FUTURE LNG MARKETING IN JAPAN

OCTOBER, 1984

NISSHO IWAI CORPORATION
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LNG TRADE
WORLD LNG FLOW

EXISTING  CONTRACTED/COMMITTED

U.S.A.  ALGERIA  LIBYA  U.A.E.  EUROPE

JAPAN  BORNEI  MALAYSIA  INDONESIA  AUSTRALIA

ALASKA  CANADA  U.S.A.
## WORLD LNG TRADE

(AS OF 1983)

<table>
<thead>
<tr>
<th>MARKET</th>
<th>SUPPLYING COUNTRY</th>
<th>QUANTITY (MILLION TON/Y)</th>
<th>SHARE</th>
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<tbody>
<tr>
<td>EUROPE</td>
<td></td>
<td></td>
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<tr>
<td>FRANCE</td>
<td>ALGERIA</td>
<td>6.46</td>
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<tr>
<td>BELGIUM</td>
<td>ALGERIA</td>
<td>3.5</td>
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<td>SPAIN</td>
<td>LIBYA</td>
<td>0.76</td>
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<td></td>
<td></td>
<td><strong>13.06</strong></td>
<td><strong>26%</strong></td>
</tr>
<tr>
<td>U.S.A.</td>
<td>ALGERIA</td>
<td>4.70</td>
<td><strong>9%</strong></td>
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<tr>
<td>JAPAN</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ALASKA</td>
<td></td>
<td>0.96</td>
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</tr>
<tr>
<td>BRUNEI</td>
<td></td>
<td>5.14</td>
<td></td>
</tr>
<tr>
<td>U.A.E.</td>
<td></td>
<td>2.06</td>
<td></td>
</tr>
<tr>
<td>INDONESIA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARUN/BADAK</td>
<td></td>
<td>7.50</td>
<td></td>
</tr>
<tr>
<td>EXESS</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>BADAK EXPANSION</td>
<td></td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>ARUN EXPANSION</td>
<td></td>
<td>3.30</td>
<td></td>
</tr>
<tr>
<td>MALAYSIA</td>
<td></td>
<td>6.00</td>
<td></td>
</tr>
<tr>
<td>CANADA</td>
<td></td>
<td>2.90</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td><strong>32.06</strong></td>
<td><strong>65%</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>49.82</strong></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL 49.82**
HISTORY AND FORECAST OF LNG TRADE IN JAPAN

ACTUAL FORECAST

MILLIONS OF TONNES

YEARS


INAU LEU

MALAYSIA

INDONESIA (ARUN EXPANSION)

ABU DHABI

ALASKA

BRUNEI

DEMAND

AUSTRALIA
ENERGY FORECAST FOR JAPAN
(Forecast by MITI in Nov. 1983)

UNIT: 10^6 K\text{e} OIL BASE

- **1982**
  - IMPORT OIL 52.5% (240 MM K\text{e})
    - LNG 12.1%
    - COAL 17.5%
    - NUCLEAR 10.8%
    - OTHERS 7.1%

- **1990**
  - IMPORT OIL 52.5% (240 MM K\text{e})
    - LNG 12.1%
    - COAL 17.5%
    - NUCLEAR 10.8%
    - OTHERS 7.1%

- **1995**
  - IMPORT OIL 48% (250 MM K\text{e})
    - LNG 12%
    - COAL 18%
    - NUCLEAR 14%
    - OTHERS 8%
**LNG SUPPLY AND DEMAND**

UNIT: MILLION TON/YEAR (BASED ON MITI FORECAST)

<table>
<thead>
<tr>
<th>1982 (ACTUAL)</th>
<th>1990 (FORECAST)</th>
<th>1995 (FORECAST)</th>
</tr>
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<tbody>
<tr>
<td><strong>UNDER OPERATION AS OF 1983</strong></td>
<td><strong>GAP 0 – 2.52</strong></td>
<td><strong>GAP 3.26</strong></td>
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<tr>
<td></td>
<td><strong>AUSTRALIA 3.00 – 5.88</strong></td>
<td><strong>AUSTRALIA 5.88</strong></td>
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<tr>
<td></td>
<td><strong>CANADA 2.90</strong></td>
<td><strong>CANADA 2.90</strong></td>
</tr>
<tr>
<td></td>
<td><strong>MALAYSIA 6.00</strong></td>
<td><strong>MALAYSIA 6.00</strong></td>
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<tr>
<td><strong>EXCESS OTHERS 0.34</strong></td>
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<td></td>
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<tr>
<td><strong>EXCESS INDONESIA 1.6</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>INDONESIA 7.5</strong></td>
<td><strong>INDONESIA 3.30 (ARUN EXP.)</strong></td>
<td><strong>INDONESIA 7.50</strong></td>
</tr>
<tr>
<td></td>
<td><strong>INDONESIA 3.20 (BADAK EXP.)</strong></td>
<td><strong>INDONESIA 3.20 (BADAK EXP.)</strong></td>
</tr>
<tr>
<td><strong>EXCESS INDONESIA 0.88</strong></td>
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<td><strong>EXCESS INDONESIA 0.78</strong></td>
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<tr>
<td><strong>INDONESIA 0.88</strong></td>
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<td><strong>U.A.E. 2.06</strong></td>
<td><strong>U.A.E. 2.06</strong></td>
<td><strong>U.A.E. 2.06</strong></td>
</tr>
<tr>
<td><strong>BRUNEI 5.14</strong></td>
<td><strong>BRUNEI 5.14</strong></td>
<td><strong>BRUNEI 5.14</strong></td>
</tr>
<tr>
<td><strong>ALASKA 0.96</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**LNG MARKET SUMMARY**

- **JAPANESE LNG MARKET IS 65% OF WORLD LNG MARKET**
- **NIC HAS MAJORITY SHARE OF THE JAPANESE LNG MARKET SINCE 1977**
- **JAPANESE MARKET IS GROWING**
  - 1983 — 17.6 MILLION TON
  - 1990 — 36.5 MILLION TON
  - 1995 — 40.0 MILLION TON
- **THERE WILL BE A DEMAND-SUPPLY GAP FROM 1990 ON**
  - AND MANY PROJECTS ARE UNDER PLANNING AND EAGER TO MARKET
  - **INDONESIA EXPANSION** (3.0–4.5)
  - SAKHALIN (3.0)
  - QATAR (6.0)
  - MALAYSIA (MIRI) (1.0–1.5)
  - SULAWESI (0.5)
  - ALASKA (NORTH SLOPE) (12.0)
  - NATUNA (6.0)
  - THAILAND (1.5–3.0)
  - NEWZEALAND (1.0)
LNG USERS
JAPANESE LNG SERVICE AREAS

- HANDLED BY NIC (INDONESIA)
- HANDLED BY NIC (CANADA)
ELECTRIC POWER COMPANIES CONSUMPTION BY TYPE IN 1990

CHUBU ELECTRIC
- HYDRO 11.0%
- OIL 33.8%
- NUCLEAR 16.3%

KANSAI ELECTRIC
- COAL 2%
- HYDRO 13%
- OIL 15%
- NUCLEAR 48%

KYUSHU ELECTRIC
- OTHERS' 3.1%
- COAL 14.1%
- HYDRO 10.1%
- OIL 11.5%
- NUCLEAR 32.7%

CHUGOKU ELECTRIC
- OTHERS (LPG) 8.3%
- COAL 26.8%
- HYDRO 10.3%
- OIL 25.6%
- NUCLEAR 20.1%

DEMAND ESTIMATE IN 1990
- CHUBU ELECTRIC: 86.5 x 10^9 kWh
- KANSAI ELECTRIC: 104.7 x 10^9 kWh
- KYUSHU ELECTRIC: 53.7 x 10^9 kWh
- CHUGOKU ELECTRIC: 43.7 x 10^9 kWh
ELECTRIC POWER COMPANIES LNG SUPPLY AND DEMAND IN 1990

(CONTRACT BASE) UNIT: MILLION TON/YEAR

6.25

AUSTRALIA 0.9

INDONESIA 1.5
(BADAK EXP.)

INDONESIA 0.55
(EXCESS)

INDONESIA 1.7
(ORIGINAL)

UNDER OPERATION
AS OF 1983

CHUBU ELECTRIC

2.87

AUSTRALIA 0.9

INDONESIA (EXCESS) 0.17

KYUSHU ELECTRIC

INDONESIA (ORIGINAL) 1.5

ČHUGOKU ELECTRIC

AUSTRALIA 0.9

1.20

INDONESIA (ORIGINAL) 1.5
GAS COMPANIES FUEL CONSUMPTION BY TYPE IN 1990

49.0 x 10^{12} \text{ Kcal}

79%

4.8 x 10^{12} \text{ Kcal}

83%

OSAKA GAS

10.5 x 10^{12} \text{ Kcal}

LNG 8.8 x 10^{12} \text{ Kcal}

TOHO GAS
GAS COMPANIES DEMAND ESTIMATE IN 1990

49 x 10^{12} \text{ Kcal}

OTHERS 8%

10.5 x 10^{12} \text{ Kcal}

OTHERS 6%

OSAKA GAS

TOHO GAS
JAPANESE LNG USERS SUMMARY

- JAPANESE LNG USERS ARE MOSTLY PUBLIC UTILITIES
  6 ELECTRIC POWER COMPANIES (OUT OF 9) AND 3 MAJOR
  GAS COMPANIES ARE RECEIVING LNG
  - ELECTRIC POWER COMPANIES — 75%
  - GAS COMPANIES — 25%

- THERE ARE INDUSTRIAL LNG USERS; MARKET IS SMALL BUT GROWING
  - NIPPON STEEL CORPORATION, WORLD LARGEST STEEL MILL,
    HAS BEEN RECEIVING LNG FROM INDONESIA THROUGH NISSHO IWAI
  - NISSHO IWAI HAS BEEN ACTIVE TO DEVELOP THIS MARKET

- JAPAN HAS BEEN RECEIVING LNG SINCE 1969, HAS BEEN HONORING
  THE CONTRACT AND IN NO CASE JAPANESE LNG BUYERS HAVE CAUSED
  TAKE OR PAY PROBLEM
• ELECTRIC COMPANIES USE LNG AS BASE LOAD FUELS WHICH DO NOT FLUCTUATE WITH THE CHANGE IN TOTAL DEMAND, WHILE OIL AS SWING FUEL.

• ELECTRIC COMPANIES ARE HIGHLY DEPENDENT ON LNG.

• GAS COMPANIES ARE SIGNIFICANTLY HIGHLY DEPENDENT ON LNG.

• NO ALTERNATIVE TO LNG, SINCE JAPAN HAS ALMOST NO DOMESTIC GAS AND OIL PRODUCTION.

• ABOVE FEATURES REQUIRE:
  • CONSTANT & STABLE SUPPLY
  • LONG TERM SUPPLY SECURITY
  • EVEN DELIVERY OVER THE YEAR
  • SAFE & RELIABLE OPERATION OF PLANT & TRANSPORTATION
NIC’S LNG PROJECTS

- FIRST INDONESIAN PROJECT
  CONTRACT QUANTITY : 7.5 MILLION TONS PER YEAR
  DELIVERY STARTED : 1977

- SECOND INDONESIAN PROJECT
  CONTRACT QUANTITY : 3.2 MILLION TONS PER YEAR
  DELIVERY STARTED : 1983

- CANADIAN PROJECT
  CONTRACT QUANTITY : 2.9 MILLION TONS PER YEAR
  DELIVERY WILL START : BEGINNING OF 1987

- NIC’S LNG BUYERS (AS OF 1983)
  ELECTRIC POWER COMPANIES
  CHUBU ELECTRIC
  KANSAI ELECTRIC
  KYUSHU ELECTRIC
  CHUGOKU ELECTRIC
  CITY GAS COMPANIES
  OSAKA GAS
  TOHO GAS
  INDUSTRIAL USE
  NIPPON STEEL

- NIC COVERS 8 LNG RECEIVING TERMINALS OUT OF TOTAL 13 TERMINALS IN JAPAN (INCLUDING “PLANNED”)
RECEIVING TERMINALS
LNG RECEIVING TERMINALS

EXISTING
PLANNED

Unit: Thousand Kt
(TANK CAPACITY)

SENBOKU 1
180

SENBOKU 2
1125

HIMEJI 1
520

SODEGAURA
1380

CHITA 1
300

TOBATA
480

CHITA-2
480

HIMEJI 2
320

YUKKAICHI
320

OHGISIMA
420

NEGISHI
680

HIGASHI-NIIGATA
520

Hokkaido

Hokuriku

Tohoku

Kansai
(Osaka Gas)

Chugoku

Kyushu

Chubu
(Toho Gas)

YAMAT
400

OTTA
320

HIMEJI 2
320

(Toho Gas)
<table>
<thead>
<tr>
<th>Terminal</th>
<th>Tank Capacity</th>
<th>Status</th>
<th>Company</th>
<th>Source</th>
<th>Quantity</th>
<th>Start of Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHITA I</td>
<td>300,000 KI (75,000 x 4)</td>
<td>Operating since 1977</td>
<td>Chubu</td>
<td>Indonesia (Original)</td>
<td>1.7 MM TON/Y</td>
<td>1977.8</td>
</tr>
<tr>
<td>(A)</td>
<td></td>
<td></td>
<td>Chubu</td>
<td>Indonesia (Excess from original)</td>
<td>Apr. 0.5 MM TON/Y</td>
<td>1983.</td>
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<tr>
<td>CHITA II</td>
<td>480,000 KI (80,000 x 6)</td>
<td>4 tanks in operating since 1983.2</td>
<td>Chubu</td>
<td>Indonesia (Badak Exp)</td>
<td>1.6 MM TON/Y</td>
<td>1983.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 tanks will be in operation since 1984.3</td>
<td>Toho</td>
<td>Indonesia (Badak Exp)</td>
<td>0.5 MM TON/Y</td>
<td>1983.8</td>
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<td></td>
<td></td>
<td>Toho</td>
<td>Canada</td>
<td>0.15 MM TON/Y</td>
<td>1987</td>
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<td></td>
<td></td>
<td></td>
<td>Chubu</td>
<td>Australia</td>
<td>0.9 MM TON/Y</td>
<td>1988</td>
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<td></td>
<td>Toho</td>
<td>Australia</td>
<td>0.16 MM TON/Y</td>
<td>1988</td>
</tr>
<tr>
<td>(B)</td>
<td>YOKKAICHI</td>
<td>Under Construction (site preparation started in 1982 and completed 80% of site preparation)</td>
<td>Chubu</td>
<td>Canada</td>
<td>1.6 MM TON/Y</td>
<td>1987</td>
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</tbody>
</table>
PLANT LAYOUT OF CHITA TERMINAL

Plant Layout
1 LNG Carrier Berth
2 LNG Tanks 3,000 Kt x 4 units
3 Boil off Gas Compressors
4 LNG Pumps
5 Open Rack Type Vapourizers
6 Submerged Combustion Type Vapourizers
7 Control Center
8 Administration Office
9 Seawater Pumps

LNG Tanks
80,000 Kt x 2
(Will be Operated at 1984/3)

LNG Tanks
80,000 Kt x 4
CHITA TERMINAL
CHITA TERMINAL
PLANT LAYOUT OF YOKKAICHI TERMINAL
YOKKAICHI TERMINAL
KAWAGOE POWER PLANT
(SITE)
KAWAGOE POWER PLANT

(SITE)
JAPANESE INSTITUTIONAL FINANCE

IMPORT LOAN

- JOINT FINANCING BY EXIM AND COMMERCIAL BANKS IS AVAILABLE FOR THE IMPORTERS OF VITAL RESOURCES SUCH AS PETROLEUM AND GAS;
  - ON LONG-TERM BASIS, AND
  - AT LOW INTEREST RATE.

MECHANISM

JOINT FINANCE

EXIM

COMMERCIAL BANKS

LOAN

JAPANESE IMPORTER

EXPORTER OF RESOURCES

IMPORT OF GOODS

- VITAL RESOURCES INCLUDE ENERGY, MINERAL, RAW MATERIALS AND OTHERS INCLUDING AIRCRAFT.

- BORROWER SHOULD BE JAPANESE IMPORTERS, WHO EXTEND LOAN TO FOREIGN EXPORTER IN RETURN FOR THE IMPORT OF GOODS.
APPLICATION OF IMPORT CREDITS TO THE LNG PROJECT

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>QUANTITY</th>
<th>FIRST DELIVERY</th>
<th>LENDER</th>
<th>BORROWER</th>
<th>AMOUNT</th>
<th>TERM</th>
</tr>
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<tbody>
<tr>
<td>INDONESIA (ORIGINAL)</td>
<td>1 MM TON</td>
<td>1978</td>
<td>NISSHO IWAI</td>
<td>JILCO</td>
<td></td>
<td>APPROX 10 YEARS</td>
</tr>
<tr>
<td>INDONESIA (BADAk EXP.)</td>
<td>1.2 MM TON</td>
<td>1983</td>
<td>JAPANESE LENDING VEHICLES</td>
<td>INALCO</td>
<td>PERTAMINA</td>
<td>USS 8416 MILLION</td>
</tr>
<tr>
<td>INDONESIA (ARUN.EXP.)</td>
<td>3.3 MM TON</td>
<td>1984</td>
<td>JAPANESE LENDING VEHICLES</td>
<td>INALCO</td>
<td>PERTAMINA</td>
<td>USS 8416 MILLION</td>
</tr>
<tr>
<td>CANADA</td>
<td>2.9 MM TON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>APPROX 10 YEARS</td>
</tr>
</tbody>
</table>

NOTE-1 JILCO: JAPAN INDONESIA LNG CO LTD CONSISTING OF MAINLY LNG BUYERS AND NIC
-2 INALCO: INDONESIA LNG CO LTD CONSISTING OF MAINLY LNG BUYERS
-3 JAPANESE LENDING VEHICLE WILL BE FORMED CONSISTING OF MAINLY LNG BUYERS AND NIC
-4 PROJECT ARRANGED

- NISSHO IWAI, WAS THE FRONTIER TO ARRANGE APPLICATION OF IMPORT CREDITS TO THE LNG PROJECT IN THE INDONESIAN LNG PROJECT.
FUTURE MARKET
FUTURE MARKET

- ELECTRIC POWER USE
- CITY GAS USE
- INDUSTRIAL FUEL USE
ELECTRIC POWER USE

1. FUTURE GROWTH OF LNG DEMAND FOR ELECTRIC POWER USE IS DEPENDENT ON THE GROWTH OF NUCLEAR AND COAL

- NUCLEAR AND COAL GROWTH IS DESIGNED BY MITI RATHER RAPID AND STEEP, WHICH IS TOO OPTIMISTIC WHEN WE CONSIDER PUBLIC RESISTANCE AGAINST NUCLEAR POWER AND DISPOSAL OF ASH AND RELATIVE ENVIRONMENTAL PROBLEM WHICH IS INHERENT TO COAL BURNING.

- LNG HAS PHYSICAL ADVANTAGE AGAINST NUCLEAR AND COAL (CLEANNESS, BURNING EFFICIENCY ETC.) BUT IS NOT COMPETITIVE ESPECIALLY AGAINST NUCLEAR (PRICE-WISE)

- RIGID TAKE AND/OR PAY PROVISION IS ONE OF HINDRANCE FOR HIGHER LNG GROWTH
2. TERMS AND CONDITIONS OF LNG TRADE ESPECIALLY PRICING SYSTEM AND TAKE
AND/OR PAY SHOULD BE REVIEWED FOR GREATER LNG DEMAND CREATION IN
ELECTRIC POWER USE.

3. NIC COVERS AS MANY AS 8 LNG RECEIVING TERMINALS (OUT OF TOTAL 13
EXISTING AND PLANNED) WHICH GIVES GREAT ADVANTAGE TO NIC'S LNG
PROJECT DUE TO THE FOLLOWING REASONS,

(1) LNG PROJECT USUALLY REQUIRES PLURAL BUYERS BECAUSE IT INVOLVES
HUGE INVESTMENT
(2) LNG PROJECT REQUIRES A CERTAIN SIZABLE GAS SUPPLY VOLUME
(3) FLEXIBILITY OF LNG TAKING IS AVAILABLE AMONG NIC'S BUYERS
CITY GAS USE

1. LNG IS SUPPLIED ONLY IN TOKYO (TOKYO GAS), OSAKA (OSAKA GAS) AND NAGOYA (TOHO GAS) AREA IN JAPAN (NIC IS SUPPLYING LNG BOTH TO OSAKA GAS AND TOHO GAS)

2. SOME INCREASE IN RESIDENCIAL USE IN THESE AREA IS EXPECTED.

3. INCREASE FOR INDUSTRIAL USE IN THE VICINITY OF THE ABOVE NATURAL GAS SUPPLY LOOP AREA IS ALSO EXPECTED. (HALF MILLION TONS OF LNG WAS CONSUMED IN THE ABOVE 3 AREAS IN 1982)

4. MEDIUM AND SMALL SCALE CITY GAS COMPANIES WISH TO INDUCE LNG FOR THEIR NATURAL GAS SUPPLY AREA

5. TERMS AND CONDITIONS OF LNG TRADE ESPECIALLY PRICING SYSTEM AND TAKE AND/OR PAY SHOULD BE REVIEWED FOR GREATER LNG DEMAND CREATION IN CITY GAS USE
INDUSTRIAL FUEL USE

1. JAPANESE GOVERNMENT GUIDELINE IN DECEMBER, 1980 BASED ON "OIL SUBSTITUTE ENERGY LAW" WOULD ENHANCE GROWTH OF INDUSTRIAL LNG USE. THIS GUIDELINE STIPULATES THAT INDUSTRIAL USERS WHO ARE IN A POSITION TO HAVE ACCESS TO NATURAL GAS SUPPLY BY LNG MUST TRY THEIR BEST EFFORTS TO INDUCE IT FOR THEIR FUEL PURPOSES,

IN ORDER TO ENHANCE THIS EFFORTS, GOVERNMENT ASSISTANCE FOR FINANCIAL AND TAX ASPECTS ARE ALSO PROVIDED FOR INDUSTRIAL LNG USERS.

THE ABOVE GOVERNMENTAL GUIDELINE IS BASED ON SUCH FOLLOWING REASONS;
(1) TO LESSEN DEPENDENCE ON OIL
(2) TO DIVERSIFY ENERGY SOURCES
(3) CLEANNESS OF LNG
(4) HIGH EFFICIENCY OF COMBUSTION AND EASY HANDLING OF LNG
(5) STABLE SUPPLIABILITY OF LNG
(6) ADVANTAGEOUS SUPPLY SYSTEM THROUGH EXTENSION OF PIPELINE FROM EXISTING MAJOR PIPELINE SUPPLY SYSTEM

REASONS WHICH ARE LISTED BY INDUSTRIAL USERS FOR THEIR SWITCHING MOTIVE FROM CONVENTIONAL FUEL TO LNG

DIVERSIFICATION OF FUELS 43%
STABLE SUPPLY 20%
STABLE PRICING STRUCTURE 14%
ANTI-AIRPOLLUTION ADVANTAGE 10%
HIGH EFFICIENCY OF COMBUSTION 8%
OTHERS 5% (SOURCE: IEE REPORT, 1982)
2. ONLY 3 BIG CITY AREA IN JAPAN CONSUME LNG FOR RESIDENCIAL FUEL PURPOSE, NAMELY TOKYO, NAGOYA AND OSAKA.

IN THESE AREA, THEY ARE COMPLETING VERY LARGE PIPELINE LOOPS TO COVER THE RESIDENTS IN THEIR NATURAL GAS SUPPLYING AREAS.

THE CURRENT NATURAL GAS SUPPLY TO THE INDUSTRIAL USE CUSTOMERS ARE BEING ONLY MADE BY USE OF THIS NATURAL GAS PIPELINE LOOPS, WITH ONLY ONE EXCEPTION, HAVING CONSTRUCTED RATHER SMALL SCALE PIPELINE EXTENSIONS THEREFROM. SUCH BEING THE CASE, THE CURRENT NATURAL GAS SUPPLY TO THE INDUSTRIAL USE IS RATHER LIMITED.

ONLY ONE EXCEPTION IS NIPPON STEEL CORPORATION WHO CONSUMES LNG FOR THEIR STEEL MILL PURPOSE AND THEY IMPORT LNG FROM INDONESIA THROUGH NIC'S LNG PROJECT.
3. ANALYSIS ON PROSPECTIVE MARKET

As long as economic growth is rather slow and it is also expected it would remain the same in the future, large demand creation for industrial LNG use should be made by replacement of conventional fuels by LNG. We have attached data how potential market is big when such replacement is successfully done. Based upon this assumption, we think such prospective markets as below should be looked at.

(1) CONCEIVABLE MARKETS

Demand increase in 3 big cities by the existing natural gas supply loops which are owned and operated by 3 big city companies. (Market A)

Demand increase in such areas where natural gas supply loops are not covering but are located rather near-by existing LNG receiving terminals as Kitakyushu, Yokkaichi, and Himeji etc. (Market B)

Demand increase in the industrial areas where are located rather remote both from natural gas supply loops and the existing LNG receiving terminals. This includes the areas facing Seto Inland Sea. (Market C)
(2) HOW TO APPROACH THE CONCEIVABLE MARKETS

PHYSICAL DISTRIBUTION CONSIDERATION

MARKET A — AS PRIMARY FUNCTION OF MARKETING WOULD BE MADE BY 3 BIG CITY GAS COMPANIES IN THESE MARKETS, THERE WOULD NOT BE SO SIGNIFICANT ROLE FOR NIC EXCEPT FOR MARKETING COOPERATION TO THE CITY GAS COMPANIES.

MARKET B — NATURAL GAS SUPPLY WOULD BE MADE THROUGH PIPELINES WHICH ARE TO BE CONSTRUCTED FROM EXISTING LNG RECEIVING TERMINALS.

MARKET C — NATURAL GAS SUPPLY COULD BE MADE BY THE FOLLOWING METHODS.

A. PIPELINE SUPPLY FROM THE EXISTING OR FUTURE LNG TERMINALS.
B. DIRECT IMPORT BY SMALL SCALE LNG CARRIERS.
C. DISTRIBUTION OF LNG FROM NEW RECEIVING TERMINAL BY COASTAL TANKER, PIPELINE AND LORRY ETC.
COMMERCIAL CONSIDERATION

A. CONSIDERATION ON SOME NEW PRICING CONCEPT SO THAT INDUSTRIAL LNG PRICE CAN BE COMPETITIVE AGAINST CONVENTIONAL FUELS.

B. REVIEW OF TAKE OR PAY LEVEL SO THAT INDUSTRIAL LNG CUSTOMERS CAN ENJOY SOME FLEXIBILITY OF LNG TAKING.

C. CONSIDERATION OF LENGTH OF LNG SALES CONTRACT.

D. TIE-UP WITH CITY GAS COMPANIES AND INVOLVEMENT OF A CERTAIN PARTY WHO OWN THE OPTIMUM AND ADVANTAGEOUS CANDIDATE PLACE FOR LOCAL RECEIVING TERMINAL.

E. UTILIZATION OF JAPANESE INSTITUTIONAL FINANCE FOR CONSTRUCTION OF RELATIVE FACILITIES REQUIRED IN JAPAN ESPECIALLY FOR CONSTRUCTION OF THE LOCAL RECEIVING & DISTRIBUTION TERMINAL.

(3) DEMAND FORECAST FOR INDUSTRIAL LNG USE

IT IS VERY DIFFICULT TO MAKE A PRECISE DEMAND FORECAST FOR INDUSTRIAL LNG USE, AT THIS PRESENT TIME, IN MARKET A, B, C, IN TOTAL, AND WE WOULD LIKE TO EXPLORE OUR CONCEPT MORE DEEPLY IN THE FUTURE.

BUT, WE BELIEVE THERE IS CERTAINLY FAR LARGER POTENTIAL DEMAND THAN MITI'S FORECAST WHEN WE SUCCESSFULLY EXPLORE THE MARKETS IN A, B, C, WE FURTHER BELIEVE THAT NEW LNG MARKET CAN BE CREATED WITH FIRST DELIVERY OF LNG IN 1987~1989 IN THE CASE OF MARKET B AND C.
FUEL CONSUMPTION IN WESTERN JAPAN
FOR INDUSTRIAL USE IN 1981

REMARKS:
(1) LIGHT FUEL OIL (LFO)
   UNIT: 1,000 Kt
   KEROSINE
   DIESEL OIL
   FUEL OIL A
   HEAVY FUEL OIL (HFO)
   UNIT: 1,000 Kt
   FUEL OIL B
   FUEL OIL C
   LIQUEFIED PETROLEUM GAS (LPG)
   UNIT: 1,000 MT
(2) ●: LNG RECEIVING TERMINAL
     (EXISTING & PLANNED)

ZONE 3
- LFO 444
- HFO 6420
- LPG 334

ZONE 2
- LFO 1780
- HFO 3222
- LPG 400

ZONE 1
- LFO 1818
- HFO 6249
- LPG 641
# Fuel Consumption by Industrial Sector in Western Japan by Region in 1981

**Source:** MITI  
**Table:** NIC

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<th>PREFECTURE</th>
<th>LIGHT FUEL OIL</th>
<th>LPG</th>
<th>HEAVY FUEL OIL</th>
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<td>64,306</td>
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<td>OITA</td>
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<td>Company</td>
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<td>(A) SENBOKU I</td>
<td>180,000 Kℓ (45,000 x 4)</td>
<td>Operating since 1973</td>
<td>Osaka Gas</td>
<td>Brunei</td>
<td>0.63 MM TON/Y</td>
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<td>(B) SENBOKU II</td>
<td>975,000 Kℓ (75,000 x 13)</td>
<td>Operating since 1977.8</td>
<td>Osaka Gas</td>
<td>Indonesia (Original) Canada</td>
<td>1.3 MM TON/Y</td>
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<td>0.8 MM TON/Y</td>
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<td>(C) HIMEJI</td>
<td>280,000 Kℓ (80,000 x 3, 40,000 x 1)</td>
<td>Operating since 1979</td>
<td>Kansai Electric</td>
<td>Indonesia (Original) Australia</td>
<td>1.70 MM TON/Y</td>
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<td>(For Kansai 80,000 x 3)</td>
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<td>0.9 MM TON/Y</td>
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<td>560,000 Kℓ (For Osaka 80,000 x 4)</td>
<td>Under Construction</td>
<td>Osaka Gas</td>
<td>Canada Australia</td>
<td>0.55 MM TON/Y</td>
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<td>0.50 MM TON/Y</td>
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PLANT LAYOUT OF SENBOKU I TERMINAL

Plant Layout

Senboku I

1. LNG Carrier Berths
2. LNG Aground Tanks
3. LNG Inground Tank
4. Sapheca Tank
5. LPG Tanks (Spherical Type)
6. Benzol Gas Compressor
7. Split Rack Type Vaporizer
8. Orr FRP Type Vaporizer
9. Air Compressor
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280. Air Compressor
281. Air Compressor
PLANT LAYOUT OF SENBOKU II TERMINAL

Plant Layout

Senboku II

1. FMC Container Berth
2. Barge Berth
3. FNL Aboveground Lavor
4. LPG Tanks (Spherical Type)
5. Load Off Gas Compressors
6. Open Rack Type Vaporizers
7. OG-TRI EX Type Vaporizers
8. OG-TRI EX Type Vaporizers
9. Control Valve Adiabatic Unit
10. Boiler
11. Administration Office, Control Center
12. Guest House
13. Seawater Pumps
14. Warehouse, Maintenance Area
15. Coal Utilization Plant
SENBOKU II TERMINAL
PLANT LAYOUT OF HIMEJI TERMINAL

Plant Layout
Kansai Electric Power
1 LNG Carrier Bunk
2 LNG Tanks
3 Ballast Gas Compressor
4 Open Rack Type Saponifier
5 Seawater Pump
6 Control Center, Office

Osaka Gas
1 LNG Carrier Bunk
2 LNG Tanks
3 Ballast Gas Compressor
4 Saponifier
5 Seawater Pump
6 Control Center, Office
7 LPG Tanks
8 LPG Tanks (Piped to LPG Tank)
9 Calibration Valve After LPG Tank
10 Boiler
11 Workshop, Maintenance, etc.

Cold Utilization Plant
12 Air Preparation Unit
13 Cryogenic Utilizing
HIMEJI TERMINAL
THE CHUGOKU ELECTRIC POWER CO., INC.

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PLANT LAYOUT OF YANAI TERMINAL
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PLANT LAYOUT OF TOBATA TERMINAL
TOBATA TERMINAL
OITA TERMINAL
OITA TERMINAL
FINANCE