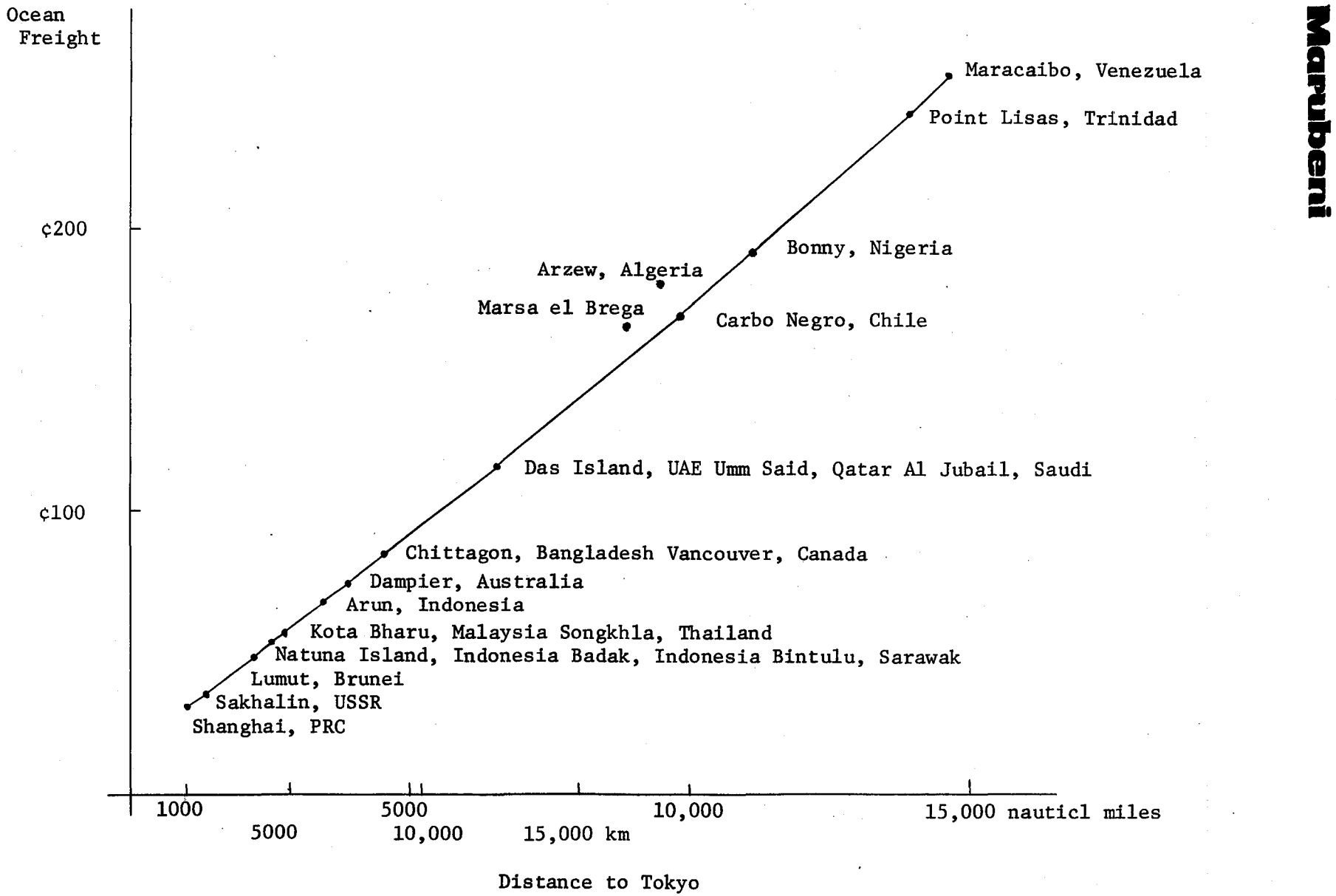
(2) Charter rate

Gross capital cost	38.5 billion yen (US$160 million)
Charter rate	18.9 million yen a day (about US$80,000)

(3) Other assumptions

Maximum load	130,000 x 98% = 127,400 m^3
Boil-off	0.25% per day, which to be used by the main turbine up to 70% of total calory need.
LNG specific gravity	0.468
Fuel oil consumption	Loaded voyage 62 KT/day Ballast voyage 88-194 KT/day
Annual off-hire	28.5 days including warm-up and cool-down periods.



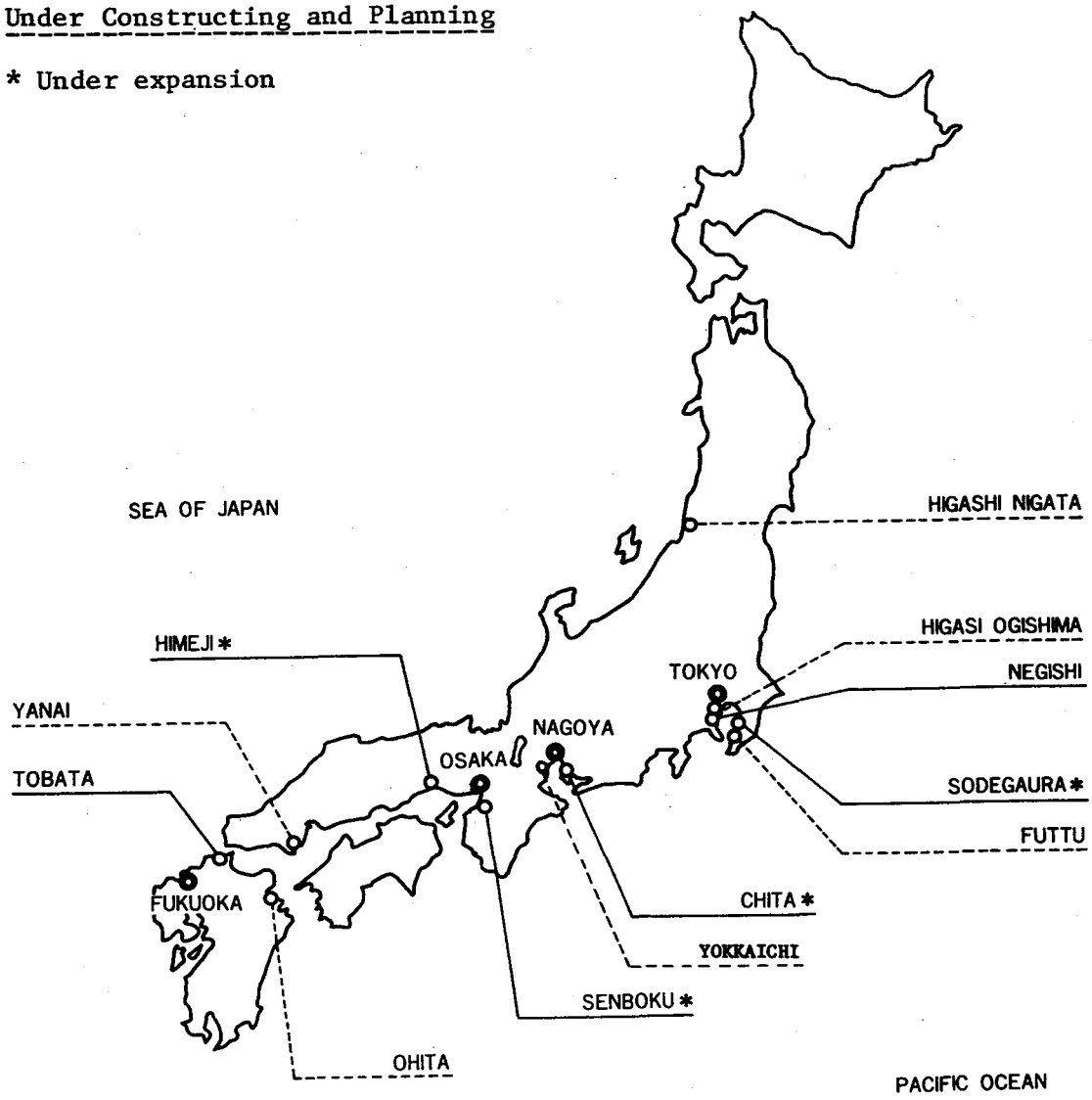

Ocean Freight
¢200
¢100
Maracaibo, Venezuela
Point Lisas, Trinidad
Bonny, Nigeria
Arzew, Algeria
Marsa el Brega
Carbo Negro, Chile
Das Island, UAE Umm Said, Qatar Al Jubail, Saudi
Chittagon, Bangladesh Vancouver, Canada
Dampier, Australia
Arun, Indonesia
Kota Bharu, Malaysia Songkhla, Thailand
Natuna Island, Indonesia Badak, Indonesia Bintulu, Sarawak
Lumut, Brunei
Sakhalin, USSR
Shanghai, PRC
1000
5000
10,000
15,000 nauticl miles
5000
10,000
15,000 km
Distance to Tokyo

LNG RECEIVING TERMINALS IN JAPAN

Currently Operational

Under Constructing and Planning

* Under expansion



In 1969, LNG from Alaska was first imported to Japan through the Negishi Receiving Terminal in Yokohama, with a contract for 0.96 million tons per year. In 1972 - 1973, LNG from Brunei was imported at the Negishi, Sodegaura and Senboku Receiving terminals with a contract for 5.14 million tons per year. By the end of 1982 seven LNG receiving

terminals, Negishi, Sodegaura, Chita, Senboku No. 1, Senboku No. 2, Himeji and Tobata, have been in operation.

Japan's LNG Receiving Terminals in 1982

(Currently operational)

Shipping Terminal	Receiving Terminal		Import Company	Import Quantity Contracted (million metric tons/year)		Start of Operations
Lumut (Brunei)	Sodegaura		Tokyo Electric Power Co.	3.00	5.78	1973
			Tokyo Gas Co.	.72		
Das Island (Abu Dhabi)			Tokyo Electric Power Co.	2.06		1977
Kenai (Alaska)	Negishi		Tokyo Electric Power Co.	.72	1.75	1969
			Tokyo Gas Co.	.24		
Lumut (Brunei)			Tokyo Electric Power Co.	.45		1973
			Tokyo Gas Co.	.34		
Arun (Indonesia) Badak (Indonesia)	Chita		Chubu Electric Power Co.	2.148	2.148	1977
Lumut (Brunei)	Senboku	I	Osaka Gas Co.	.63	2.798	1972
Arun (Indonesia)		II	Osaka Gas Co.	1.30		1977
Badak (Indonesia)			Kansai Electric Power Co.	.868		
Arun (Indonesia) Badak (Indonesia)	Himeji		Kansai Electric Power Co.	1.70	1.70	1979
Arun (Indonesia)	Tobata		Kyushu Electric Power Co.	1.556	2.156	1977
Badak (Indonesia)			Nippon Steel Corp.	.60		
			Total		16.332	

Many technical improvements in LNG receiving terminals have been made in Japan. Negishi and Sodegaura are important in describing Japan's LNG receiving terminals, because the former was the Japan's first receiving terminal, providing much valuable experience, and the latter is the largest in Japan and has the various advances.

Sodegaura starting operations in 1973 is the largest LNG receiving terminal in Japan and is supplying natural gas for power plant of Tokyo Electric Power Company and for Tokyo Gas Company as town gas. Sodegaura has the following advanced feature through the experience gained in planning, operation, and maintenance of the Negishi terminal, which is operated efficiently based on the common use of facilities

such as berths, storage tanks and vaporizers owned by the two companies, Tokyo Electric Power Company and Tokyo Gas Company.

1. Beneficial combination of power plants and town gas manufacturing plants.
2. In ground tanks adopted mainly as a safety precaution.
3. Sophisticated automatic control system based on the use of computers.
4. LNG cold potential used for production of liquid oxygen and nitrogen at an adjacent area.

New LNG Receiving Terminals

(Under Constructing and Planning)

Receiving Terminal	Source of LNG	Import Company	Capacity	Start of Operation
Higashi Niigata	Indonesia (Arun)	Tohoku Electric Power Co.	(80,000 x 4) (100,000 x 2)	1984
Higashi Ogishima	Malaysia (Sarawak)	Tokyo Electric Power Co.	(60,000 x 7)	1983
Futtsu	Australia etc.	Tokyo Electric Power Co.	(60,000 x16)	1985
Chita No. 2	Indonesia (Badak)	Chubu Electric Power Co. Toho Gas Co.	(80,000 x 6)	1983
Yokkaichi	Australia Canada	Chubu Electric Power Co.	(80,000 x 4)	1986
Senboku No. 3	Indonesia (Badak)	Osaka Gas Co.	(80,000 x 8)	1983
Himeji No. 2	Indonesia (Badak) etc.	Kansai Electric Power Co.	(80,000 x14)	1983
Yanai	Australia Canada	Chugoku Electric Power Co.	(80,000 x 7)	1987
Ohita	Australia Canada	Kyushu Electric Power Co.	(80,000 x 5)	1986

In Japan, to meet expanding demand for natural gas and to start receiving LNG from Malaysia (Sarawak), Indonesia (Arun, Badak), Canada and Australia, new LNG receiving terminals are under constructing planning; such as Higashi Niigata, Higashi Ogishima, Futtsu, Chita No. 2, Yokkaichi, Senboku No. 3, Himeji No. 2, Yanai, and Ohita.

JAPAN'S ENERGY DEMAND

(THE RETROSPECTIVE)

Since the so-called 2nd oil crisis in 1979, a picture of energy growth of Japan shows a noteworthy change; that is, a stagnant growth, or even downturn trend in this particular period, that represents a remarkable take-off from the previous records of the continued growth. The main reason of this change is attributed to the incessant effort for energy conservation throughout the country and to the structural change of industry from base material production toward assembling including the "high-tech" industry. These factors are considered to remain in the future too and together with the estimated slower growth of economy itself these should be counted in the future outlook of the Japan's energy picture.

	FY1977	1978	1979	1980	1981
Energy Demand	412	415	443	429	417 MMKl
Petroleum	74.7%	73.2%	71.6%	66.4%	64.2%
Coal	14.8%	13.7%	13.9%	16.7%	18.1%
Nuclear	2.0%	3.7%	4.2%	5.0%	5.5%
Gas	3.6%	4.6%	5.2%	6.0%	6.2%
Hydro	4.8%	4.7%	5.0%	5.6%	5.6%
Others	0.1%	0.1%	0.2%	0.3%	0.3%

As shown above, Japan's energy demand since 1979 shows trend of negative growth; 1980/1979 is -3.2% and 1981/1980 is -2.8%. In addition,

the total energy demand in 1982 is provisionally estimated at 399 MMKl, which is another negative growth of -4.3% from a year before.

Japan once experienced a negative growth of its primary energy demand in 1974-75 when was the adjustment period immediately after the first oil crisis in 1973. However the negative energy growth after the 2nd oil crisis shows a distinctive difference from the previous one because the previous one took place in line with the flat-to-negative growth of economy (1974/73 -0.5% and 1975/74 +1.4%) while the recent negative phenomenon was amid relatively healthy economic growth (1980/79 +4.5%, 1981/80 +3.3% and 1982/81 estimated at +3.1%): This might indicate a fundamental change, as many affirm, in correlation between economic growth and energy growth in Japan.

Japan is largely dependent on imported oil for its primary energy needs but the oil import again is in declining trend as follows:

CY	Crude import	Fuel Oil import	Total, 1,000 b/d
1973	4,934	335	5,269
1974	4,834	376	5,210
1975	4,527	207	4,734
1976	4,629	308	4,937
1977	4,789	301	5,090
1978	4,656	308	4,964
1979	4,834	347	5,184
1980	4,425	259	4,684
1981	3,968	278	4,246

At the Tokyo Summit meeting in 1979, Japan promised to live up to import limit of oil at 5.4 million b/d in 1980 and at 6.3-6.9 million b/d in 1985, which seems an obsolescent standard under situation to prevail.

The following is one of the crude import statistics now in terms of fiscal year (April to next March) and million kilolitres:

FY	Crude import	Saudi	Indonesia	UAE	Mideast	SE Asia
1976	276	31.4%	12.1%	11.5%	79.5%	16.7%
1977	277	30.1%	13.8%	10.7%	77.8%	18.7%
1978	270	29.7%	13.0%	10.7%	77.9%	18.6%
1979	277	26.9%	14.5%	10.2%	75.9%	20.3%
1980	249	33.0%	15.0%	14.7%	71.4%	20.3%
1981	230	35.3%	15.8%	12.7%	69.3%	19.9%
1982	205	32.9%	14.5%	14.7%	70.4%	18.7%

Petroleum Council, an advisory body of the MITI, made public on May 24, 1983 its forecast, inter alia, for crude oil import in the future: 204 million kl in FY 1983, 201 in 1984, 200 in 1985, 202 each in 1986 and 1987.

As a result of two oil crises, Japan has achieved great advances in energy conservation. Statistics for the years between the second oil crisis and fiscal 1981 indicate that improvements in energy consumption efficiency were particularly notable.

Specifically, with energy consumption per unit of GNP in fiscal 1973 as

100, that in fiscal 1981 was 82.0. This indicates that energy-conservation measures have made great headway, with a basic change in the industrial structure as an important factor behind the progress. Particularly in fiscal 1980 and 1981, the years following the second oil crisis, the reductions achieved in energy consumption per unit of GNP on a year-to-year basis were 6.6% and 5.8%, respectively.

As below, all major industries have reduced energy consumption significantly compared with their consumption levels before the first oil crisis. At the same time, oil consumption per unit of industrial output has also fallen significantly, something that reflects the nation's effort to switch fuel from oil to non-oil sources. The greatest reductions were achieved by the cement industry while oil consumption per unit of output in fiscal 1981 being as low as 10.2 with fiscal 1973 as 100, followed by the steel industry at 32.0.

DOWNTREND IN ENERGY CONSUMPTION

PER UNIT OF INDUSTRIAL OUTPUT (FY 1973=100)

Industry	FY 1978	FY 1979	FY 1980	FY 1981
Pulp & Paper	-	95.4	91.4	91.1
Dyeing & Finishing	94.4	92.0	81.0	75.2
Cement	89.3	83.1	79.1	76.2
Steel	92.0	90.5	88.0	86.0
Flat Glass	84.1	75.4	70.6	75.0
Aluminum Refining	94.3	92.2	90.0	92.3
Petrochemical	87.7	80.3	81.4	80.8

The structural change in Japan's industrial pattern is the other large factor which has affected its energy picture. As being developed, industry tends to pursue a direction to add itself higher value and Japan is no exception. In this direction, fabrication/assembly industry, replacing base materials industry, service industry and information industry are to become more prevailing and this will bring a trend toward the less-energy-intensive industry as a whole. According to a recent government forecast, in the year 2000 the service industry will have 48.6% a share in Japan's total industrial structure while one in 1980 was 33.0%; fabrication/assembly industry to grow to 15.7% from 11.9% while base materials production to decline to mere 2.3% from 9.0%.

The following statistics might also imply the structural change in the industrial pattern in relation with its energy demand:

Growth	FY1965-73	FY1973-75	FY1975-79	FY1979-82
GNP	9.5%	1.7%	5.2%	3.6% p.a.
IIP	12.7%	-7.1%	7.5%	4.1% p.a.
Energy	11.1%	-2.0%	3.4%	-4.0% p.a.

(PERSPECTIVE)

Last year, on April 21, 1982, the Ministry of International Trade & Industry accepted a report titled "Long-Term Energy Demand-Supply Outlook" which was prepared by a government Advisory Committee for

Energy. The Outlook shows the Government's firm stance toward reducing the nation's dependence on petroleum and introducing alternative energies coupled with effort for energy conservation. Realizing that the present oil glut is only temporary and that the world oil supply will fundamentally become tight "cyclically and structurally" in the medium-long term, the Report calls for deployment of collective energy policy aiming at (i) securing the stable supply of oil, (ii) promoting development and introduction of alternative energies and (iii) promotion of energy conservation.

The Outlook projects the Japan's energy demand-supply in 1990 and in the year 2000. The new 1990 energy demand outlook represents a 15.7% decrease from the 700 million kl predicted in the previous outlook announced in 1979 down to 590 million kl in oil equivalent terms. The large downward revision was made possible owing to the expected slower growth of energy demand through energy conservation, slower economic growth and structural change in industry, namely shift from the base materials production toward the assembly industry.

The Outlook stands on the assumption that the Japan's economy will grow at an annual rate of about 5% throughout the 1980's and about 4% throughout the 1990's. The growth of energy demand in 1980's is projected at rate of 3.2% yearly and therefore the GNP elasticity is to be 0.64 while the previous report projected it at 0.76.

The main features of the Outlook are as follows:

(1) OIL

Although oil is still expected to maintain a lion's share in the total energy demand-supply picture toward the year 2000, the share keeps decreasing from 66.4% in 1980 to 49.1% in 1990 and 38% in the year 2000, while the oil demand will remain unchanged throughout this century at the level of 290 million kl including LPG. The highlight here is that oil's share is to drop down to less than 50% in 1990 and the oil alternative energies therefore to exceed over the oil's share.

(2) NATURAL GAS

Natural gas is to have an 11.5% share, up from 6.0% in 1980, of the total energy supply in 1990 with the figure of 68 million kl oil equivalent, out of which indigenous natural gas is expected to be 7.3 billion cubic meters, or 700 MMcfd, and LNG to be 43 million tons.

The LNG is predicted to be consumed as follows:

Electric Power generation	31,500 thousand tons
Town gas industry	11,350 thousand tons
(of which special industrial consumption	3,500 thousand tons)

The Outlook states "LNG is a clean energy, of which a relatively stable supply can be expected and therefore it is necessary to promote further expansion of the LNG introduction mainly into city and suburban areas".

(3) COAL

The Outlook also foresees in coal's contribution to the total energy supply from 16.7% in 1980 to 19.5% in 1990 with 153 million tons. The steaming coal demand in 1990 will be 66 million tons, of which 42 million tons is for electric power generation.

(4) NUCLEAR ENERGY

Nuclear energy remains as a main pillar among the oil substitute energies while its supply in 1990 is to be 46 million kilowatts. The nuclear energy will have an 11.3% share in the total energy supply in 1990 and an 18% in the year 2000 with 90 million kilowatts, as it holds a 5.0% share in 1980 with 15.7 million kilowatts.

Out of the 46 million kilowatts in 1990, 32.9 million is under presently operation and firmly planned and therefore the additional 13.1 million kilowatts is to be developed toward the target.

Nuclear energy is regarded as a "semi-indigenous energy" having its own nuclear fuel cycle domestically and the top priority is being attched by the Government to the development of the nuclear energy to decrease the nation's oil dependency.

(5) NEW ENERGIES

Development of new energies which substitute oil energy is expected to be one of effective deterrents against the future price increase of petroleum and the Report calls for the incessant

and well planned efforts for the development of new energies standing on a long-term foresight.

The new energies will represent a 2.5% share in the 1990 energy supply with 15 million kl oil equivalent, of which 1.4 million kl of liquefied coal, 6.5 million kl of solar energy and 3.5 million kl of oil-sand and oil-shale oils. The new energy is expected to have an 8% share in the year 2000 with 65 million kl oil equivalent.

In the meantime, conditions surrounding Japan's economy and energy has apparently turned face about: The economic growth, assumed to be 5% p.a. throughout 1980's, could not be achieved and the recent governmental view is that it will fall into "a higher part of a 3-4% bracket". The growth of energy would be restrained by the faster change in industry structure into fabrication/assembly industry including high-tech electronics industry. In addition, the price rollback of crude oils is believed to make the development of oil substitute energies delayed and thus to make the assumed future energy picture changed.

MITI's Advisory Committee for Energy is to set out re-examination of Japan's energy outlook in a move to complete its deliberations in the coming September, 1983. A revised energy demand in 1990 is reportedly to be set at 491 million kl, about 17% less from the last year's Outlook.

The Advisory Committee held its first meeting on April 20 to discuss a

procedure in an aim to review the Japan's energy policy and the long-term energy outlook which serves as a basis of the energy policy. The subjects to be deliberated over are:

(1) Realistic outlook on energy demand

(2) Energy cost in consideration of national economy

(3) Structure of energy supply sources

(4) Strengthening of energy industries

(5) Security of necessary fund - Governmental aid

The years targeted for discussion are 1990, 1995 and 2000 while 1995 being main and the year 2000 being "reference".

The Advisory committee plans to hold meetings at least two time a month in an attempt to compile a provisional report at a meeting to be held around the end of August or the beginning of September.

One assumption put forward on the table of the Committee's first meeting was as follows:

Economic growth after 1983:	4% p.a.
Energy demand growth after 1983:	2.6% p.a. (elasticity 0.64)
Oil demand growth after 1983:	0.15% p.a.(elasticity 0.037)
Electricity demand growth after 1983:	3.4% p.a. (elasticity 0.86)
Energy supply in 1990:	491 million kl
Oil demand in 1990:	251 million kl
Power demand in 1990:	680 billion kwh

The Institute of Energy Economics (IEE), one of the most prestigious private research institutions, made public in December, 1982 their long-term energy supply projection. They adopted more conservative

figures for assumption than the Government's views; economic growth 1981-90 to be 3.1% p.a. in a Base Scenario and energy's GNP elasticity to be 0.48 -- Thus, the total primary energy demand in 1990 is to be 465 million kl in oil equivalent terms.

In 1990	High Growth	Base Case	Low Growth
GNP	4.0% p.a.	3.1% p.a.	1.4% p.a.
Elasticity (1981-90)	0.53	0.48	0.43
Hydro (MW)	39,000	38,000	37,000
Geothermal (MW)	550	500	450
Domestic Oil & Gas (MMKl)	0.47	0.47	0.47
LNG (1,000 tons)	37,000	35,000	33,000
Nuclear (MW)	35,000	34,000	33,300
Domestic Coal (MMt)	17.0	17.0	17.0
Imported Coal (MMt)	102.5	94.6	86.5
(Steam Coal)	(33.0)	(31.0)	(29.5)
New Energies (MMKl)	0.18	0.15	0.13
Imported Oil (MMKl)	264	251	241
(LPG, MMt)	(15.6)	(15.1)	(14.5)
Total (MMKl)	488	465	444

LONG-TERM ENERGY DEMAND-SUPPLY OUTLOOK

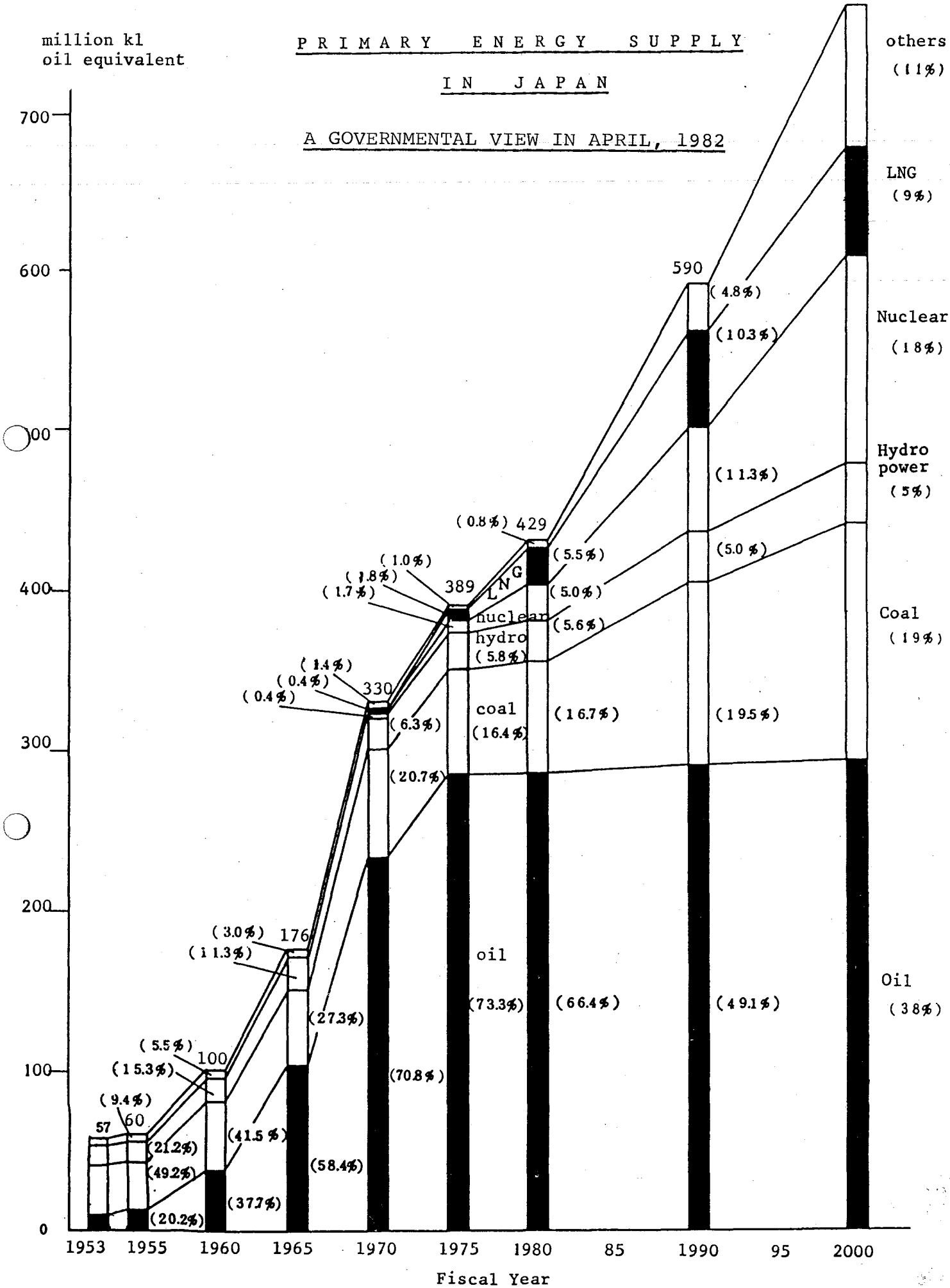
A GOVERNMENTAL VIEW IN APRIL, 1982

Fiscal Year	1980 (Actual)		1990		2000 (roughly estimated)	
Energy Demand (Energy Conservation Rate)	429 million kℓ oil equivalent		590 million kℓ oe (15.5%)		770 million kℓ oe (25%)	
Type of Energy	Quantity	Share	Quantity	Share	Quantity	Share
Coal	92.4 million tons	16.7%	153.0 million tons	19.5%	200.0 million tons	19%
of which indigenous	18.1 million tons		18-20 million tons			
of which steaming coal	21.3 million tons		66.0 million tons			
Nuclear Power	15,700 megawatts	5.0%	46,000 megawatts	11.3%	90,000 megawatts	18%
Natural Gas	25.9 million kℓ oe	6.0%	68.0 million kℓ oe	11.5%	82.0 million kℓ oe	11%
of which indigenous	2.2 billion m^3		7.3 billion m^3			
of which LNG	16.8 million tons		43.0 million tons			
Hydro Power		5.6%		5.0%		5%
of which ordinary	19,000 megawatts		23,500 megawatts		30,000 megawatts	
of which pumped up	10,800 megawatts		22,000 megawatts		33,000 megawatts	
Geothermal	0.3 million kℓ oe	0.1%	6.0 million kℓ oe	1.0%	15.0 million kℓ oe	2%
New Energies	0.7 million kℓ oe	0.2%	15.0 million kℓ oe	2.5%	65.0 million kℓ oe	8%
Oil	285 million kℓ	66.4%	290 million kℓ	49.1%	290 million kℓ	38%
of which indigenous	0.5 million kℓ		1.9 million kℓ			
of which LPG	14 million tons		24 million tons			
Supply Total	429 million kℓ oe	100%	590 million kℓ oe	100%	770 million kℓ oe	100%

(Oil 1ℓ = 9,400 kcal)

Marubeni

approx. 770


million kl
oil equivalent
PRIMARY ENERGY SUPPLY
IN JAPAN
A GOVERNMENTAL VIEW IN APRIL, 1982
700
600
400
300
200
100
0
57
60
100
176
330
389
429
590
(9.4%)
(15.3%)
(5.5%)
(11.3%)
(3.0%)
(0.4%)
(1.4%)
(1.7%)
(1.8%)
(1.0%)
(0.8%)
(5.5%)
(5.0%)
(5.6%)
(5.8%)
(4.8%)
(10.3%)
(11.3%)
(5.0%)
(19.5%)
(49.1%)
(21.2%)
(49.2%)
(20.2%)
(41.5%)
(37.7%)
(27.3%)
(58.4%)
(70.8%)
(6.3%)
(20.7%)
(16.4%)
(16.7%)
(73.3%)
(66.4%)
oil
coal
nuclear
hydro
LNG
others (11%)
LNG (9%)
Nuclear (18%)
Hydro power (5%)
Coal (19%)
Oil (38%)
1953
1955
1960
1965
1970
1975
1980
85
1990
95
2000
Fiscal Year

POLICY BACKGROUND

It is a fundamental policy of the Japanese Government that it pursues stable supply of energy, while noting environmental aspects, through which it promotes the public welfare and the national security. To achieve the object the following measures are slated:

(1) Security of stable supply of oil
(2) Promotion of the energy conservation
(3) Promotion of development and introduction of alternative energies
(4) Promotion of siting for electric power plants
(5) International cooperation

It is resolute for the Japanese Government, as mentioned above, that it pursues the promotion of development and introduction of alternative energies to reduce the dependence on oil: Thus the Government established in May, 1980 a law in order to actually proceed the promotion and also established in October, 1981 an organization named "New Energy Development Organization" who is charged with responsibilities (i) to develop technology for new energies, such as coal liquefaction and solar energy, (ii) to develop geothermal resources, and (iii) to develop overseas coal resources. The law furthermore covers nuclear energy, hydro power, and LNG.

The LNG is regarded as a fuel having long-term security of supply, when compared with oil, and is expected to play a major role among the alternative energies, together with nuclear energy and coal, through utilization in electric power and gas industries. In future, espe-

cially, the LNG is assumed to be more consumed in the town gas industry through (i) resale of gas by the LNG importers to smaller gas enterprises and large industrial consumers and (ii) spread of gas air-cooling systems nation-wide.

To encourage the faster introduction of LNG into Japanese energy framework the Japanese Government has adopted the following policies:

1. Immediate Policy

(i) Aid for exploration, development and production

a. Aid by Japan National Oil Corporation (JNOC)

Under legislative provisions established in 1972 governing the activities of JNOC, it is permitted to provide financial aid to gas exploration and development ventures in the form of equity capital and loan. Guarantees of the obligation can be obtained from JNOC for production of LNG. JNOC is authorized to provide in Fiscal Year 1982 140 billion yen (about US$600 million) of the financial aid and 1 billion yen (about US$4 million) of the guarantee of obligation.

b. Credit by The Export-Import Bank of Japan (EXIM Bank)

By co-financing with commercial banks the EXIM Bank extends credit to usually exporters to provide them with funds necessary to cover their deferred payment credits in connection with construction of liquefaction plants. The EXIM Bank has in FY 1982 a budgetal frame of 312 billion yen (about US$1,300 million) to promote import

toward Japan.

c. Loan by the Development Bank of Japan (DBJ)

The Government hold a Government Shipbuilding Program which includes in FY 1981 loans of 117 billion yen (about US$500 million) by the DBJ coupled with the government interest subsidies of 6.63 billion yen (about US$28 million). The 1981 program allows building of three LNG tankers, 600,000 gross tons of energy-resources transportation vessels and other 300,000 ton vessels. The interest subsidy system now expired though.

(ii) Exemption of import duty for LNG

To encourage the import of LNG the Government exempts the import duty, basic tariff of which is 20%.

(iii) Aid for facilities for LNG utilization

From a standpoint to prevent pollution and to improve individual life, the DBJ offers loans to electric power companies for construction of LNG-fired power plants and to gas companies for construction of LNG receiving terminals. The DBJ also makes available to LNG consumers credits for construction of LNG related facilities, pipe-laying for exclusive use of regasified LNG, and installation of industrial furnaces and boilers being fueled by regasified LNG.

(iv) Special arrangements for taxation

LNG consumers are allowed to choose either the 7% tax amount deduction or the 30% special depreciation rate for their accounting in connection with the LNG related facilities and equipments.

(v) Special contract rate for large consumption of industrial LNG consumers

The rate is now around 7-8 yen per 1,000 kcal (about US$7.35-8.40/MMBTU), which is almost equivalent to ones of kerosine and light fuel oil.

(vi) Subsidy for studies

Subsidies are extended to local governments to study on possibility of introduction of LNG into local industries and study on site and environmental issues of a receiving terminal and secondary transportation. In FY 1981 the amount of 85 million yen (about US$350,000) was provided.

2. Policy toward future

(i) To progressively develop and maintain good diplomatic relations with exporting countries, which will contribute to security of long-term supply of LNG.

(ii) To enrich conditions of loans associated with construction of liquefaction plants by EXIM Bank, JNOC and Overseas Economic Cooperation Fund (OECF) in favor of LNG consumers and also to enrich condition of guarantee of obligation

extended by JNOC.

(iii) To arrange low-interest-financing and favored tax mechanism for construction of LNG receiving terminals.

(iv) In order to facilitate siting of LNG receiving terminals and LNG-fired power plants:

a. to promote enforcement of policies set to form agreement of surrounding and local people to necessity of introduction and safety of LNG.

b. to establish fine-grained siting policies which suit to each specific location.

and in order to meet regulations for reclamation and for navigation:

a. to perform thoroughly advance surveys on safety and environment.

b. to establish a structure for the promotion which coordinates concerned institutions and parties.

(v) To strengthen the system of governmental aids in order that building of LNG tankers in Japan and possession and operation of LNG tankers by Japanese shipping companies are internationally competitive with those of advance countries, and to promote to form a structure for cooperation of concerned business circles.

(vi) To examine a domestic system of LNG receiving (actual measure) corresponding with a "take or pay" clause which is

common in LNG supply contracts.

(vii) In order to expedite more utilization of LNG in gas enterprises and other industries, to strengthen measures of governmental aid for laying pipelines to connect with existing LNG pipelines and for changing in heat value, and examine structures to collect small demands and to supply LNG at low cost.

LNG USAGE IN JAPAN

The LNG imported is currently utilized in Japan in the fields of electric power generation, city gas and general industry, of which power generation is the largest to consume more than 75% of the total imported LNG. Although it is the governmental policy to foster the use of LNG in gas and general industries, the share of the power generation will remain the largest even in 1990 to be about 75% according to the official outlook.

Cold utilization is the newest field of the LNG market and a several cryogenic venture businesses have started in the areas of air liquefaction, CO_2 liquefaction and refrigerated warehouse.

(1) Electric Power Generation

Electric power demand for nine major electric power companies is expected to grow on at a moderate growth rate in the future according to an official forecast announced in April, 1983:

	1981		1987		1992	
Gross Demand	443.5		533.7		638.9	billion kwh
Growth Rate		3.1		3.7		% annually

Due to unexpected low growth rate of the current electricity demand, stable supply is expected for the time being. However, in order to secure long term and stable electric power supply, following development plan is scheduled by the nine electric power companies and EPDC (Electric Power Development Co., a semi-governmental body) for the year 1983 to 1992.

A New Electric Power Development Plan

(Unit: 1,000 KW)

Year / Power	1983-1987	1987-1992	1983-1992 total
Nuclear	10,700	17,680	28,380
Hydro	2,680	5,050	7,730
Thermal	17,420	18,290	35,710
Coal	(3,500)	(7,500)	(11,000)
LNG	(7,960)	(9,700)	(17,660)
LPG	(1,050)	(500)	(1,550)
Geothermal	(110)	(530)	(640)
Oil	(4,800)	(60)	(4,860)
Total	30,080	41,020	71,820

From the standpoint of national security on energy, diversification of energy sources and flexible electric power supply structure is aimed. In addition to the stress on nuclear power development, coal and LNG are steadily promoted in order to reduce dependence on oil.

As the result, a newly developed electric power supply within 10 years will be provided by nuclear (40%), LNG (25%) and coal (15%), respectively.

With the newly developing power supply, the installed capacity of the nine electric companies and EPDC in the long range is scheduled as below table:

Installed Capacity

(Unit: 1,000 KW)

	1982	(%)	1987	(%)	1992	(%)
Nuclear	17,180	(12.8)	27,880	(17.1)	45,560	(22.6)
Hydro						
Ordinary	18,100	(13.4)	19,130	(11.7)	20,780	(10.3)
Pumped-up	13,960	(10.4)	15,550	(9.6)	18,880	(9.3)
Thermal						
Coal	6,500	(4.8)	11,710	(7.2)	18,900	(9.4)
LNG & NG	19,740	(14.7)	32,970	(20.3)	43,100	(21.3)
LPG	1,700	(1.3)	2,750	(1.7)	3,250	(1.6)
Other gas	2,910	(2.2)	2,560	(1.6)	2,560	(1.3)
Geothermal	180	(0.1)	290	(0.2)	820	(0.4)
Oil	54,220	(40.3)	49,840	(30.6)	48,020	(23.8)
Total	134,490		162,680		201,870	

Meantime, the share of each power source in the generated electricity will change from 20% to 34% for nuclear, 16% to 24% for LNG and 7% to 10% for coal in the year 1982 to 1992.

Generated Electricity

(Unit: Billion KWH)

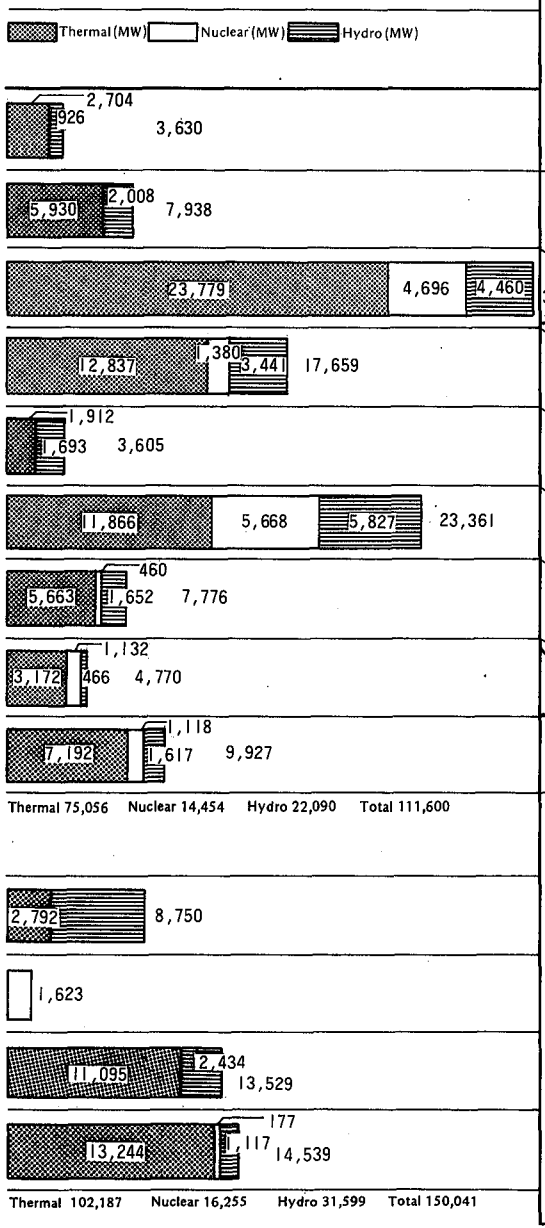
	1983	(%)	1987	(%)	1992	(%)
Nuclear	99.8	(20.0)	159.1	(26.2)	249.5	(34.2)
Hydro	76.7	(15.3)	87.5	(14.4)	95.4	(13.1)
Coal	34.1	(6.8)	53.0	(8.7)	73.1	(10.0)
LNG, LPG & Other Gas	93.5	(18.7)	159.9	(26.4)	193.9	(26.5)
Geothermal	1.0	(0.2)	1.6	(0.3)	2.4	(0.3)
Oil	194.7	(39.0)	145.2	(24.0)	116.1	(15.9)
Total	499.8		606.3		730.4	

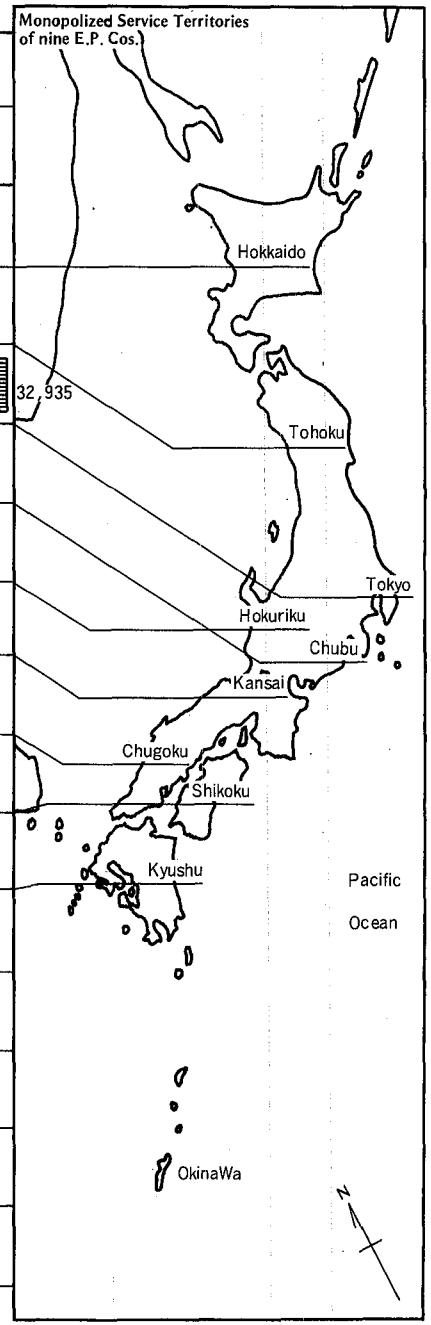
Business Data of Electric Power Companies (As of March 31, 1982)

Names of Member Companies	Capital	Customers	Annual Energy Sales			Service Area	Employees
			Lighting	Power	Total		
	Million Yen	Thousands	Million kWh	Million kWh	Million kWh	Square km	Person
Hokkaido EPCo.	76,469	2,693	5,022	11,372	16,394	78,518	6,265
Tohoku EPCo.	240,000	5,585	9,923	27,790	37,713	79,543	12,634
Tokyo EPCo.	650,000	18,193	35,899	100,160	136,059	39,455	40,064
Chubu EPCo.	293,760	7,319	12,914	52,620	65,534	39,131	19,213
Hokuriku EPCo.	78,540	1,460	2,889	12,051	15,940	12,282	5,639
Kansai EPCo.	359,734	9,443	20,165	63,023	83,187	28,715	24,130
Chugoku EPCo.	174,260	4,068	7,279	25,921	33,200	32,129	11,792
Shikoku EPCo.	103,164	2,164	3,868	12,416	16,284	18,446	6,550
Kyushu EPCo.	220,831	5,952	11,135	28,035	39,220	42,084	14,645
Total 9 Electric Power Companies	2,196,758	56,877	109,144	334,387	443,531	370,303	140,932
Electric Power Development Co.	70,600						3,469
Japan Atomic Power Co.	62,000						1,121
Other Electric Utilities							
Industry Owned							
Total	2,329,358						145,522

Note: 1. "Other Electric Utilities" used herein involve Okinawa E.P. Co., all the public utilities (whole salers) operated by local autonomies and joint-ventured generating companies, etc.
2. "Industry Owned" (or "Auto-Producers")shows those plants operated exclusively for their own industry use.

Generating Capacity Installed
(As of March 31, 1982)





MODIFIED

RECORD OF LNG-FUELED POWER UNITS IN FY1981

COMPANY & UNIT	CAPACITY (MW)	GENERATED POWER (Million kwh)	CAPACITY FACTOR	FUEL CONSUMED				THERMAL EFFICIENCY
				FUEL OIL (Kℓ)	CRUDE OIL (Kℓ)	LNG (LPG) (Ton)	LIGHT OIL (Kℓ)	
TOKYO								
SODEGAURA 1-4	3,600 (600, 1,000 x 3)	17,700	56.1%			3,011,088		38.85%
MINAMI-YOKOHAMA 1-3	1,150 (350 x 2, 450)	5,919	58.8%			1,039,207		37.14%
GOI 1-6	1,760 (265 x 4, 350 x 2)	5,139	33.3%		24,382	890,438	150	37.48%
ANEGASAKI 1-4	2,400 (600 x 4)	8,677	41.3%	360,734	626,308	803,987 (5,349)	255	37.89%
ANEGASAKI 5-6	1,200 (600 x 2)	6,406	60.9%			393,316 (754,567)		38.98%
19 units	10,110 MW					6,138,036		
CHUBU								
CHITA 3-4	1,200 (500,700)	5,554	52.8%	520,123	175,590	434,495	2,712	38.60%
5-6	1,400 (700 x 2)	9,001	73.4%			1,548,648		38.43%
4 units	2,600 MW					1,983,143		
KANSAI								
SAKAIKOH 1-8	2,000 (250 x 8)	9,129	52.1%	144,003	350,852	1,292,705	3,253	36.53%
HIMEJI-II 1-6	2,550 (250, 325 x 2 450, 600 x 2)	12,337	55.2%	155,328	530,131	1,683,432	2,301	37.43%
14 units	4,550 MW					2,976,137		
KYUSHU								
SHINKOKURA 1-2	312 (156 x 2)	679	24.9%			127,992		35.05%
3-4	1,200 (600 x 2)	7,479	71.2%			1,301,060		38.01%
TOBATA-KYODO 1-4	937 (156 x 2, 250, 375)	6,303	76.8%			700,272	(+BFG/COG)	37.44%
8 units	2,449 MW					2,129,324		
45 units	19,709 MW					13,226,640		

(2) City Gas

The Japanese gas industry which started in 1872 using coal as a feedstock has expanded since then and following the energy revolution in the 1950's by which the solid fuel was shifted to liquid fuel, the gas undertakings one after another began to use oil-based feed-stocks such as crude oil, naphtha and LPG. In the 1960's large gas companies started to use the LNG as a means to prevent air pollution, and to preserve the clean environment.

There are 248 gas companies in Japan in 1982 and classification according to usage of feedstocks in 1982 was as follows:

	'1982
Naphtha	2
Natural gas	64
LPG	102
LPG and Naphtha	30
Variety of coal, coak, oil, LPG and LNG	50

Consumption of raw material is historically shown as follows:

	Coal (1000t)	Crude Oil (1000 kl)	Kerosine/Naphtha (1000 kl)	LPG (1000t)	LNG (1000t)
FY 1969	6,995	1,234	1,424	156	19
1970	7,126	1,300	1,533	176	229
1971	6,682	1,268	1,800	223	247
1972	6,167	1,011	2,322	389	240
1973	6,541	643	2,453	381	764
1974	6,597	270	2,841	450	1,187
1975	6,312	109	2,918	538	1,499
1976	5,710	47	2,991	648	1,845
1977	5,147	3	2,658	722	2,096
1978	4,640	0	2,243	821	2,681
1979	4,479	0	1,856	1,101	2,851
1980	4,884	0	1,749	1,394	3,424
1981	4,769	0	1,086	1,737	3,783

The prospects of feedstocks in the future is expected as follows:

1) Coal is now mainly used by four large companies (Tokyo, Osaka, Toho and Saibu Gas Co.) and it is assumed that no drastic change will take place in the consumption of coal, both indigenous and imported.

2) Being the main feedstocks especially for small and medium sized undertaings, petroleum-based feedstocks are expected to remain unchanged. However, the unstable supply and the expensiveness of naphtha for city gas manufacturing has resulted in the rapid remodeling of manufacturing facilities to shift to LPG feedstock which is expected to be in more stable supply. Consequently, the use of naphtha is decreasing while that of LPG increasing.

3) The consumption of LNG has been on a steady increase since it was first imported from Alaska in 1969. The LNG is regarded as one of the ideal fuels for gas industry because of its characteristics of clean burning and of high gasification efficiency. Furthermore calorific value of supply gas can be increased almost double by adopting the LNG and this means the capacity of existing pipelines and holders becomes double without change of equipments. LNG is further expected to grow as a main feedstock of the major gas companies; for Tokyo Gas, largest gas company in Japan will have an 78.9% share for LNG out of total feedstock raw materials in 1987.

The forecast prepared by the Government in this spring on the future feedstocks is as follows:

	Coal (1000t)	Kerosine/Naphtha (1000 kl)	LPG (1000t)	LNG (1000t)	Gas sold (10,000 Kcal)
FY 1982	4,416	814	1,863	3,996	9,900 million m^3
1983	4,366	840	1,875	4,287	10,232
1984	4,396	783	1,919	4,599	10,637
1985	4,325	767	1,973	4,963	11,080
1986	4,583	740	2,102	5,209	11,552
1987	4,631	695	2,171	5,519	12,054

In 1981, city gas was consumed 59.9% by domestic houses, 17.4% by commercial customers, 16.4% by industrial customers; the total volume of sold gas was about 9.7 billion cubic meters at 10,000 Kcal.

Home use of the city gas is assumed not to grow much because of competition with solar heating and consumers' effort for energy conservation and its growth is only estimated at an annual rate of 2.6% toward 1987 to have 56.2% share. The commercial use is regarded to grow at 3.3% to have an 17.0% share and the industrial use is expected to increase rapidly, replacing kerosine and light fuel oil, at 7.1% to a 20.0% share in 1987. Gross gas to be sold is to reach a volume of 12.1 billion cubic meters in 1987 by a growth at an annual rate of 3.6%.

Backed by the governmental promotion, the gas companies who now imports LNG, namely Tokyo, Osaka, and Toho Gas, are promoting special gas sales contracts with their industrial customers for regasified LNG. The contract should be (i) long-term, more

than 3 years, (ii) of large volume, more than 4 million cubic meters at 11,000 Kcal per year, equivalent to 3,400 tons of LNG, and (iii) under obligation of some load factor. The gas price under this arrangement is controlled by the Government and is currently in the range of 7-8 yen per 1,000 Kcal (about US$7.35-8.40/MMBTU) which is almost equivalent to ones of kerosine and light fuel oil. The first special industrial contract was concluded in September 1979 by Osaka Gas and the volume of the special industrial contracts has grown, with tax incentives such as special depreciation mechanism for LNG related facilities and exemption of gas tax, to 0.68 billion cubic meters at 10,000 Kcal in 1982.

Next important subject is the seasonal load adjustment extended over electric power and gas utilities, especially in summer season. Because of electric power demand for air conditioning unit, index for July - August power demand shows a peak of 117 when 100 is annual through average while demand for gas in the same period plunges to 72 (136 in January). With this background, MITI now plans to promote air conditioning by gas and as the first step to have those in governmental buildings.

(3) Industry

There are no pipeline networks which cover wide areas in Japan, being different from situation in the U.S.A. and Europe, and this makes it difficult to broaden the customers of LNG in general industry, except those users who are located close enough to LNG

receiving terminals.

Gas energy is quite preferable from a standpoint of anti-pollution and expected to be used more in industry if the above difficulty is removed. To promote the LNG use in industry the Japanese Government provides gas enterprises with a low-rate financing with a single year frame of 20.0 billion yen in FY 1983 (about US$83 million) for pipeline laying and facilities exclusively for industrial use of LNG at the rate of 5.15% p.a. In addition Government offers a financing at 7.5% p.a. for modification and new installation of LNG use boilers and furnaces in industry.

LNG can be utilized as a chemical feedstock to produce such chemical products as methanol and ammonia but it is difficult for chemical companies to commit themselves to take the LNG for 20 years long when consider the market fluctuations and technological development in the future.

(4) Cold Utilization

LNG is conventionally just vaporized by using sea water but with an eye to the cold potential of LNG, the various processes to utilize LNG cold has been developed. The following summarizes the projects operated and planned at each LNG terminal:

Marubeni

Utilization of LNG Cold

Process	LNG Terminal	Starting Date	Capacity	LNG Amount Used (t/H)
Air Separation	Negishi	Jul. 1971	Liquid O_2 7,000 m^3/H Liquid N_2 3,050 m^3/H	8
	Senboku (I)	Sep. 1977	Liquid O_2 7,500 m^3/H Liquid N_2 7,500 m^3/H Liquid Argon 150 m^3/H	23
	Senboku (II)	Jan. 1983	Liquid O_2 7,500 m^3/H Liquid N_2 7,500 m^3/H Liquid Argon 200 m^3/H	40
	Sodegaura	Oct. 1978	Liquid O_2 6,000 m^3/H Liquid N_2 6,000 m^3/H Liquid Argon 100 m^3/H	34
	Chita	Apr. 1980	Liquid O_2 6,000 m^3/H Liquid N_2 4,000 m^3/H Liquid Argon 120 m^3/H	26
	Kitakyushu	Jul. 1984 (Planned)	Liquid O_2 3500 m^3/H Liquid N_2 3500 m^3/H Liquid Argon 75 m^3/H	15
Refrigerated Warehouse	Negishi	Oct. 1974	Freezing Capacity 12,000 t	4
Liquid Carbon Dioxide	Senboku (I)	Apr. 1980	Liquid CO_2 100 t/D	3.2
	Negishi	May 1983 (Planned)	Liquid CO_2 86 t/D Dry Ice 48 t/D	6.4
	Chita	Jul. 1982	Liquid CO_2 70 t/D Dry Ice 40 t/D	6
Electric Power Generation	Senboku (II)	Dec. 1979	Generated Power 1450 kW	60
	Senboku (II)	Mar. 1982	Generated Power 6,000 kW	150
	Negishi	Oct. 1980	Generated Power 130 kW	5
	Negishi	Aug. 1984 (Planned)	Generated Power 4,000 kW	100
	Himeji	1981	Generated Power 400 kW	10
	Chita	Dec. 1981	Generated Power 1,000 kW	40
	Kitakyushu	Nov. 1982	Generated Power 8,500 kW	150
	Chita	Mar. 1983 Mar. 1984 (Planned)	Generated Power 6,000 kW x 2	130 x 2
	Niigata	Jul. 1984 (Planned)	Generated Power 5,600 kW	175
	Higashi-Ogishima	Dec. 1986 (Planned)	Generated Power 19,300 kW	–
	Futtsu	Nov. 1988 (Planned)	Generated Power 15,000 kW	–

Marubeni

JAPAN'S ROOM FOR LNG, MARUBENI'S FORECAST

The faster change in Japan's industry structure and the price rollback of crude oils have made it very difficult to forecast the future demand for LNG. According to MITI's long-term energy outlook* announced in April 1982, demand for LNG and domestic natural gas was estimated at 48 million tons in LNG equivalent in 1990 and 58 million tons in 2000, while, however, MITI has set out re-examination of Japan's energy outlook which is scheduled to be complete in September 1983.

One of the most important elements in the forecast of the future LNG demand in Japan is how to estimate the consumed volume of LNG in electric power companies' multi-fueled plants. Power capacity of LNG-exclusively-fired and multi-fueled plants are expected as follows:

	1982	1992
LNG Exclusive	7,662 MWe	22,884 MWe
Multi-Fueled	12,047 MWe	18,185 MWe
(LNG/Oil)	(9,910 MWe)	(16,048 MWe)
(LNG/LPG)	(1,200 MWe)	(1,200 MWe)
(LNG/BFG/COG)	(937 MWe)	(937 MWe)
Total	19,709 MWe	41,069 MWe

In FY 1981 LNG-exclusively-fired consumed 7.0 million tons of LNG and multi-fueled plants consumed 6.2 million tons of LNG, 1.2 million kl of fuel oil, 1.7 million kl of crude oil, 760 thousand tons of LPG and so on.

This forecast is made under an assumption that LNG will maintain an advantage over crude oil and fuel oil throughout the 20th century until

2,000 not only as non-pollution fuel but also in price per heat value.

MARUBENI has maintained close and excellent relationships with all the electric power companies and major gas companies in Japan through supply of many kinds of fuels including the $25 billion worth nuclear fuels and this enables us to perform a forecast of Japan's room for LNG through detailed survey of each company's room.

*MITI's forecast in its long-term energy outlook

	1980 (actual)	1990	2000
LNG	16.8 million tons	43 million tons	Not indicated
Natural Gas	2.2 billion M^3	7.3 billion M^3	"
(In LNG equivalent)	(1.5 million tons)	(5 million tons)	
Total Demand	18.3 million tons	48 million tons	58 million tons
(In oil equivalent)	(25.9 million kl)	(68 million kl)	(82 million kl)

Note: Demand for LNG in 2000 will be 53-58 million tons in case that Japan can't maintain the volume of domestic natural gas production in 2000 at the level of the volume in 1990, while Japan will be able to estimate the imported volume of LNG in 2000 conservatively at 49.5 million tons if the increase of the volume of annual natural gas production in 90's is expected to be as much as expected in 80's.

The following is a summary of the forecast by MARUBENI:

Marubeni

Latent Demand, million tons

	1988	1990	1992	2000
Electric Power (Nippon Steel included)	26.8	30.1	31.5	38.4-46.6
Gas	7.4	7.9	8.4	10.2-12.4
Total	34.2	38.0	39.9	48.6-59.0

*Scheduled Supply, million tons

Electric Power (Nippon Steel included)	25.8	28.1	28.7	25.2
Gas	7.4	7.9	7.9	6.2
Total	33.2	36.0	36.6	31.4

* Supply from Alaska, Brunei, Abu Dhabi, Indonesia, Sarawak, Canada and Australia only.

Room for LNG, million tons

Electric Power (Nippon Steel included)	1.0	2.0	2.8	13.2-21.4
Gas	0	0	0.5	4.0- 6.2
Total	1.0	2.0	3.3	17.2-27.6

In terms of billion cubic feet per day, approximately .....

0.14	0.27	0.45	2.33-3.74

The case studies are performed for Tokyo, Kansai and Chubu Electric Power Companies and Gas Companies as follows:

(1) LNG Requirement by Tokyo Electric Power Company (TEPCO)

1. LNG POWER PLANT

(i) TEPCO's thermal power plants which are capable to burn LNG has now reached 10,110 MWe as follows:

Anegasaki	Nos. 1 thru 6	3,600 MWe
Sodegaura	Nos. 1 thru 4	3,600 MWe
Goi	Nos. 1 thru 6	1,760 MWe
Minami-Yokohama	Nos. 1 thru 3	1,150 MWe
	Total	10,110 MWe

(ii) TEPCO plans to convert the following plants to have capability of burning LNG by 1985:

Kawasaki	Nos. 1 thru 6	1,050 MWe
Yokohama	Nos. 1 thru 6	1,225 MWe
	Total	2,275 MWe

(iii) In addition, TEPCO intends to have the following LNG power plant operated commercially:

In 1986	Higashi-Ohgishima	Nos. 1 and 2	2,019 MWe
In 1986	Futtsu	No. 1	1,000 MWe
In 1988	Futtsu	No. 2	1,015 MWe
		Total	4,034 MWe

(iv) In total of the above, 16,419 MWe is to be available for TEPCO to burn LNG in 1988.

(v) TEPCO's target toward the formation of power sources at the end of FY 1992 is as follows:

	Capacity	Electric Energy
Hydro	18%	7%
Nuclear	25%	40%
Oil	18%	15%
Coal	4%	3%
LNG and Natural Gas	33%	34%
Others	2%	1%
	100%	100%

2. LNG PROCUREMENT

(i) TEPCO now has the following LNG supply contracts:

Alaska	720,000 tons yearly
Brunei	3,450,000
Abu Dhabi	2,060,000
Sarawak	4,000,000
Indonesia (Arun new contract)	400,000

(ii) TEPCO expects 900,000 tons yearly of LNG from Australia. It is said the supply will start in 1988 and will reach 900,000 tons yearly around 1990.

3. TEPCO'S ROOM FOR LNG

(i) TEPCO plans to supply electric power of some 70.0 billion kwh generated by LNG burning plants and

domestic natural gas burning plants in 1989 and onward in its electric energy supply plan for FY 1983 - FY 1992 announced in this April.

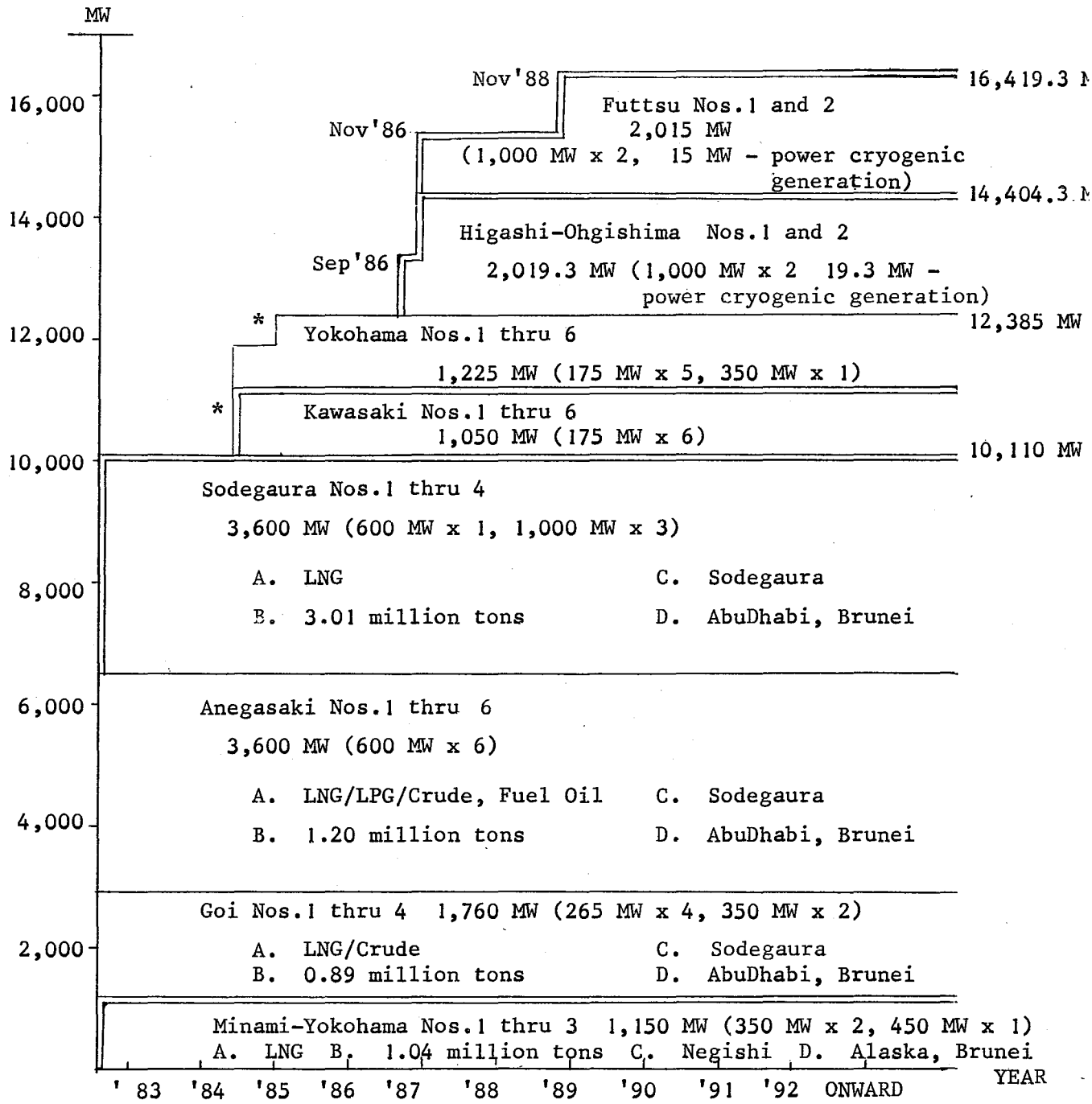
In 1990 TEPCO's power plant to have capability of burning domestic natural gas is expected to be 1,600 MWe in addition to the capacity of LNG burning plants be 16,419 MWe, so it is expected that TEPCO's maximum LNG demand will be 11.5 million tons.

(ii) While the LNG supply will be 10.8 million tons in total from Brunei (3.45 million tons), Abu Dhabi (2,06 million tons), Sarawak (4.0 million tons), Indonesia (0.4 million tons) and Australia (0.9 million tons) in 1990 due to the termination of the supply from Alaska.

(iii) Thus we estimate that TEPCO has finished minimum LNG procurement until 1992, but nevertheless, can accommodate 0.7 million ton yearly in 1990 and onward, if LNG could succeed in replacing fuel oil at the multi-fueled power plants.

Marubeni

TOKYO ELECTRIC POWER CO.



* Conversion from oil-burning plant
A Fuel actually in FY 1981
B Consumed volume of LNG in FY 1981
C Receiving Terminal
D Source of LNG

(2) LNG Requirement by Kansai Electric Power Company

1. LNG POWER PLANT

(i) Kansai's thermal power plants which are capable to burn LNG has reached 4,550 MWe.

Sakaiko	Nos. 1 thru 8	2,000 MWe
Himeji-No.2-Station	Nos. 1 thru 6	2,550 MWe
	Total	4,550 MWe

(ii) Kansai plans to modify Himeji-No.2-Station power plants Nos. 3 and 4 (281 MWe in total) to enable to burn LNG after 1985.

(iii) Kansai also plans to have five 600 MWe power plants Nos. T1 thru T5, which will burn LNG exclusively;

In 1988	T1	600 MWe
In 1989	T2 and T4	1,200 MWe
In 1991	T3 and T5	1,200 MWe
	Total	3,000 MWe

(iv) In total of the above, 7,831 MWe is to be available for Kansai to burn LNG in 1991.

(v) Kansai's target toward the formation of power sources at the end of FY 1992 is as follows:

	Capacity	Electric Energy
Hydro	19%	13%
Nuclear	30%	48%
Oil	30%	15%
Coal	2%	2%
LNG	19%	22%
	100%	100%

2. LNG PROCUREMENT

(i) Kansai has now the following LNG supply contracts:

Indonesia	2,568,000 tons yearly
Indonesia (Badak new contract)	800,000 tons yearly

(ii) It is said the supply from Australia (900,000 tons yearly) will start in 1988 and will reach 900,000 tons yearly around 1990.

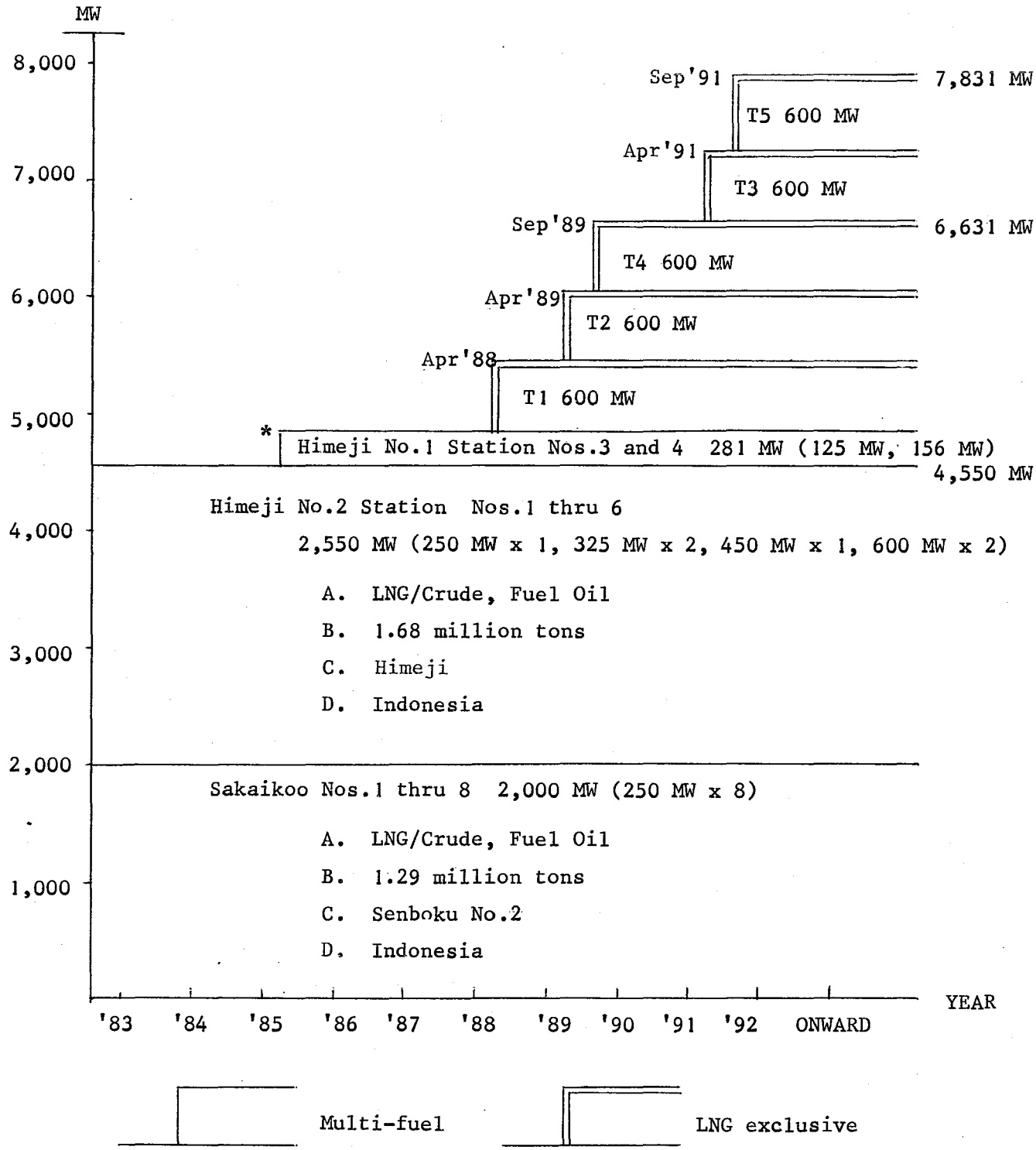
3. KANSAI'S ROOM FOR LNG

(i) Kansai plans to supply electric power of 29.8 billion kwh generated by LNG burning plants in 1991 and 1992 in its electric energy supply plan for FY 1983 - FY 1992. It is expected that Kansai's maximum LNG demand will be 5.7 million tons yearly in 1991 and 1992.

(ii) While the LNG supply will be 4.3 million tons from Indonesia and Australia. Thus Kansai's room for LNG will reach 1.4 million tons yearly in 1991 and 1992.

Marubeni

KANSAI ELECTRIC POWER CO.



* Conversion from oil-burning plant
A Fuel actually in FY 1981
B Consumed volume of LNG in FY 1981
C Receiving Terminal
D Soruce of LNG

(3) LNG Requirement by Chubu Electric Power Company

1. LNG POWER PLANT

(i) Chubu's thermal power plants which are capable to burn LNG has reached 2,600 MWe as follows:

	Chita	Nos. 3 thru 6	2,600 MWe

(ii) Chubu plans to convert the following plants to have capability of burning LNG:

In 1984	Chita	No. 1	375 MWe
In 1985	Chita	No. 2	375 MWe
In 1986	Yokkaichi	Nos. 1 thru 3	660 MWe
		Total	1,410 MWe

(iii) Chubu also plans to have following new power plants operated commercially.

In 1983	Chita-No.2-Station	Nos. 1 and 2	1,400 MWe
In 1986	Yokkaichi	No. 4	572 MWe
In 1989	Kawagoe	No. 1	700 MWe
In 1991	Kawagoe	No. 2	700 MWe
		Total	3,372 MWe

(iv) According to Chubu's latest electric power installation plan announced in this April Chubu has a new conversion plan around 1990 of "X" plant with a capacity of 750 MWe.

(v) In total of the above, 8,132 MWe is to be available for Chubu to burn LNG in 1991.

(vi) Chubu's target toward the formation of power sources at the end of FY 1992 is as follows:

	Facility	Electric Energy
Hydro	18%	12%
Nuclear	14%	25%
Oil	32%	25%
Coal	3%	5%
LNG	33%	36%
	100%	100%

2. LNG PROCUREMENT

(i) Chubu has now following LNG supply contracts:

Indonesia	2,148,000 tons yearly
Indonesia (Badak new contract)	1,500,000 tons yearly

(ii) It is said the supply from Canada will reach 1.6 million tons yearly in 1988 and the supply from Australia starting in 1988 will reach 0.9 million tons yearly around 1990.

3. CHUBU'S ROOM FOR LNG

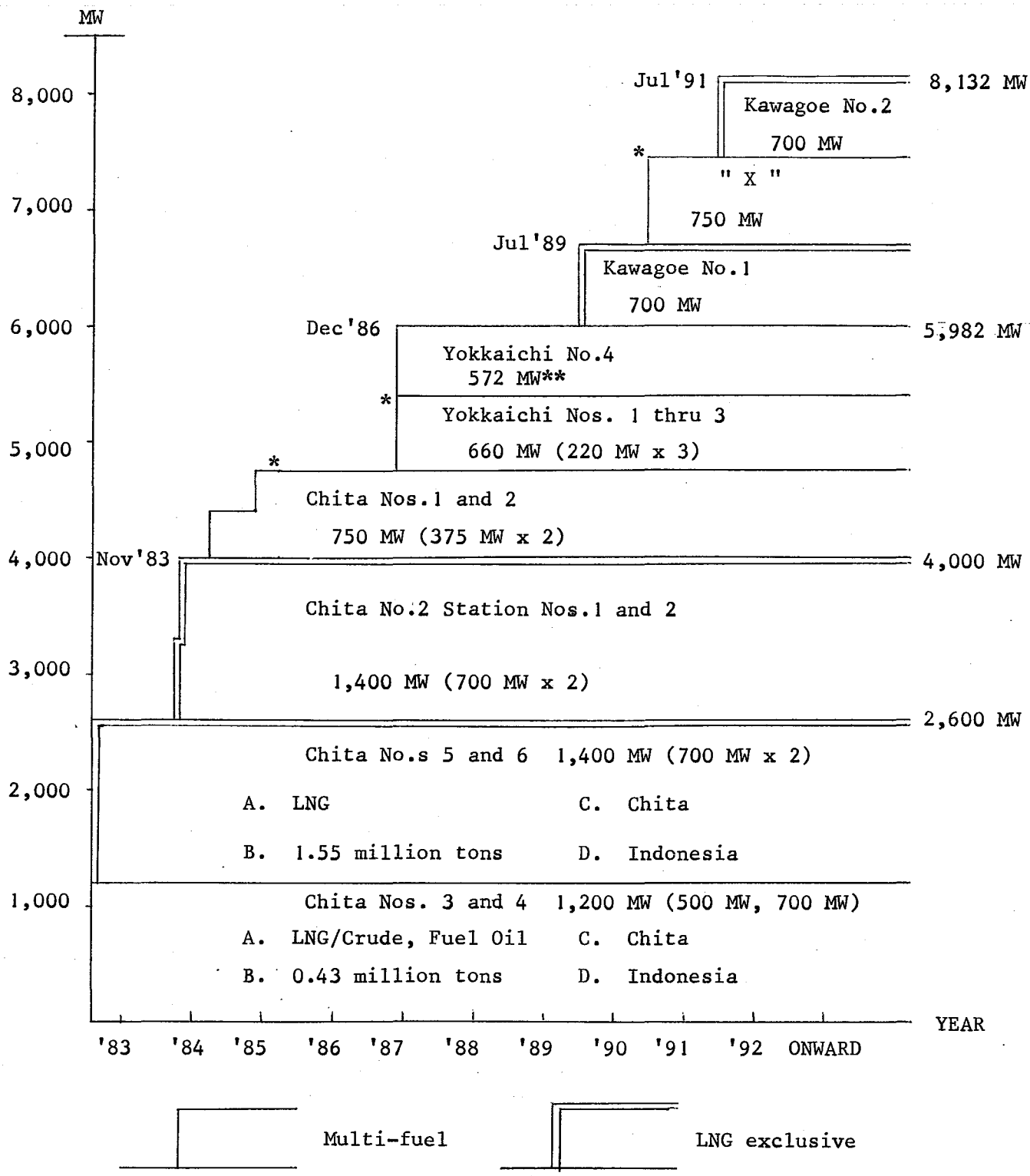
(i) Chubu plans to supply electric power of 35.4 billion kwh generated by LNG burning plants in 1991 and 1992 in its electric energy supply plan for FY1983 - FY1992.

It is expected that Chubu's maximum LNG demand will be 6.8 million tons yearly in 1991 and 1992.

(ii) While the LNG supply will be 6.1 million tons from Indonesia, Canada and Australia. Thus Chubu's room for LNG will reach 0.7 million tons yearly in 1991 and 1992.

Marubeni

CHUBU ELECTRIC POWER CO.



* Conversion from oil-burning plant

** of which 6 MW capacity (power cryogenic generation) will be installe in Jul'89 and another 6 MW capacity will be installed in Jul'91

A Fuel actually in FY 1981

B Consumed volume of LNG in FY 1981

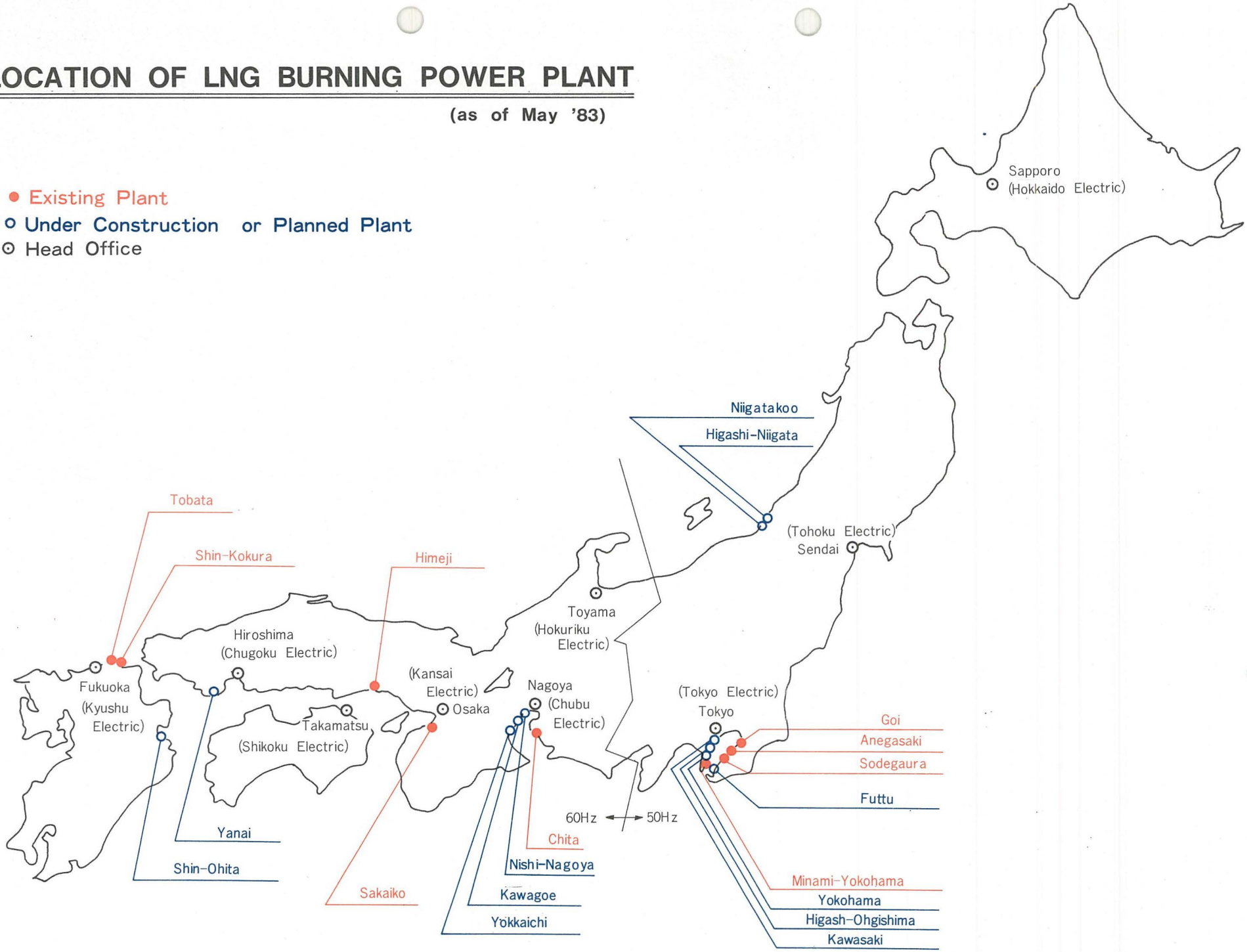
C Receiving Terminal

D Source of LNG

LOCATION OF LNG BURNING POWER PLANT

(as of May '83)

● Existing Plant
○ Under Construction or Planned Plant
⊙ Head Office



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(4) LNG Requirement by Gas Companies

1. OUTLINES OF GAS COMPANIES

There were 248 gas companies at the end of 1981. The range of the scope of gas companies is substantially varied, from a big scale company that supplied gas extensively for a large economic bloc to a very small one that supplied gas on a municipal basis.

Tokyo Gs Co., the largest gas company, supplied 35,860 billion Kcal gas in FY 1982 for the Metropolitan Area including Tokyo and Yokohama. Osaka Gas Co., the second largest, of which supply area is the Kinki economic bloc including Osaka, Kyoto and Kobe supplied 30,339 billion Kcal gas in FY 1982. Toho Gas Co. of which gas sales for the central Japan economic bloc around the city of Nagoya reached 5,819 billion Kcal in FY 1982 is the third largest.

In 1981 about 74% of the total gas use in Japan was sold by these three leading companies.

2. LNG USING OF GAS COMPANIES

The LNG's share in all feedstocks of Osaka Gas reached 70% in 1980 increasing by 47% in 6 years from 1974 and the share of Tokyo Gas will be over 70% in 1983 and will be 79% in 1987 according to Tokyo Gas' plan announced in this March.

On the other hand Toho Gas plans to increase the LNG's share which was 65% in 1982 up to 74% in 1983.

So it is presumed the LNG's share in all feedstocks of major three gas companies will be 70 - 80% in late 80's.

3. LNG PROCUREMENT

* i) Gas Companies has now the following supply contracts:

Alaska	240,000 tons yearly (for Tokyo Gas)
Brunei	1,690,000 tons yearly (1,060,000 tons for Tokyo Gas and 630,000 tons for Osaka Gas)
Indonesia	(including Badak new contract) 2,200,000 tons yearly (1,700,000 tons for Osaka Gas and 500,000 tons for Toho Gas)
Sarawak	2,000,000 tons yearly (for Tokyo Gas)

(ii) Gas Companies expect the following LNG supplies:

Canada	700,000 tons yearly (550,000 tons for Osaka Gas and 150,000 tons for Toho Gas)
Australia	1,340,000 tons yearly (580,000 tons for Tokyo Gas, 580,000 tons for Osaka Gas and 180,000 tons for Toho Gas)

It is said by 1990 the supply from Canada will reach 700,000 tons yearly and the supply from Australia will reach 1,340,000 tons yearly.

(iii) So LNG procurement of Gas Companies will be some 7.9 million tons in 1990 and onward.

4. GAS COMPANIES' ROOM FOR LNG

(i) It is very difficult to achieve the figure of 11.35 million ton which MITI's outlook, announced in April 1982, estimated as the required LNG volume for gas companies in 1990 due to the fall of economic growth throughout 1980's from 5% P.A., assumed last year by MITI's outlook, to 3-4% P.A., assumed by recent governmental view.

(ii) Tokyo Gas estimated the growth of its gas sales for 1983-1987 at 3.8% P.A. in the gas supply plan announced in this March and Osaka Gas estimated at a little over 3% P.A.

(iii) It is expected gas companies will be hard to fully consume their contracted LNG throughout 1980's, and thus no additional LNG could be required by gas companies by 1990.

Japanese Utility Companies' room for LNG:

	FY1988	FY1990	FY1992
Tokyo Electric			
Power capacity (MWe)*	16,419	16,419	16,419
Latent demand (estimate, million tons)	11.5	11.5	11.5
Scheduled supply (million tons)	10.9	10.8	10.8
Room for LNG (million tons)	0.6	0.7	0.7
Kansai Electric			
Power capacity (MWe)	5,431	6,631	7,831
Latent demand (estimate, million tons)	4.1	5.3	5.7
Scheduled supply (million tons)	3.7	4.3	4.3
Room for LNG (million tons)	0.4	1.0	1.4
Chubu Electric			
Power capacity (MWe)	5,982	7,432	8,132
Latent demand (estimate, million tons)	5.5	6.4	6.8
Scheduled supply (million tons)	5.5	6.1	6.1
Room for LNG (million tons)	0.0	0.3	0.7
Other Electric Power Companies			
Power capacity (MWe)	6,350	7,050	7,750
Latent demand (estimate, million tons)	5.1	6.3	6.9
Scheduled supply (million tons)	5.1	6.3	6.9
Room for LNG (million tons)	0.0	0.0	0.0
Gas Companies			
Latent Demand (estimate, million tons)	7.4	7.9	8.4
Scheduled supply (million tons)	7.4	7.9	7.9
Room for LNG (million tons)	0.0	0.0	0.5
Nippon Steel			
Latent Demand (estimate, million tons)	0.6	0.6	0.6
Scheduled supply (million tons)	0.6	0.6	0.6
Room for LNG (million tons)	0.0	0.0	0.0
TOTAL ROOM	1.0	2.0	3.3

* Power capacity of each electric company is presumed at the end of each fiscal year.

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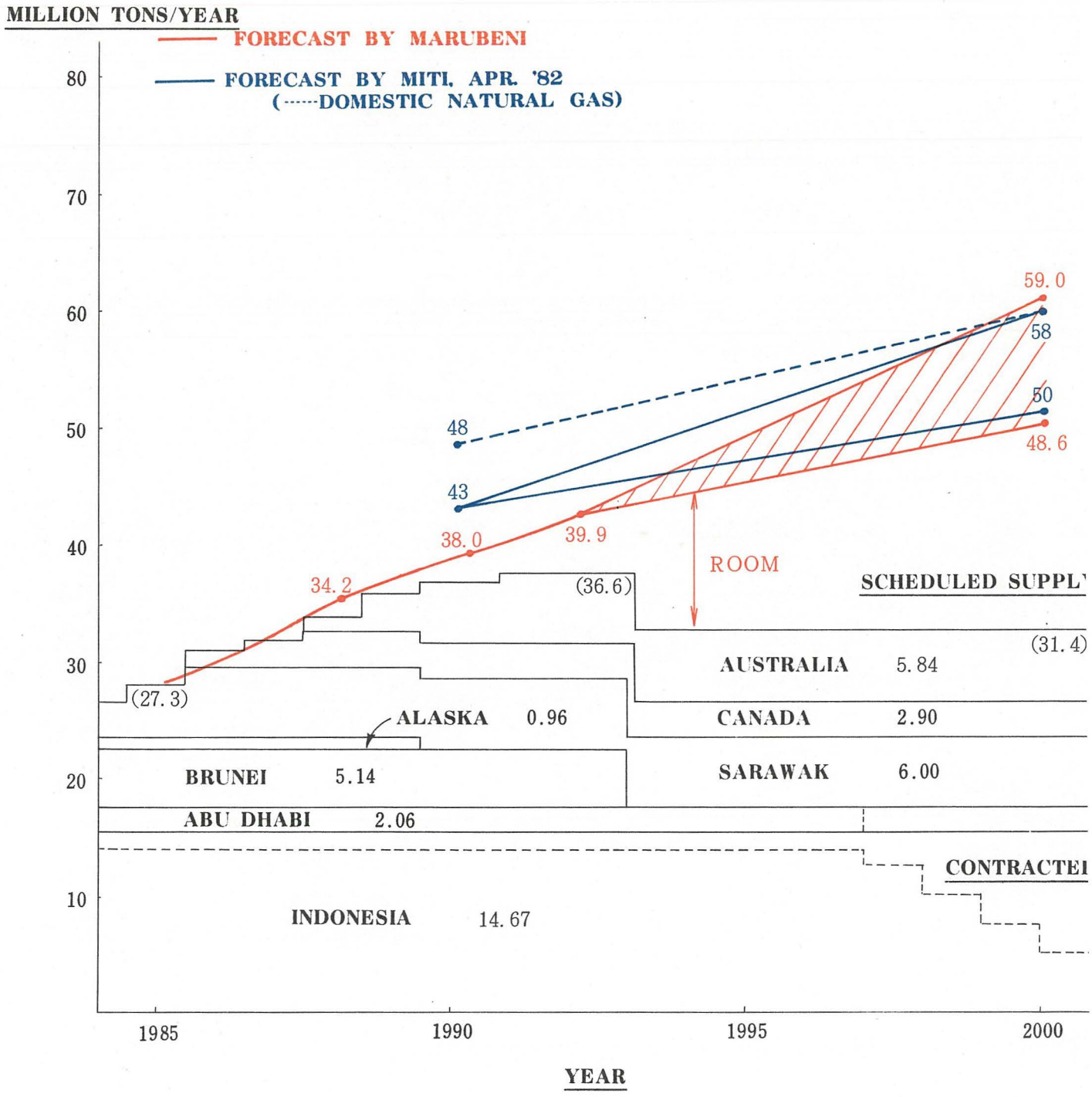
JAPAN'S ROOM FOR LNG
FORECAST BY MARUBENI CORP.



LNG PRICE

It is necessary to tailor each gas export contract to the specific market, and, depending on end uses, competitive prices might vary widely even within a particular market. Japan, however, now consumes LNG dominantly as a boiler fuel for electric power generation and is understood that the customers have generally accepted the LNG price at approximate delivered parity with crude oils. Increasingly demanding environmental conditions and the need to diversify sources of energy supply, off petroleum, are thought to account, in the main, for the growth of LNG imports into Japan and the acceptance of such a pricing system.

Price setting mechanisms of each LNG project through which Japan is now importing and will in the future import LNG are, so long as reported, as follows:

(1) ALASKA

The original contract signed in March, 1967 called for a fixed price for 15 years on a delivered-in-Japan basis: "Buyers shall pay Sellers for all LNG delivered to Buyers hereunder prior to June 1, 1984 a price of US$0.52 per million BTU delivered."

In 1974 price was adjusted upward following Brunei's price and since then price had been adjusted basically annually. In the wake of the second oil crisis and oil price hike in 1979 both parties agreed to increase the LNG price by one dollar for the period

of January to March, 1980 and to adopt the pricing mechanism to link a new price, after April, 1980 for a period of one year, to the average change of Government-Sales-Price (GSP) of all imported crude oils into Japan. The prices were fixed monthly looking at those GSP's of the imported crude oils three months before the LNG import. This was again revised in discussion of both parties to determine the 1981 price to select the top 20 crude oils imported into Japan, prices of which are relatively stable, instead of "all" the crude oils which counts more than 80 kinds.

Following the agreement of both parties on the 1981 price, the 13th Amendatory Agreement which provides a new price formula of Alaska LNG effective from April, 1982 was signed in March, 1982. The new price based on this Amendatory Agreement is calculated in the following manner:

1) The base price on a delivered-in-Japan basis is posted at $5.928 per million Btu.
2) A delivered price is adjusted for each calendar month so as to reflect changes in the weighted average of Government Selling Prices in a month perior to each calendar month of the top twenty oils (by volume) imported into Japan in 1981.
3) The averaged GSP corresponding to the base price is $34.48 per barrel.

The sellers (Phillips Petroleum Company and Marathon Oil Company) told in the application to amend the authorization of Economic Regulatory Administration of the U.S. that the amendment of the price formula produced a delivered price for LNG exported during

the month of April, 1982 of approximately $5.76 per million Btu. In April, 1982 the both parties of the Alaska LNG contract agreed to extend the LNG delivery for an additional period of five years from and after June, 1984 and accordingly the new price formula will apply to LNG deliveries prior to June, 1989.

The top twenty oils imported into Japan in 1981 are as follows:

Crude		Volume	
Arabian Light-34	(Saudi Arabia)	42,452,696 Kl	(18.44%)
Arabian Heavy-27	(")	16,131,458 Kl	(7.01%)
Sumatran Light-34	(Indonesia)	15,231,932 Kl	(6.62%)
Arabian Medium-31	(Saudi Arabia)	10,832,601 Kl	(4.70%)
Daqing-33	(China)	10,402,106 Kl	(4.52%)
Murban-39	(Abu Dhabi)	9,433,092 Kl	(4.10%)
Oman-36	(Oman)	9,319,693 Kl	(4.05%)
Kuwait-31	(Kuwait)	9,060,022 Kl	(3.94%)
Zakum-40	(Abu Dhabi)	7,498,036 Kl	(3.26%)
Dubai-32	(Dubai)	7,123,357 Kl	(3.09%)
Berri-39	(Saudi Arabia)	6,123,161 Kl	(2.66%)
Khafji-28	(Kuwait)	6,035,116 Kl	(2.62%)
Dukhan-40	(Qatar)	5,805,820 Kl	(2.52%)
Umm Shaif-37	(Abu Dhabi)	5,783,759 Kl	(2.51%)
Cinta-34	(Indonesia)	4,876,348 Kl	(2.12%)
Iranian Heavy-31	(Iran)	4,763,840 Kl	(2.07%)
Handil-34	(Indonesia)	4,667,794 Kl	(2.03%)
Kirkuk-36	(Iraq)	3,463,920 Kl	(1.50%)

Light Seria-36	(Brunei)	3,362,548 Kl	(1.46%)
Iranian Light-34	(Iran)	3,184,594 Kl	(1.38%)
Total		185,551,893 Kl	(80.60%)
Total Imported Volume in 1981		230,238,891 Kl	(100.00%)

(2) BRUNEI

There are two sales contracts, in a strict term, in the Brunei LNG project; the first one is for the supply of 3.65 million tons yearly of LNG starting 1972 and the second for additional 1.49 million tons yearly following the capacity expansion in 1976.

The first contract called for a fixed delivered-in-Japan price of 48.6 U.S. cents for 20 years, although this was revised upward to 58.6 cents in 1973, and the second contract required for a price linkage to the average price of crude oils imported into Japan while the base price at January, 1972 was set to be 83.3 cents.

As in the case of the Alaska project abovementioned, Brunei also has adopted the same pattern to determine the LNG price: After April, 1980 for a period of one year, the price was tied to the averaged change of GSP of all imported crude oils into Japan and was actually determined monthly looking at those GSP's of crude oils imported into Japan three months before the LNG import. The 1981 and the 1982 prices are fixed seeing at only top 20 crude oils instead of "all"; which is also the same as in Alaskan case.

(3) ABU DHABI

The original 1972 agreement set the 1972 base price as 86 cents which was to escalate toward 1976, for a period of construction of the LNG plant, with a moderate fix rate to be 98 cents in 1976 and then, after the first scheduled shipment in 1976, to escalate in parallel with crude oil price CIF Japan. In 1976 a new formula was agreed: The LNG CIF price in and after 1980 would be equivalent to CIF value of crude oil delivered to Japan during the previous year and a bridging formula was set up for a period of 1977 and 1979, the initial period of deliveries, with a market of $1.90 for 1976.

Since January 1, 1980, however, the pricing base has been changed to adopt the thermal parity with Murban (39 API) crude, using GSP effective in each month of LNG loading to vessels, on a FOB basis plus freight of crude oil from Abu Dhabi to Japan by AFRA's VLCC rate which to be reviewed every three months. The Abu Dhabi price had become highest among prices of other LNG sources with notably large margin through 1981 and 1982.

It is reported that Tokyo Electric Power Company, only customer of the Abu Dhabi LNG, has negotiated with Abu Dhabi to down the highest price and has won the price reductions three times. The latest price reduction due to OPEC's crude price cuts has been effective from March 1, 1983.

(4) INDONESIA

The contract signed in December, 1973 posted the base delivered-in-Japan price of LNG as $1.29 per million BTU; of which $0.99 is the LNG element and $0.30 is the transportation element.

The price adjustment is being made in the following manner:

(i) Two kinds of calculation to be made for the LNG element:

(a) MINIMUM Adjustment

The $0.99 LNG element is escalated 3% annually compounded commencing with January 1, 1975.

(b) MARKET VALUE Adjustment

90% of the $0.99 LNG element is subjected to escalation with a ratio of the average sales price per barrel of all Indonesian crude oils in U.S. dollars over $6.00 plus the rest 10% to escalate 3% annually compounded starting 1975. This adjustment is to be made only when prices of two or more brands of Indonesian crude oils are changed.

(ii) The adjustment for the LNG element is to be either (a) or (b) above, whichever gives the higher escalation.

(iii) The LNG element is subjected to currency adjustment too:

(a) Currency adjustment is calculated by the arithmetical average of the fluctuation of the exchange rate against U.S. dollar of the major 11 currencies.

(b) The currency adjustment for the LNG element which is

subjected to the 3% annual escalation is calculated by applying the formula $\frac{E1}{E2}$ in which:

E1 : the exchange rate for each of the 11 currencies in effect on the first day of the calendar month in which the currency adjustment is to be applied.

E2 : the exchange rate for each of the 11 currencies in effect on the first delivered date of LNG.

However, when the currency adjustment reduces the LNG element the currency adjustment will not be applied.

(c) The currency adjustment for the LNG element which is subjected to the escalation of average crude oil price is calculated by applying the formula $\frac{E3}{E4}$ in which:

E3 : the exchange rate for each of the 11 currencies in effect on the date of each invoice as to which the currency adjustment to be applied.

E4 : the exchange rate for each of the 11 currencies in effect on the date of the last Market Value Adjustment.

However, when the value of $\frac{E3}{E4}$ is between 1.03 or and 0.97 the currency adjustment will not be applied.

(iv) The transportation element is subjected to annual escalation according to the Charter Party.

(5) SARAWAK

The contract between PETRONAS and the Japanese consumers was signed in March this year, however, the pricing formula has not been disclosed minutely yet. The pricing formula is reportedly that

1) 50% is tied to the averaged change of GSP price of top 20 crude oils into Japan with the same idea as the pricing of the Alaska LNG.
2) the remaining 50% is tied to the averaged change of CIF price of top 20 crude oils into Japan.

(6) INDONESIAN EXPANSION

There are two expansion projects at Badak and Arun, and it is regarded that these two projects have adopted the same pricing mechanism except for the base price, which is $5.87 per million BTU FOB at Badak and $5.78 at Arun, effective in April, 1981.

The pricing is reportedly tied to a mix of 19 Indonesian crude oils calculated on the unweighted average percentage changes to be applied for the full base price.

It is assumed that in order to estimate a CIF price a surchage of 1% of the FOB value is to be added to the FOB price to account for boil-off gas at sea, and the estimated ocean freight to Japan, 65 cents from Badak and 75 cents from Arun, shall also be accounted for: i.e. the 1981 CIF price of the Badak expansion might be around $5.87 + $0.06 + $0.65 = $6.58 per million BTU.

(7) CANADA-DOME

The LNG contract is signed between Japanese Buyers (Chubu Electric Power Co., Chugoku Electric Power Co., Kyushu Electric Power Co., Osaka Gas Co. and Toho Gas Co.) and Canadian Sellers (Dome Petroleum Limited and NIC Resources Inc.) in March 1982. This contract calls a base sales price on a delivered-in-Japan basis of $6.585 per million Btu and a escalation formula that

1) 50% is subject to escalation with a ratio of the Canada-U.S. border reference gas price in effect at the time of LNG unloading in Japan over $4.94; and
2) the remaining 50% with a ratio of the arithmetic average of the official GSP FOB per barrel in effect at the time of LNG unloading in Japan of Arabian Light (34 API) crude and Sumatran Light (34 API) crude over $33.50 which is the arithmetic average of the above two crude oils in effect on August 26, 1981.

(8) WEST AUSTRALIA

The CIF Japan price is still to be agreed upon: Basically the price is to be comparable to other LNG prices when shipment made but actual base price and escalation formula is still being discussed between suppliers and purchasers.

For fixing LNG prices, the reference to crude oil prices has gained the favor of many experts recently, but there still is an argument whether

it is logical to tie the LNG price to the crude oil price, even if so, what kind of crude oil is to be referred to, lighter one or heavier one, and how the crude oil equivalency shall be achieved, in absolute terms -- thermal parity -- or price percentage change, etc.

The producers of LNG are saying:

(i) Oil is still a dominant energy source throughout this century and prices of crude oils are widely published; therefore it is reasonable to use the prices of crude oil as reference to the LNG pricing. On the other hand, prices of petroleum products are controlled by the governments of consuming countries and it is not appropriate to use those petroleum product prices as reference to the LNG pricing.

(ii) For the LNG pricing, it should be taken into account that the LNG is a premium-worthy clean energy under long-term stable supply arrangements.

(iii) By keeping the LNG price reasonably high, incentives are given for producing countries to encourage gas export projects and for consuming countries to develop alternative energy sources and also to consume gas in noble use. Therefore the LNG price shall be linked to prices of the high priced light crude oils.

The consumers are claiming on the other hand:

(i) Crude oil prices are being determined unilaterally, not reflecting actual market situation; crude oil is a feedstock of

in the main transportation fuels while gas is an outright consuming material: It is not logical to tie the LNG price to price of crude oil. As a fuel of electric power generation LNG is marginal not to petroleum products but to non-oil products such as coal.

(ii) Supply security of LNG becomes dubious, in the wake of embargos by Algeria and Libya. Premium as a clean energy is not much for residential and commercial markets, which are common in Europe and in U.S.A.

(iii) There are various factors for development of oil-alternative fuels in consumers countries and it is not directly tied to the high price of hydrocarbons especially of gas to develop those substitute energy sources. It is ideal to consume gas in noble use but the present market is actually determined through competition with petroleum products in the market of the consumers countries.

(iv) Crude oil prices vary widely according to geographical location of export terminals and qualities: It is difficult to decide what crude oils be a reference to the LNG pricing and how the linkage be made, on an FOB base or on a CIF base.
Light crude oil is priced high because of its lighter compositions and is inferior in terms of calorific content, namely light crude oil is rather high-priced not reasonably when viewed the contained BTU; it is not logical to link the LNG price to

that of the light crude oil whose value exists in light specific gravity not in the calorific content.

On the LNG-7 Conference held in Jakarta in May, 1983 a delegate from Tokyo Gas Co. told on the appropriate price of LNG in Japan's market as follows:

"LNG imports to Japan have grown steadily since 1969. At 17 million tons in 1981, they had come to account for 5.7 percent of Japan's total primary energy and 75 percent of international trade in LNG. The main reasons for this growth are to be seen in what had been virtually insatiable demand for energy, and in the fact that city gas and electric utilities came to see LNG as more economical than other energy sources.

However, the two oil crises have slowed the expansion of Japanese demand for energy to where no more than about 2 percent annual growth can be expected for primary energy demand in the foreseeable future. And competition among energy suppliers has escalated in a cramped market.

If LNG business is to be expanded amid these trying conditions, LNG will have to be provided in a manner which offers greater economy to users of secondary energy as compared to other forms of energy. In other words, LNG must manifest compelling economic advantages at the burner tip.

The author estimates the price at which LNG could make further penetration into each area of demand to be around 90

percent of the CIF price for crude oil. Whether or not LNG can be provided at this pricing level will largely determine the future orbit for LNG business in Japan.

Although natural gas represents 19 percent of the world's primary energy use, the figure for Japan is only 6 percent. Thus there could be further room for expansion. Appropriate pricing and flexible supply conditions would ensure a greater future for LNG in Japan."

In opposition to the claim of Tokyo Gas a PERTAMINA's specialist told, standing for Indonesia's opinion on LNG pricing, as follows:

"LNG pricing concept has always been a controversy between producing and consuming countries since its first introduction into the energy export/import scene, and will always be so, so long as there is a different approach in assessing its role in the energy production and utilization pattern.

Indonesia adopts a pricing concept which is based on the premise that LNG being an exportable energy form is originally natural gas, a hydrocarbon energy source, which is formed and found geologically similar to, and which utilization pattern is basically similar to crude oil.

It is an accepted fact today that one alternative way to export natural gas is through liquefaction and trading in the form of LNG, therefore LNG merits full parity to crude oil at point of export of the producing country.

History has shown that linking LNG price to that of crude oil has now become an accepted reality, however, there is still disagreement regarding where full parity should be determined. Indonesia takes the position that valuation of price should be determined at point of export (FOB), however, Indonesia is fully aware of the commercial and political realities of the energy export trade."

The latest price setting of LNG for LNG importers other than Japan was made in July, 1982 between Algerian state-owned corporation Sonatrach and Boston-based Distrigas. Both parties signed an amendment agreement under which some articles, including the FOB price formula and the rate of deliveries, of the original contract were replaced.

Following is an excerpt from an article on the FOB price of the new agreement:

"The FOB price, Algerian coast shall result from the application of the following formula:

$P = PI + (B - Bo)$

in which

P = the FOB price of LNG in U.S. dollars/MMBTU calculated to the sixth decimal place, the first day of the first month of each quarter of the Gregorian Calendar, to be applied in the course of such quarter, hereinafter referred to as the "Quarter of Application";

PI = the base price, equal, on July 1, 1982, to U.S. dollars 4.44/MMBTU to be applied during the third quarter of 1982.

B = the arithmetic average, during the quarter preceding the Quarter of Application, of the average prices, expressed in U.S. dollars/MMBTU, of the crude oils whose characteriastics are set forth hereafter.

For the calculation of B, the average price of each of the crude oils, listed below, shall be the arithmetic average of the daily prices of such oil, expressed in U.S. dollars/MMBTU, during the quarter preceding the Quarter of Application.

The conversion of the prices of such crude oils expressed in U.S. dollars per barrel to prices expressed in U.S. dollars per MMBTU is made based on the Gross Heating Values shown below:

Crude Oils	Gravity API	Gross Heating Value (MMBTU/BBL)
Arabian Light (Saudi Arabia)	34°	5.84
Sahara Blend (Algeria)	44°	5.60
Bonny Light (Nigeria)	37°	5.77
Isthmus (Mexico)	32°	5.89
Minas (Indonesia)	34°	5.84
Tia Juana (Venezuela)	26°	6.03

Bo = The value of B in the third quarter of 1982, that is, U.S.$5.879572 per MMBTU, resulting from the calculation shown in the table below:

Crude Oils	Gravity °API	Gross Heating Value (MMBTU/BBL)	Price for the 2nd Quarter 1982 $/BBL	$/MMBTU
Arabian Light (Saudi Arabia)	34°	5.84	34.00	5.821918
Sahara Blend (Algeria)	44°	5.60	35.50	6.339286
Bonny Light (Nigeria)	37°	5.77	35.50	6.152513
Isthmus (Mexico)	32°	5.89	32.50	5.517827
Minas (Indonesia)	34°	5.84	35.00	5.993151
Tia Juana (Venezuela)	26°	6.03	32.88	5.452736
Arithmetic average				5.879572

The calculation above shall be used as a model for the periodic calculation of the value of B."

Under the amendment agreement remarkable changes were not given to the article of the transportation cost, including an insurance cost, port charges and so on, from Algeria to the U.S. which is estimated at approximately $1.03 per million Btu and consequently the CIF price at the port of discharging in the U.S. was set at approximately $5.47 per million Btu on July 1, 1982.

One of the remarkable amendments of the amendment agreement is a reduction in the take-or-pay obligation of Distrigas.

The original agreement has been modified to reflect a reduction in Distrigas's take-or-pay obligations from 17 to 14 cargoes per year. Under the amendment, Sonatrach will continue to sell to Distrigas

seventeen (17) shiploads using tankers of 125,000 cubic meters of capacity. Thus, the total volume available to Distrigas from Sonatrach, as well as the number of related shiploads, remains the same under the amendment as provided for by the original agreement. Sonatrach, however, agreed to reduce the number of cargoes subject to take-or-pay obligations from 17 to 14 shiploads annually. As to the difference of three shiploads per year, such volumes of LNG may be purchased by Distrigas at its option. An option ship is available to Distrigas for three out of four quarters annually. From and after 1986, the option is reduced to two ships annually.

The original agreement has been further amended to modify the delivery schedule of the 14 cargoes which Sonatrach is obligated to sell and deliver to Distrigas. The amendment provides that nine cargoes will be delivered to Distrigas during the winter period between October 1 and March 31. Five cargoes will be delivered during the summer period between April 1 and September 30 of each year.

Following is an excerpt from the application Distrigas submitted to Economic Regulatory Administration and Federal Energy Regulatory Commission of the U.S. in August, 1982 in which Distrigas pointed out the advantages of the amendment:

"The amendment provides for a reduction in the take-or-pay obligation which may otherwise be placed upon Distrigas. By reducing from 17 to 14 the number of LNG shiploads subject to take-or-pay while providing an option to take the trhee additional ships per year, Distrigas has

acted in the best interests of customers. The modification to the schedule for delivery of LNG by Sonatrach to Distrigas also benefits customers. Such modifications provide greater flexibility. The majority of these deliveries (nine cargoes) will be made during the winter heating season when demand for supplemental gas supplies such as LNG by customers is at its highest level.
Accordingly, this scheduling permits customers to substitute LNG for more expensive alternative supplemental supplies, such as propane. Moreover, the option provided to Distrigas to schedule the purchase of up to three additional cargoes provides a flexibility to customers by providing a supplemental supply at times of greatest demand on an asneeded basis."

The following is meanwhile the historical review of the LNG price on a CIF Japan basis comparing with crude oil prices in terms of U.S. dollars per million BTU:

Marubeni

Historical Review of the LNG prices per MMBTU (CIF JAPAN)

Fiscal Year/Month	Alaska	Brunei	Abu Dhabi	Indonesia	Sarawak	Average	Crude Oil
1969	$0.52					$0.52	$0.30
1970	$0.52					$0.52	$0.31
1971	$0.52					$0.52	$0.39
1972	$0.57	$0.49				$0.55	$0.43
1973	$0.56	$0.79				$0.69	$0.80
1974	$0.87	$1.44				$1.30	$1.94
1975	$1.35	$2.03				$1.87	$2.03
1976	$1.73	$1.92				$1.89	$2.14
1977	$1.99	$2.07	$2.01	$2.52		$2.12	$2.31
1978	$2.15	$2.20	$2.21	$2.78		$2.40	$2.34
1979	$2.62	$2.63	$3.07	$4.07		$3.33	$3.89
1980. 4	$4.41	$4.73	$5.37	$4.96		$4.87	$5.38
1980. 7	$5.41	$5.45	$5.77	$5.56		$5.53	$5.76
1980.10	$5.82	$5.84	$5.90	$5.50		$5.67	$5.79
1981. 1	$5.81	$5.88	$6.11	$5.83		$5.86	$6.03
1981. 4	$5.81	$5.99	-	$5.53		$5.72	$6.49
1981. 7	$5.91	$5.97	$6.65	$5.11		$5.60	$6.35
1981.10	$5.91	$5.91	$6.68	$6.60		$6.04	$6.18
1982. 1	$5.80	$5.82	$6.50	$5.99		$5.98	$6.07
1982. 4	$5.73	$5.78	$6.39	$5.70		$5.74	$5.90
1982. 7	$5.74	$5.78	$6.21	$5.43		$5.63	$5.86
1982.10	$5.77	$5.78	$6.24	$5.24		$5.56	$5.63
1982.11	$5.76	$5.81	$6.19	$5.48		$5.67	$5.60
1982.12	$5.76	$5.80	$6.10	$5.94		$5.88	$5.75
1983. 1	$5.73	$5.81	$6.07	$6.10		$5.97	$5.72
1983. 2	$5.73	$5.77	$6.04	$5.97	$5.91	$5.89	$5.73
1983. 3	$5.73	$5.76	$6.00	$5.66	$5.91	$5.71	$5.62
1983. 4	$5.18	$5.24	$5.11	$4.99	-	$5.09	$5.22
1983. 5	$4.89	$4.91	$5.12	$4.99	$5.96	$5.02	$4.97

Ref. CIF price of LPG in May, 1983 $322.23/ton ($6.71/MMBTU) (1 bbl = 5.93 MMBTU)

In May the average of the LNG prices was down to $5.02 per MMBTU reflecting the price rollback of crude oil. The CIF price of crude oil imported in May was down $1.44 a barrel on a month-to-month basis, to $29.50 a barrel ($4.97 per MMBTU). The crude import price went below the $30 mark for the first time in three years and four months.

The dollar price of crude oil imported by Japan had been on an upward trend, despite some fluctuations, until April 1981, when it hit a peak of $38.49 a barrel ($6.49 per MMBTU). Then, the import price turned down as oil-producing countries rolled back their prices in the face of declining demand and as the oil companies' efforts to reduce crude procurement costs produced results. For all of 1982, the CIF price of imported crude averaged $34.66 a barrel ($5.84 per MMBTU); and from January through March of this year, it hovered at the $33 level and recorded a low of $30.94 a barrel in April.

When the CIF price went below $30 a barrel in May, it was an indication that the price cut announced at OPEC's extraordinary meeting in March had a direct impact on Japan.

The volume of crude oil imported in May, which totaled 92 million barrels, also declined on a year-to-year basis at a rate of 13.8%. In fact, because of weakening demand and inventory drawdowns by oil companies, Japan's crude oil imports have diminished significantly since February of this year.

One of major concerns for electric power companies, who are the largest consumers of LNG in Japan, is power generation cost, rather than fuel

cost alone, taking such other cost elements as capital cost into account. The capital cost varies according to mode of power generation; for example that of hydropower must be the largest among others and that of an oil-fired plant be the lowest.

An LNG power plant needs an expensive LNG receiving terminal, total construction cost of which is estimated at 188.5 billion yen (US$800 million) for a 2-million-tons-a-year capacity with 7 x 60,000 kl inground tanks and its total capital cost will fall between ones of an oil-fired and a coal-fired plants. Terminal cost is assumed to be $1.24/MMBTU, out of which $1.06 for capital charges and $0.18 for operating cost.

In October MITI had calculated unit construction costs and generating costs for different types of power plants, which are assumed to go into operation in fiscal 1982 as models, on condition that the price of crude oil was $34 per barrel.

In terms of generating costs, MITI's calculations indicate that nuclear power is cheapest, at about ¥12 a kilowatt-hour, followed by coal-fired thermal power (approx. ¥15) and LNG-fired thermal power (approx. ¥19).

Oil-fired thermal power and hydropower are the most costly, both at about ¥20 a kilowatt-hour. In unit construction costs, however, hydropower is the most expensive, followed by nuclear power.

Oil-fired thermal power has the highest ratio of fuel cost to generating cost, at 80%. This indicates that oil price rises can

directly push the generating cost of this type of power plant up. By contrast, the fuel cost ratio of nuclear power plants is only about 25%. Unit construction costs of nuclear power plants are higher than those of thermal power plants, but once nuclear power plants go into operation, their generating costs remain relatively unaffected by fuel cost rises.

Type of Power Plant	Unit Cost (¥1,000/kW)	Sending End Generating Cost (¥/kWh)	Fuel Cost Ratio (%)
Hydropower	Approx. 600	Approx. 20	--
Oil-fired	Approx. 130	Approx. 20	Approx. 80
Coal-fired	Approx. 200	Approx. 15	Approx. 50
LNG-fired	Approx. 170	Approx. 19	Approx. 70
Nuclear	Approx. 270	Approx. 12	Approx. 25

Capacity factor: 70%, except 45% for hydropower

Types and capacities of power plants used for cost calculations are as follows:

Hydropower	10,000 - 40,000 kW
Oil-fired thermal power	600,000 kW x 4 plants
Coal-fired thermal power	600,000 kW x 4 plants (imported coal used)
LNG-fired thermal power	600,000 kW x 4 plants
Nuclear power	1,100,000 kW x 4 plants

In this April MITI re-calculated the sending end generating cost of each type of power plants on condition that the price of crude oil is

$29 per barrel taking account of the price rollback of crude oils. The generating costs re-calculated are as follows:

Oil-fired	a little over	¥17/kWh
Coal-fired	approx.	¥15/kWh
LNG-fired	a little under	¥17/kWh
Nuclear	approx.	¥12/kWh