



Report and Recommendation of the President to the Board of Directors

Project Number: 39921
August 2006

Proposed Loan to Petronet LNG Limited India: Dahej Liquefied Natural Gas Terminal Expansion Project

In accordance with ADB's public communications policy (PCP, 2005) this abbreviated version of the RRP excludes confidential information and ADB's assessment of project or transaction risk as well as other information referred to in paragraph 126 of the PCP.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 1 May 2006)

Currency Unit	–	Indian rupee/s (Re/Rs)
Re1.00	=	\$0.02
\$1.00	=	Rs45

ABBREVIATIONS

ADB	–	Asian Development Bank
BPCL	–	Bharat Petroleum Corporation Limited
CSP	–	country strategy and program
DSCR	–	debt service coverage ratio
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
EPC	–	engineering, procurement, and construction
GAIL	–	GAIL (India) Limited
GDF	–	Gaz de France
GDFI	–	GDF International
GSPA	–	gas sales and purchase agreement
HBJ	–	Hazira-Bijaypur-Jadgishpur
ICB	–	international competitive bidding
IHI	–	Ishikawajima-Harima Heavy Industries Company Limited
IOC	–	Indian Oil Corporation Limited
JCC	–	Japan crude oil cocktail
KfW	–	KfW Bankengruppe
KRL	–	Kochi Refineries Limited
LNG	–	liquefied natural gas
LPG	–	liquefied petroleum gas
MEF	–	Ministry of Environment and Forests
MPNG	–	Ministry of Petroleum and Natural Gas
ONGC	–	Oil and Natural Gas Corporation Limited
O&M	–	operation and maintenance
PCG	–	partial credit guarantee
PLL	–	Petronet LNG Limited
Rasgas II	–	Ras Laffan Liquefied Natural Gas Company Limited (II)
SPA	–	sales and purchase agreement
TCA	–	time charter agreement

WEIGHTS AND MEASURES

bcm	–	billion cubic meters
ha	–	hectare
km	–	kilometer
MW	–	megawatt
MMBTU	–	million British thermal units
MMT	–	million metric tons
MMTPA	–	million metric tons per annum
MMSCMD	–	million standard cubic meters per day
toe	–	ton of oil equivalent

NOTES

- (i) In this report, "\$" refers to US dollars.
- (ii) The fiscal year (FY) ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends.

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INDIA DAHEJ LIQUEFIED NATURAL GAS TERMINAL EXPANSION PROJECT

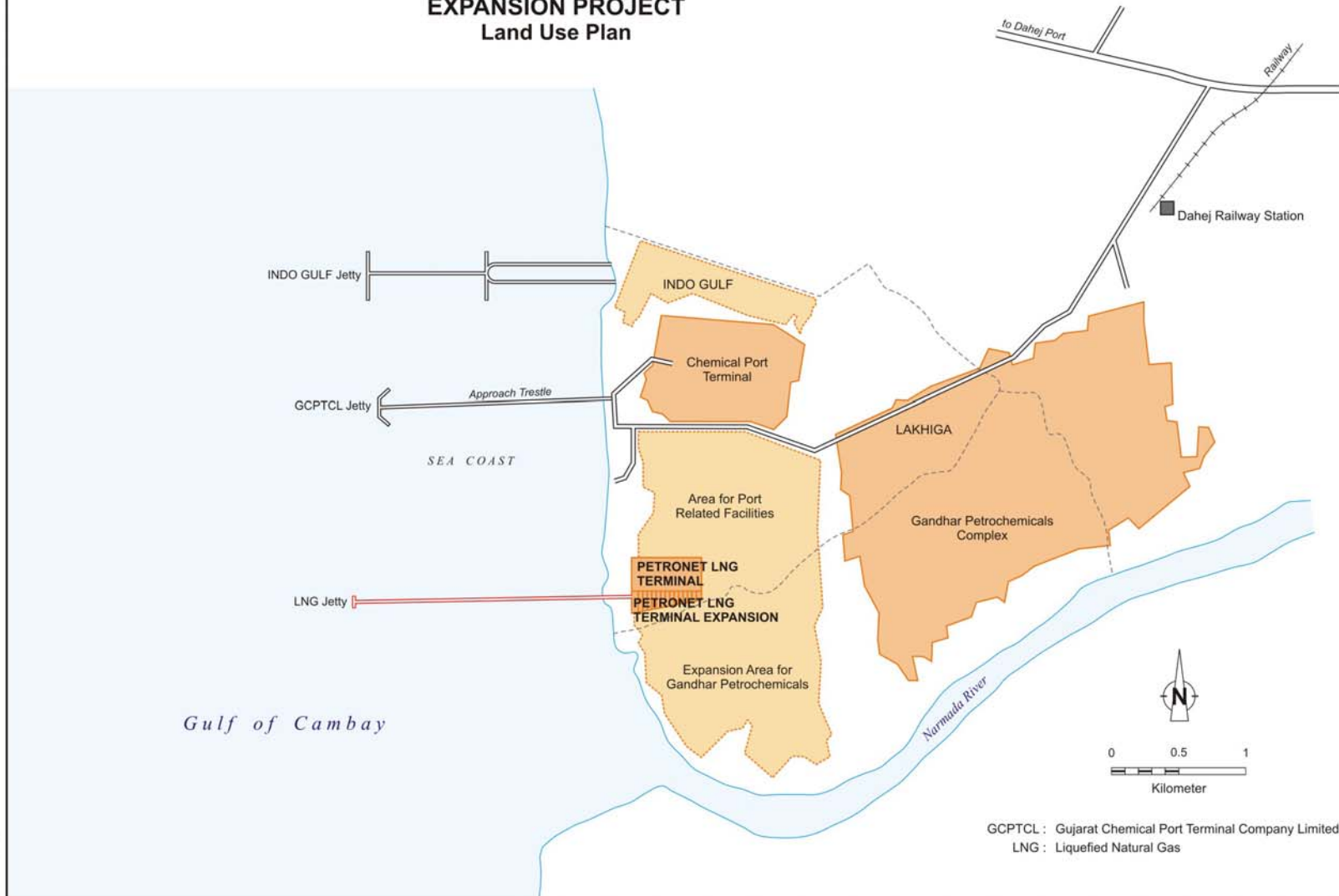


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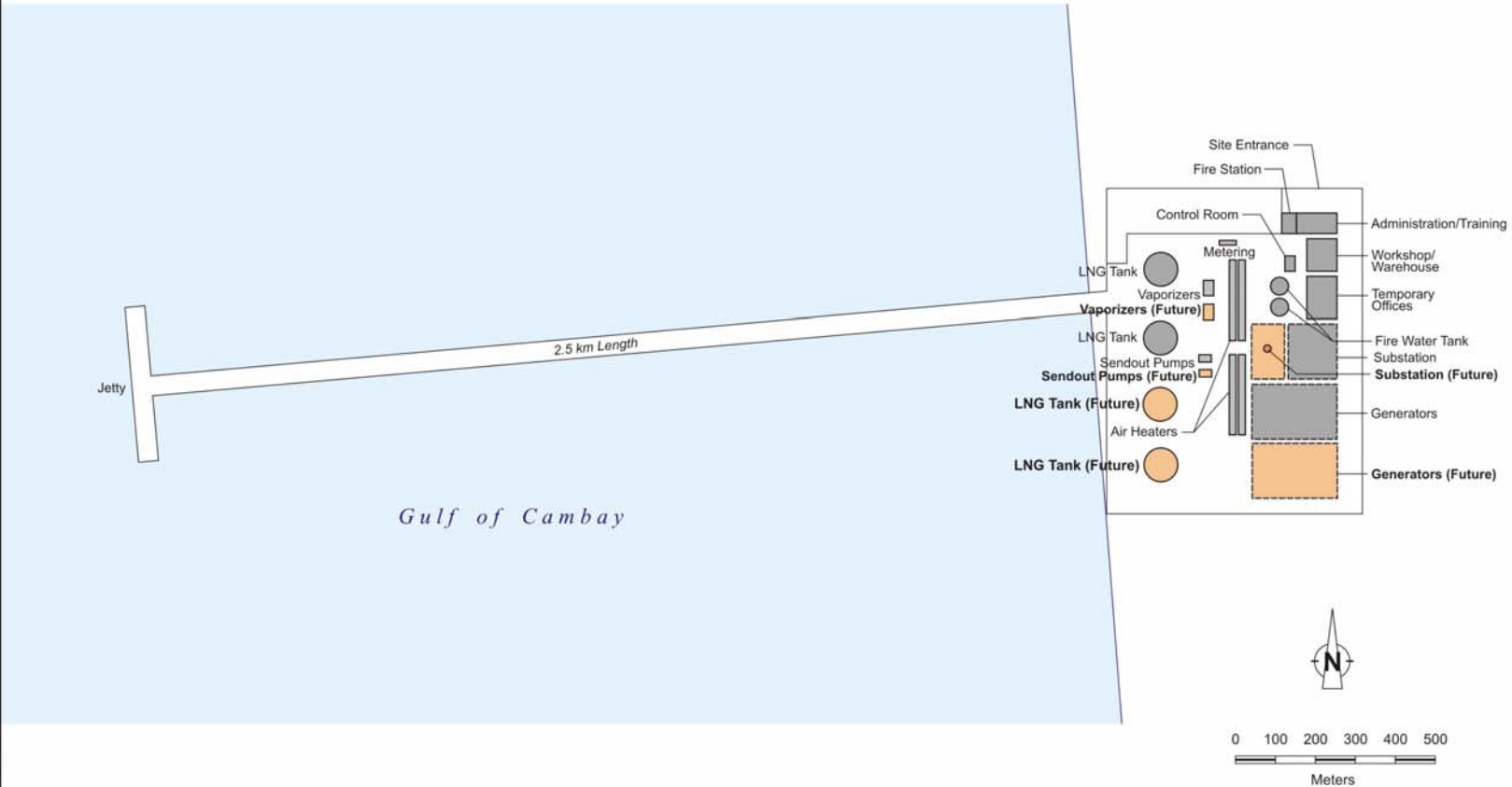
- ⊛ National Capital
 - ⊙ State Capital
 - ⊙ District Headquarters
 - City/Town
 - National Highway
 - Other Road
 - +— Railway
 - River
 - - - District Boundary
 - - - State Boundary
 - - - International Boundary
- Boundaries are not necessarily authoritative.



INDIA
**DAHEJ LIQUEFIED NATURAL GAS TERMINAL
 EXPANSION PROJECT**
 Land Use Plan



INDIA
DAHEJ LIQUEFIED NATURAL GAS TERMINAL EXPANSION PROJECT
Project Layout



I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed Indian rupee-denominated loan, without government guarantee, supported by a partial credit guarantee (PCG) from German development cooperation through KfW Bankengruppe (KfW), to Petronet LNG Limited (PLL) for the Dahej Liquefied Natural Gas (LNG) Terminal Expansion Project. If approved, this will be the first loan of the Asian Development Bank (ADB) to receive risk participation by a third party financial institution. The design and monitoring framework is in Appendix 1.

II. INTRODUCTION

2. PLL owns and operates India's first LNG import and regasification terminal, located in Dahej, Gujarat. The terminal was built with first phase capacity of 5 million metric tons per annum (MMTPA) with the intention of expanding to 10 MMTPA in the second phase. PLL also plans to construct another LNG terminal in Kochi, Kerala.

3. PLL is a product of ADB's advisory work with the Government of India from its public sector window. In 1997 ADB provided a Japan Special Fund-financed technical assistance¹ for a study on setting up a public-private joint venture to build and operate LNG terminals. The technical assistance completion report² states that the LNG terminal project could be funded in part under ADB's private sector window. The concept to set up a public-private joint venture for LNG terminals was later incorporated in the Hydrocarbon Vision 2025, the Government framework for energy development.

4. Based on the study and framework, four leading state companies—Bharat Petroleum Corporation Limited (BPCL), GAIL (India) Limited (GAIL), Indian Oil Corporation Limited (IOC), and Oil and Natural Gas Corporation Limited (ONGC)—formed PLL to implement the first LNG terminal in the country. Throughout this process, ADB maintained dialogue with the Government and the four project promoters and helped make the project commercially viable. After incorporating ADB's advice on the project structure, including 50:50 joint public-private sector ownership and gas pricing, in 2002 the four companies reconfirmed their desire to have ADB financial assistance.

5. In response, on 13 January 2004, the ADB Board approved an equity investment and PCG amounting, in exposure terms, to Rs3.525 billion (equivalent to \$75 million at the exchange rate of that time) to finance the first phase of PLL's Dahej terminal. ADB subscribed to 5.2% equity of PLL. The terminal started commercial operation on 9 April 2004 and its production reached full capacity of 5 MMTPA in March 2005.

6. The terminal was financed with equity and debt. The entire debt requirement was met by loans from Indian banks that carry floating interest rates. It was intended that after the commencement of commercial operation, PLL would replace part of the Indian bank loans with a bond issue partially guaranteed by ADB. The bonds would provide long-term, fixed interest rate funds, which are not available in India. ADB's PCG would upgrade PLL's credit rating, making its bond issue possible and helping stabilize the project's economics.

¹ ADB. 1997. *Technical Assistance to India for the Liquefied Natural Gas Terminal Project*. Manila.

² ADB. 2000. *Technical Assistance Completion Report on the LNG Terminal Project in India*. Manila.

7. However, PLL did not proceed with a bond issue due to changes in the bond market conditions since PLL and ADB started negotiating the PCG. Under the new market conditions, a bond issue would not provide PLL with a low enough interest rate.

8. As the expansion of the Dahej terminal became imminent, PLL decided to keep the existing debt arrangement for the first phase terminal and not pursue a bond issue to refinance part of the existing loans. PLL still asked ADB to provide finance for the Dahej expansion and to do so in collaboration with KfW, which had expressed strong interest in financing PLL, but only in association with ADB. After obtaining concept clearance for the Dahej expansion project on 16 August 2005 and cancelling the board approval for the PCG on 26 August 2005, ADB fielded a due diligence mission in March 2006.

III. BACKGROUND

A. The Gas Sector

1. Demand and Supply

9. India's primary energy consumption stood at 3.7% of the world's total in 2004.³ India is now the fifth largest consumer of primary energy in the world. However, per capita supply of energy is still low, even among Asian developing countries. In 2003, compared with the world total primary energy supply per capita of 1.69 tons of oil equivalent, India recorded only 0.52,⁴ reflecting the strong potential for continuing growth in the Indian energy sector.

10. The predominant source of primary energy continues to be coal (54.5%), followed by oil (31.7%), natural gas (7.7%), hydro (5.1%), and nuclear (1.0%). Recent environmental concerns as well as spiraling oil prices have boosted natural gas as a source of energy. While the share of natural gas is much lower than the world average of 23.7%,⁵ growth has been faster than for any other fuel. From only 16.6 billion cubic meters (bcm) (equivalent to 45 million standard cubic meters per day [MMSCMD]) in 1994, natural gas use was nearly 29.4 bcm (81 MMSCMD) in 2004. The share of natural gas is expected to increase from 8% to 15% by 2011–2012 and to 20% by 2024–2025, provided that gas is made available from domestic and imported sources.

11. India's natural gas demand was met by domestically produced gas, but with the start-up of PLL in April 2004, India started importing gas. Most domestic gas production currently takes place in the Bombay high fields and Gujarat. State-owned ONGC and Oil India Limited still dominate gas production (79%), with joint ventures and private sector companies accounting for the rest. In the mid-1990s, domestic production was deemed to have peaked and was forecast to decrease as low as 36 MMSCMD by 2025. However, major new gas fields have been discovered since 2000, most notably Reliance Industries' KG-D6 block in the Krishna Godavari Basin offshore of Andhra Pradesh, with an estimated 400 bcm reserves. With such discoveries,

³ BP plc. 2005. *BP Statistical Review of World Energy 2005*. Available: http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/publications/energy_reviews_2005/STAGING/local_assets/downloads/pdf/statistical_review_of_world_energy_full_report_2005.pdf. Primary energy refers to commercially traded fuels. Fuels such as wood, peat, and animal waste, which though important in many countries, are unreliably documented in terms of consumption statistics and are excluded.

⁴ International Energy Agency. 2005. *Key World Energy Statistics 2005*. In 2003, the per capita total primary energy supply of Organisation for Economic Co-operation and Development members averaged 4.67 tons of oil equivalent; Asia, excluding the People's Republic of China, 0.61; and the People's Republic of China, 1.10.

⁵ BP plc. 2005. *BP Statistical Review of World Energy 2005*. Available: http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/publications/energy_reviews_2005/STAGING/local_assets/downloads/pdf/statistical_review_of_world_energy_full_report_2005.pdf

India's proven reserves are now 920 bcm (665 million metric tons [MMT] in LNG). At the current production level of 80 MMSCMD, the reserves are expected to last for 31 years.

12. Even with new reserves, India's domestic supply is not likely to keep pace with demand and the country needs to import significant amounts of gas either as LNG or via pipeline. PLL's first phase terminal was India's first initiative in this direction and has added gas supply of 17.5 MMSCMD to domestic supply. Following PLL, Shell constructed a 2.5 MMTPA (8.8 MMSCMD of gas) at Hazira, Gujarat. PLL Dahej and Shell Hazira are the only LNG terminals operating in India today.

13. Current gas demand is estimated to be around 163 MMSCMD (equivalent of 43 MMTPA of LNG), against the total supply capacity of 99 MMSCMD (equivalent to 26 MMTPA of LNG), which implies a deficit of around 64 MMSCMD (17 MMTPA of LNG). The demand-supply gap is expected to widen, with demand projected to exceed 300 MMSCMD by 2011 and 390 MMSCMD by 2024. Supply is projected to grow to around 250 MMSCMD, including PLL's Dahej expansion and Kochi terminal. India is negotiating with Australia, Iran, Malaysia, Oman, and Qatar for procurement of LNG. India has not started importing gas by pipeline yet. Plans are under way for pipeline import from Bangladesh, Iran, Myanmar, and Turkmenistan; but these are not expected to be implemented in the near future due to technical challenges and political sensitivities.

14. About 80% of natural gas is consumed by the power and fertilizer subsectors. Demand from other sectors is increasing, including refineries as fuel and feedstock; transport sector as compressed natural gas; petrochemical plants as feedstock; and glass, ceramics, automotive industries, sponge iron, and other industries as fuel.

2. Gas Sector Regulation

15. India's oil and gas subsector is regulated in two areas: upstream and downstream. For the upstream, exploration and production is regulated by the Directorate General of Hydrocarbons under the administrative control of the Ministry of Petroleum and Natural Gas (MPNG) based on the Oilfields (Regulations and Development) Act, 1948 and the Petroleum and Natural Gas Rules, 1959. The downstream has been regulated by the Oil Coordination Committee, also under MPNG, based on the Petroleum Act, 1934 and control orders passed by MPNG from time to time. However, with the passing of the long-awaited Petroleum and Natural Gas Regulatory Board Bill, 2005 by Parliament on 21 March 2006, the downstream regulation will be transferred to an independent regulator, the Petroleum and Natural Gas Regulatory Board, in the near future. The board will regulate refining; processing; storage; transportation; distribution; marketing; and sale of petroleum, petroleum products, and natural gas.

16. With liberalization initiated in 1991, the oil and gas subsector was opened to private sector participation with concession rights awarded for a few small- and medium-sized fields for development by joint ventures and the private sector. The 1999 New Exploration Licensing Policy was to encourage private sector participation in the exploration program; concessions have been awarded through five rounds of bids. The Government has already removed all restrictions on importing natural gas. The private sector is free to import gas either by pipeline or as LNG. While GAIL still has a near monopoly on onshore transmission, the Petroleum and Natural Gas Regulatory Board Act, 2006, is expected to induce more entrants into the transmission business. Under the act, all gas pipelines will be required to offer open access to all users. Gas distribution is already open to the private sector.

3. Gas Price

17. Natural gas sold in India is priced differently for different suppliers and users: (i) nominated gas, which is produced by ONGC and Oil India Limited from the nominated reserves, amounts to 55 MMSCMD and is distributed by GAIL at controlled prices determined by the administered price mechanism; (ii) other domestic gas, amounting to 20 MMSCMD, is produced by joint ventures and private sector producers and sold directly to consumers at a market-linked price; and (iii) imported gas (PLL and Shell Hazira), amounting to 27 MMSCMD, is sold at the market price.

18. In 1997 the Government announced phased dismantling of the administered price mechanism for certain petroleum products. In March 2002, it gave notice that marketing and pricing of all petroleum products except kerosene and LPG was to be deregulated with effect from April 2002. As of mid 2006, however, due to political reasons, nominated gas is still sold to power, fertilizer, compressed natural gas, and other small consumers at the administered price mechanism price, which is currently \$1.9/million British thermal units (MMBTU). The price applicable to other users of nominated gas is linked to the price of imported LNG, which is currently \$3.5/MMBTU (ex LNG import terminal price [= LNG price + shipping + import tariff + regasification charge]). The price of other domestic gas, since July 2005, is market-linked, and is already very similar to the price of imported LNG. Gas to be produced from new fields will be priced completely freely.

B. Asian Development Bank Operations

1. Country Strategy

19. Mainstreaming poverty reduction is the central organizing theme of ADB's country strategy and program for India.⁶ It draws on all three pillars of ADB's poverty reduction strategy: pro-poor growth, social development, and good governance. The strategy aims to support the Government's high-growth agenda through assistance for fiscal consolidation, infrastructure development, and private sector development. Consensus is now emerging within the development community on the strong nexus between infrastructure and poverty reduction. The strategy aims to emphasize investments in publicly provided infrastructure, including hydrocarbons, to remove key bottlenecks where private investment is not forthcoming. Physical investments are also to be combined with policy reforms and capacity building, which are as important as physical investment in improving infrastructure.

20. Private sector development is integral to ADB's operational strategy. The country strategy and program focuses on promoting an enabling environment for private sector development through financial sector interventions to improve financial intermediation and resource mobilization, policy reforms to remove impediments to private investment, investment in public infrastructure, public-private partnerships, and investments in private sector projects. A list of ADB's private sector operations in India is in Appendix 2.

⁶ ADB. 2003. *Country Strategy and Program (2003–2006) India*. Manila; and ADB. 2005. *Country Strategy and Program Update (2006–2008) India*. Manila.

2. Energy Sector Strategy

21. ADB's energy sector strategy⁷ designates ADB's operational priorities as (i) reducing poverty by, among others, creating energy infrastructure for sustainable economic growth; (ii) promoting private sector involvement by restructuring the energy sector and creating an enabling environment for private investors; (iii) addressing regional and global environmental impacts; and (iv) promoting regional cooperation. In particular, the strategy strongly encourages ADB interventions to increase private sector participation in the energy sector to take advantage of the higher operational efficiencies that private operators can achieve and to meet the large capital requirements. ADB's energy sector strategy promotes a shift to cleaner fuels and processes, which in India includes shifting from coal to natural gas. The strategy also encourages liberalization of markets and elimination of subsidies.

3. The Project's Consistency with Asian Development Bank Strategies

22. The Project is in line with ADB's country, energy sector, private sector development, and environmental protection strategies. As a public-private partnership, PLL was the first step in commercializing the gas sector's LNG import segment, and the policy dialogue associated with PLL has led to delicensing of this segment and deregulation of input and output pricing. The expansion of PLL's terminal will augment supplies of environment-friendly fuel that will displace use of more polluting fuels, and will do so cost-competitively. The Project will help India diversify its energy sources. PLL's successful operation has demonstrated that the concept of public-private partnership in infrastructure development that ADB has advocated can be implemented successfully, with careful planning and structuring. This model has drawn the interest of several countries in the region for possible replication.

IV. THE PROPOSED PROJECT

A. Project Description

1. Existing Facilities

23. The Project involves the expansion initially to 7.5 MMTPA and later to 10 MMTPA of an existing LNG import and regasification terminal with a capacity of 5 MMTPA at Dahej, Gujarat. PLL is the owner of the LNG terminal. The existing facilities consist of marine facilities; unloading facilities; two full containment LNG storage tanks each with a net capacity of 148,000 cubic meters (m³); boil-off gas recovery system for recondensation of boil-off gas; send-out facilities, including "shell and tube" and "submerged combustion" vaporizers; auxiliary facilities, including a gas-fired captive power plant with three 7.6-megawatt gas turbines, electrical and control systems, utilities production, metering, and fire and gas detection and protection system; and a jetty.

24. Originally, a 660-meter C-shaped breakwater was included in the first phase project scope to restrict downtime during monsoons. About 20% of work was completed on the breakwater. However, based on the actual morphological data collected during implementation of the first phase project, PLL, in consultation with Gaz de France and other experts, concluded that the estimated downtime without the breakwater would still be at an acceptable level, and that an additional LNG storage tank would provide more operational flexibility than the

⁷ ADB. 2000. *Energy 2000: Review of the Energy Policy of the Asian Development Bank*. Manila.

breakwater.⁸ Thus PLL is removing the breakwater and constructing the third LNG storage tank. PLL is implementing this in conjunction with the processing capacity expansion.

2. Expansion Facilities

25. The Dahej terminal was designed with a configuration easily expandable to 10 MMTPA. The Project will, to a large extent, use the existing facilities. Additional facilities include (i) the third LNG storage tank with a capacity of 148,000 m³, which replaces the function of the breakwater; (ii) the fourth LNG storage tank with a net capacity of 148,000 m³; (iii) one additional compressor for the boil-off gas recovery system; (iv) another set of send-out facilities with in-tank pumps; (v) two additional gas turbines; and (v) other minor associated facilities.

B. Management and Ownership

26. PLL, a public limited company established under the Companies' Act, 1956 is implementing the Project. Its sponsors are BPCL, GAIL, IOC, and ONGC, holding 50% in total. Other shareholders are GDF International (GDFI) holding 10%, ADB 5.2%, and public investors 34.8%. PLL, a private sector company under the Indian Companies Act, is managed by a team of business professionals with energy sector and private sector backgrounds.

27. BPCL, 66% owned by the Government, is India's second largest petroleum refining and marketing company following IOC. GAIL, 57% owned by the Government, is India's largest gas transmission and marketing company. IOC, 82% owned by Government, is India's largest petroleum refining and marketing company and is ranked 170th in the Fortune 500 list of the world's largest companies. IOC has also been ranked first in petroleum trading among the 15 national oil companies in Asia and the Pacific. ONGC, 74% owned by the Government, is India's largest oil and gas producer, accounting for nearly 80% of crude oil and natural gas produced domestically. All four sponsors are run commercially, with significant autonomy from the Government.

28. GDFI is a subsidiary of Gaz de France S.A. (GDF), a state-owned natural gas company in France, and responsible for all GDF international operations. GDF, the world's fourth largest purchaser of natural gas and Europe's largest importer of LNG with a regasification capacity of 42 MMSCMD, operates Europe's largest gas transmission and distribution system. In February 2006, it announced a merger with Suez S.A., a Franco-Belgian multi-utility and the sixth largest natural gas company in Europe. After the merger, GDF-Suez will become Europe's largest gas company.

29. PLL's board has 15 members: secretary of MPNG (chairperson); and one representative from each of ADB, BPCL, GAIL, GDFI, IOC, ONGC, the lenders, and the Gujarat government;⁹ three management staff (managing director and chief executive officer, director technical, and director finance); and three independent directors.

C. Implementation Arrangements

30. The Project's contractual framework is shown in Appendix 3.

⁸ An LNG storage tank would mitigate the impact of suspension of LNG delivery resulting from not only bad weather conditions but also LNG receiving machinery breakdowns.

⁹ The Gujarat government is not a shareholder of PLL but has the right to nominate a director on PLL's board as per the concession agreement.

1. Concession

31. PLL is implementing the first phase terminal and the Project on a build-operate-transfer basis under a 30-year concession¹⁰ from the Gujarat Maritime Board. The concession agreement was not executed in time for commencement of construction of the first phase and PLL implemented the first phase based on a letter of intent from the Gujarat Maritime Board, pursuant to which it took over the land measuring 58.6 hectares. The concession agreement was finally signed on 20 December 2005.

2. Liquefied Natural Gas Supply

32. PLL is currently sourcing 5 MMTPA of LNG for the first phase production from Ras Laffan Liquefied Natural Gas Company Limited (II) (Rasgas II) under a 25-year LNG sales and purchase agreement (SPA) dated 31 July 1999. Rasgas II was selected through international competitive bidding (ICB). Rasgas II is a joint venture between Qatar Petroleum (70%) and ExxonMobil Corporation (30%). The two companies have access to North Field,¹¹ one of the world's largest nonassociated gas fields, with the proven and probable reserve of 25,000 bcm (18,000 MMT in LNG equivalent). The recoverable reserves of the blocks allocated to Rasgas II are about 900 bcm (650 MMT in LNG equivalent).

33. The LNG SPA obligates supply and offtake of 7.5 MMTPA, of which 5.0 MMTPA is for the first phase of the Dahej terminal and 2.5 MMTPA (tranche A) was originally intended for PLL's other proposed terminal in Kochi, Kerala, which is at the initial stages of planning and development. PLL and Rasgas II have agreed to reallocate tranche A to the Project because the Project is progressing faster than the Kochi terminal. Two side letters were executed on 22 September 2005 and 20 December 2005 respectively to indicate the commencement date, quality, and quantity of tranche A LNG. Rasgas II is obligated to start supply of tranche A on 1 October 2009, while the completion of the expansion facilities and the delivery date of the third LNG tanker are expected on 31 March 2009. During this 6-month period, PLL hopes to acquire LNG from Rasgas II from its spare capacity¹² or buy LNG on short-term contracts from other sources.¹³

34. PLL is obligated to purchase LNG from Rasgas II on a take-or-pay basis for 25 years at a fixed price of \$2.53/MMBTU for the first 5 years of the contract (January 2004–December 2008). During the remaining contract period, the LNG price will fluctuate with the Japan crude-oil cocktail price of crude oils, with a cap and a floor.

3. Liquefied Natural Gas Transport

35. Currently, two dedicated tankers, with a capacity of 138,000 m³ each, transport LNG from Qatar under two 25-year time charter agreements (TCAs) awarded through ICB. The

¹⁰ The terminal facilities are divided into the port terminal and the regasification facility. After 30 years the port terminal will be transferred to the Gujarat Maritime Board. PLL will own the regasification facility for 90 years. PLL will maintain its access to and use of the port terminal by a port-user agreement with the Gujarat Maritime Board.

¹¹ North Field, discovered in 1971, extends over 6,000 square kilometers, predominantly underwater, to the northeast of Qatar. A portion of North Field underlies the Qatari landmass and another portion extends into Iran's territorial waters.

¹² Qatar Petroleum and ExxonMobil, through another joint venture, own trains 1 and 2 with a capacity of 3.3 MMTPA each. Rasgas II owns and operates trains 3 and 4 with a capacity of 4.78 MMTPA each, and is constructing train 5 of the same capacity. Yet another joint venture of Qatar Petroleum and ExxonMobil is constructing trains 6 and 7 with a capacity of 7.8 MMTPA each. Tranche A for PLL will be produced at train 7.

¹³ An LNG tanker is available for spot hiring at a price of \$70,000–\$80,000 per day depending on the demand.

tankers are owned by two consortia comprising Mitsui OSK Lines Limited (29.1%), Shipping Corporation of India Limited (29.1%), Nippon Yusen KK (17.9%), Kawasaki Kisen KK (8.9%), and Qatar Shipping Corporation (15%).¹⁴ The tankers were built by Daewoo Shipbuilding and Marine Engineering Company Limited. Both tankers were delivered in advance of the contract delivery dates and have been operating without any problems.

36. PLL conducted an ICB for a TCA for the 2.5 MMTPA of additional LNG supply from Rasgas II and awarded the contract to a consortium of Mitsui OSK, Shipping Corporation of India, Nippon Yusen, and Kawasaki Kisen. The contract contained an option for PLL to get a share in the consortium for assignment to Qatar. This time, Qatar Gas Transportation Company will have a 20% share and PLL will retain a 3% share, leaving 26% each for Mitsui OSK and Shipping Corporation, 16.7% for Nippon Yusen, and 8.3% for Kawasaki Kisen. The third tanker will have a capacity of 154,800 m³ and be constructed by Samsung Heavy Industries. The third TCA was executed on 21 February 2006.

4. Gas Offtake

37. Gas from the first phase terminal is being purchased by GAIL, IOC, BPCL (offtakers) in the ratio of 60%, 30%, and 10% respectively under gas sales and purchase agreements (GSPAs). The rights and obligations under the GSPAs mirror those under the Rasgas II LNG SPA: as long as PLL takes or pays for LNG and delivers gas, the offtakers are obligated to take or pay for the gas. The offtakers have agreed to purchase tranche A gas in the same proportion and on the same terms and conditions as the first 5 MMTPA. This agreement was recorded in a side letter to each of the GSPAs dated 31 December 2005 for GAIL and 29 December 2005 for IOC and BPCL.

38. The offtakers sell almost all of the gas to third parties. The end users are predominantly industrial users along the Hazira–Bijaypur–Jadgishpur (HBJ) pipeline, who have switched from more expensive alternatives such as naphtha and diesel to natural gas. The first phase Dahej terminal and the Shell Hazira terminal, the second LNG terminal in India, have not satisfied the demand in Gujarat and surrounding areas. Significant gas supply shortage is projected in areas currently served or could be served by PLL if a pipeline connection is established. Additional output from PLL is expected to be absorbed again by industrial users along the HBJ pipeline, including the offtakers' plants. In addition, GAIL is laying a 475 km pipeline connecting Dahej to Uran in Maharashtra targeting completion within 2006. Once this pipeline is operational, PLL will be able to expand its service area to Maharashtra, India's most industrialized state.

39. 39. PLL's gas price is set commercially without any government control. It is currently \$3.51/MMBTU at PLL's delivery point (ex-terminal price) and consists of (i) the LNG rate, (ii) the taxes and duties rate, and (iii) the regasification rate. The LNG and taxes and duties rates reflect the actual cost of LNG supply and taxes and duties. The regasification rate covers PLL's operation and maintenance costs, debt service, and return to shareholders.

40. PLL's gas price is considerably higher than the price of nominated gas to the protected end users (power, fertilizer, and small users) of \$1.9/MMBTU, but compares favorably with the price of other domestic gas. PLL gas does not compete with nominated gas or other domestic gas; rather PLL gas has met and will continue to meet demand that is either not met at all,

¹⁴ The consortia originally consisted of Mitsui OSK, Shipping Corporation of India, Nippon Yusen, and Kawasaki Kisen. The contract contained an option for PLL to obtain a share in the consortia for assignment to Qatar. Qatar Shipping Corporation subsequently bought a 15% share in both consortia.

causing capacity underutilization, or met by more expensive alternate fuels such as naphtha, diesel, and fuel oil. Domestic gas from newly found reserves is not considered a threat to the Dahej terminal. Projections from various sources of gas demand and supply suggest that, even including new domestic gas supply sources, the demand-supply gap will not disappear for the foreseeable future.

41. The take-or-pay GSPAs contractually shield PLL from market risk. The primary risk for PLL is the creditworthiness of the offtakers. GAIL and IOC are rated AAA by the India Credit Rating Agency, and BPCL is rated AAA by the Credit Rating Information System of India Limited.¹⁵ Introduction of the Petroleum and Natural Gas Regulatory Board Act in the near future will mean not only more competition for GAIL but also more business opportunities, which GAIL, with its dominant infrastructure, should be able to take advantage of. IOC and BPCL have been making losses over the past year due to crude oil price hikes without commensurate increase of petroleum product prices. In the first quarter of fiscal year (FY) 2006, both companies (along with Hindustan Petroleum Corporation Limited, the third largest petroleum company after the two) recorded losses for the first time in history, which continued until the third quarter. All three earn a wide refining margin, but the prices of their products are regulated by the Government below the cost-recovery level. Altogether losses of Rs400 billion are expected for FY2006 for the entire downstream oil industry, all such losses will be supplemented by the Government. The India Credit Rating Agency and Credit Rating Information System of India Limited believe that IOC and BPCL's downturn is temporary, and that with liberalization of the downstream petroleum industry, particularly retail product pricing, IOC and BPCL business will grow to meet ever-increasing energy demand in the country and the region. IOC and BPCL are expected to maintain the AAA rating for the foreseeable future. The business and financial performance of the three offtakers are summarized in Appendix 4.

5. Gas Transport

42. PLL gas is transported through the HBJ pipeline, India's major trunk line operated by GAIL. It covers Gujarat, Western Madhya Pradesh, Rajasthan, Uttar Pradesh, Haryana, and Delhi. IOC and BPCL executed gas transmission agreements with GAIL, which have been amended by side letters dated 29 December 2005 to reflect increased gas transmission volume for tranche A supply. Under the gas transmission agreements, GAIL is obligated to transport gas to receiving points of IOC and BPCL's end users. PLL is contractually protected from the gas transportation risk as it is entitled to receive take-or-pay gas charges from the offtakers as long as it is in a position to supply gas to designated entry points on the pipelines.

43. The original HBJ pipeline had a capacity of 33 MMSCMD, of which 30 MMSCMD was used. To accommodate gas from PLL, GAIL expanded the capacity to 56 MMSCMD by laying an 82 km pipeline from Dahej to Vemar, Gujarat, and a 528 km pipeline parallel to the existing HBJ pipeline from Vemar to Bijaypur, Madhya Pradesh. Currently, 40 MMSCMD of the expanded HBJ pipeline is being used, including 18 MMSCMD for PLL, leaving spare capacity of 16 MMSCMD. PLL gas requires additional 9 MMSCMD transmission capacity at 7.5 MMTPA production, and 18 MMSCMD at 10 MMTPA. With an additional compressor, the HBJ pipeline capacity can be raised by 7 MMSCMD, thus all PLL gas, even at the 10 MMTPA production level, can be transported through the HBJ pipeline.

¹⁵ The India Credit Rating Agency and Credit Rating Information System of India Limited are India's major credit rating agencies.

44. In addition, GAIL is laying a 475 km pipeline connecting Dahej to Uran in Maharashtra, targeting completion within 2006. Once this pipeline is operational, PLL will be able to expand its service area to Maharashtra. The Dahej–Uran pipeline will have a capacity of 12 MMSCMD.

6. Construction

45. The first phase terminal, except the breakwater, was successfully completed in accordance with an EPC contract by a consortium of Ishikawajima-Harima Heavy Industries Company Limited (IHI), Ballast Nedam International BV, Toyo Engineering India Limited, Toyo Engineering Corporation, Itochu Corporation, and Mitsui & Company Limited. This consortium was selected through an ICB. The terminal was commissioned on 9 April 2004 and the provisional acceptance certificate, which marked the commencement of the warranty and the latent defects liability period, was achieved on 13 June 2004. PLL and the EPC contractor executed a supplemental agreement on 8 December 2005 to remove the breakwater from the scope of work and reduce the contract price.

46. The EPC contract for the third LNG storage tank was awarded to IHI alone without bidding. After analyzing advantages and disadvantages of contracting with the same or a different contractor, PLL concluded that engaging the original EPC contractor would reduce implementation time as a detailed engineering design could be skipped based on the design and drawing for the existing two tanks. As per this lump-sum, fixed-price, date-certain, turnkey EPC contract dated 9 December 2005, the work has commenced and the tank will be completed by 26 December 2008. The third tank is being constructed ahead of the expansion facilities to allow increase of output even before completion of the expansion facilities if short-term LNG supply can be arranged.

47. The EPC contract for the expansion facilities was awarded through a fresh ICB to a consortium comprising IHI, Toyo Engineering India Limited, Toyo Engineering Corporation, Itochu Corporation, and Mitsui & Company Limited. This contract, dated 23 January 2006, is also on a lump-sum, fixed-price, date-certain, turnkey basis, with performance guarantees. The guaranteed provisional acceptance date is 26 June 2008 for the regasification facilities and 26 December 2008 for the fourth tank. Adding a 3-month commissioning period, the expansion facilities will be ready to commence commercial operations by the end of March 2009.

7. Operation and Maintenance

48. Following industry practice, PLL, as the owner, has operated and maintained the terminal with its in-house staff. PLL was supported with key personnel for the initial period from ONGC and technical support from GDFI. As per the technical services agreement, dated 21 October 2003, GDFI provided comprehensive training of operators and managers at GDF's facilities, onboard LNG tankers, and at the Dahej terminal. GDF developed and updated the operating procedure from time to time. The technical services agreement, scheduled to terminate on 1 September 2005, was extended until 31 August 2006 with a reduced scope of work, focusing on safety aspects, in particular, ensuring that a proper lock-out procedure is followed in case of LNG leakage. According to GDF, the terminal system is already well understood by PLL and the certification of compliance was obtained.

D. Environmental Aspects and Social Dimensions

49. The first phase terminal was assigned environmental category A. However, the proposed Project is classified as environmental category B as the major facilities to be

constructed during the expansion phase will involve only two additional storage tanks and associated equipment. Both of the environmental impact assessment (EIA) reports, one for onshore storage and regasification facilities and the other for marine facilities, were updated. The existing LNG terminal received a no-objection certificate from the Gujarat Pollution Control Board based on the original EIA reports prepared during 1999–2000, which also cover the second phase of development. However, the Ministry of Environment and Forest (MEF) granted environmental clearance only for the first phase development. PLL submitted the two updated EIA reports to MEF in April 2005 and received environmental clearance for the Project from MEF on 23 November 2005.¹⁶ The summary initial environmental examination was prepared in line with ADB's environmental and social safeguard policies and information disclosure for environmental category B projects. The summary initial environmental examination is based on the existing EIA documents as well as the two updated EIA reports, and has been posted on the ADB website. The Project is being implemented within the existing site and no additional land acquisition is required. The Project is not being implemented in areas inhabited by indigenous people. The Project has been assigned category C for impact on involuntary resettlement and indigenous people.

50. PLL has been accredited with ISO 9001, OHSAS 18001 for its occupational health and safety management system, and ISO 14001 for its environmental management system. In addition, PLL strictly enforces a policy and a manual on health, safety, and environment, which includes an emergency response plan. Since the commencement of operations, the existing LNG terminal has not experienced major incidents related to environment and safety or occupational health. Environmental mitigation measures and a monitoring program for the construction and operation phases of the Project were developed from the existing measures and program, which are based on best practices of LNG industries. The impact of construction activities of the two LNG storage tanks, such as dust, noise, and emissions of heavy construction equipment and vehicles, will be insignificant and confined within the existing project site with no communities nearby. The health, safety, and environment unit will monitor the EPC contractor's compliance with the requirements of Gujarat Pollution Control Board and MEF. During operation, the only cumulative environmental impacts of the Project will be increased gaseous emissions from the additional gas turbine generators and vaporizers. Natural gas is considered a clean fuel with a low impact on air quality. Nitrogen oxide, the major air pollutant, will be controlled through the use of lean-burn technology in the gas turbine generators, and high stacks for rapid dispersion of emissions. The emission of nitrogen oxides after the expansion is predicted to be within the limit prescribed under the National Ambient Air Quality Standard.¹⁷

51. Safety is the key issue for LNG terminal operations. The major risks are pool-fires and vapor dispersion if LNG spills or leaks from the storage tanks, pipelines, and process equipment. PLL will comply with the well-established industry standards for design, construction, and operation of LNG terminal facilities,¹⁸ as well as emergency response and disaster management plan and procedures, which were adopted during the phase I project. The

¹⁶ In updating the EIA for the Project, public consultation was carried out in a more limited scale since the public consultation during the previous EIA already included public meetings and newspaper announcements to inform the public of the Project and solicit their comments and covered the full-scale development. In addition, the Project is located within the boundary of the existing project site. PLL published the project information as well as the MEF's environmental clearance on 30 November 2005 in two local newspapers and also on MEF's website. No public concerns were received after the publication of the project information.

¹⁷ Based on a model of the United States Environmental Protection Agency.

¹⁸ Both the national design codes, i.e., the Oil Industry Safety Directorate OISD—94, and the international design standards, i.e., the European standard, EN—1473, the US National Fire Protection Association standard, NFPA—59A and British Standard BS777.

two additional storage tanks will be full containment tanks, following the same standards as the two existing LNG storage tanks. Full containment tanks have the highest standard of safety features compared with single and double containment tanks. The standard practices reduce the probability of explosion and pool fire caused by LNG leakage from pipes and storage tanks to extremely low levels.¹⁹ The consequence analysis of an LNG leakage under the EIA of the phase I project indicated that the vapor dispersion exclusion zone and thermal exclusion zone are within the site boundary.

52. The facilities not within the scope of the Project but associated with the Project are the three pipelines that transport or will transport the gas from the Project: Dahej–Vemar, Vemar–Bijaypur, and Dahej–Uran pipelines. All are owned and operated by GAIL. The Dahej–Vemar and Vemar–Bijaypur pipelines received no-objection certificates from the pollution control boards of Gujarat and Madhya Pradesh states and MEF environmental clearance, and are already in operation. The 82 km Dahej–Vemar pipeline was constructed on a new right-of-way acquired by GAIL. The 528 km Vemar–Bijaypur pipeline was constructed parallel to the original HBJ pipeline on the existing right-of-way owned by GAIL. According to GAIL, the handover of land was temporary and the affected people were duly compensated. In July 2004 the new 475 km Dahej–Uran pipeline received environmental clearance from MEF; construction is expected to be completed by the end of 2006. The EIA of the Dahej–Uran pipeline found no significant environmental impacts; the pipeline corridor will not traverse ecologically sensitive areas. Due diligence is ongoing on the handover and compensation process of the land for the Dahej–Uran pipeline.

E. Development Impact

1. Impact, Outcome, and Output

53. The Project aims to promote India's sustainable economic development by providing cleaner and lower cost energy. With the duly completed and operated expansion facilities of the LNG terminal (outputs), the Project will provide additional natural gas to industrial and household users (outcome). The Project will help India increase energy supply, shift to cleaner energy away from more polluting energy, and enhance energy security by diversifying the energy base (impact).

2. Development Effectiveness

54. The development effectiveness of the Project will be assessed in terms of private sector development, business success, and economic sustainability as per the guidelines for implementing the Good Practice Standards for Evaluation of Private Sector Investment Operations prepared by the Evaluation Cooperation Group of multilateral development banks. In terms of private sector development impact at the company level, the first phase terminal has transferred managerial and operational know-how and skills required of an LNG terminal for the first time to India through technical support by GDFI. Through expanded operation of the terminal, the Project will continue to improve the skills and knowledge of local staff. During the 3 years of construction, PLL will employ about 500 workers on average. Currently, PLL employs about 145 staff for its existing operations at the terminal and 55 staff at its head office in Delhi. An additional 176 staff will be employed indirectly through shipping LNG, outsourcing jetty management, and security. The Project is expected to increase the total number of staff at the

¹⁹ The probability for pipeline rupture is estimated at 9×10^{-9} per year, while that for the LNG storage tank on fire is 2×10^{-28} .

terminal to 204. The Project is expected to yield private sector development impact beyond the company. The first phase terminal has demonstrated that an LNG terminal could be implemented as a public-private partnership successfully and profitably in India and could attract commercial financing. The Project will (i) demonstrate good practices in public-private partnership in infrastructure development and financing; (ii) provide a benchmark for other gas producers in terms of pricing and operation; (iii) promote competition; (iv) facilitate rationalization of gas price; and (v) in the long run, improve efficiency in the gas subsector and contribute to the generation of more affordable environment-friendly energy. The Project's development effectiveness framework is in Appendix 1.

F. Economic Evaluation

55. The economic analysis of the Project was carried out in accordance with ADB's *Guidelines for the Economic Analysis of Projects*. The economic analysis adopts conservative assumptions and covers the same period as the financial evaluation. The incremental gas supply from the Project will meet both incremental and nonincremental demand. Incremental demand stems from the expansion of industrial projects, and economic benefits are the economic value-added of these projects. Nonincremental demand represents the replacement of more expensive fuel like naphtha, and resource cost savings are treated as economic benefits.

56. Economic costs include both incremental costs directly related to the expansion of the LNG terminal and incremental costs of associated facilities, which are borne by the offtakers and end users. Incremental costs incurred by PLL include capital costs and operation and maintenance costs. A shadow exchange rate factor was applied to traded components of the costs. Labor conversion factors were applied to unskilled and skilled labor. The economic internal rate of return is estimated at 28.6%, which is above the social discount rate of 12%. The results of the sensitivity analysis indicate that the Project will be economically robust and viable under adverse scenarios.

V. THE PROPOSED ASSISTANCE

A. Loan

57. The proposed ADB loan of up to Rs6.750 billion to PLL will be denominated in Indian rupees and provided from ADB's ordinary capital resources without government guarantee but with a KfW PCG covering up to Rs3.375 billion of amounts outstanding under the ADB loan. ADB will be exposed to the credit risk of KfW, which is rated AAA; therefore ADB's net exposure to the risk of PLL will be reduced. The financing structure whereby KfW participates with a PCG in the ADB loan is proposed for two reasons. First, by having risk participation by a third party financial institution, ADB's net exposure to the risk of PLL could be reduced to the level within ADB's single project exposure limit applicable for nonsovereign guaranteed operations.²⁰

²⁰ Reducing ADB's risk exposure to a project by obtaining a guarantee from another financial institution was envisaged in ADB. 1985. *Bank Assistance to the Private Sector*. Manila (R58-85 dated 25 June. Paragraphs 25–27 of this paper read: "One of the principal concerns regarding this facility [lending without government guarantee] is that Bank loans to private enterprises without a DMC [developing member country] government guarantee will inevitably involve higher risk in comparison with loans guaranteed or relented through DMC governments.....In the short term, the Bank will have to adopt other measures to minimize and safeguard against the risk of providing loans without government guarantee.....Where necessary, the Bank could also seek a guarantee for its loan from a financial institution acceptable to the Bank, or obtain appropriate collateral arrangements or other forms of security." Catalyzing larger funds through risk-sharing is also one of the pilot financing instruments envisaged under the Innovations and Efficiency Initiative launched in November 2003. ADB. 2005. *Innovation and Efficiency Initiative: Pilot Financing Instruments and Modalities*. Manila (R194-05 dated 4 August).

Second, this structure would enable KfW, which does not currently have rupee funding capacity, to assist a project that needs long-term rupee financing.

58. ADB has an existing equity investment in PLL. The ADB loan amount will be determined so that ADB's total net exposure to the PLL risk, including that from ADB's existing equity investment in PLL, and taking into account the KfW PCG coverage will be up to Rs3.375 billion (equivalent to \$75 million), the single project exposure limit.

B. Justification

59. The Project merits ADB support for the following reasons:

- (i) The Project will help India meet the growing demand for energy and contribute to India's sustainable economic development by providing cleaner and lower cost fuel and feedstock to industrial users and households. The Project will enable supply of natural gas to several cities and towns in north India for provision of compressed natural gas for industrial and public transportation use. This will help reduce pollution levels.²¹
- (ii) The Project will enhance energy security by diversifying the energy base away from coal and imported oil. India is close to large gas reserves in the Middle East and Central Asia, and so the rationale for increasing LNG receiving terminal capacity on India's west coast is strong. Alternative plans to import gas through transcontinental pipelines require prior resolution of technical and political issues, which will take time.
- (iii) PLL operates the first LNG terminal in India and ADB's support since project conceptualization has had demonstration effects and promoted strategic private sector investment in the gas sector. ADB's involvement in the Project will strengthen PLL's operation as a private sector entity and facilitate PLL's dialogue with the Government on gas sector reform.
- (iv) The Project (a) embodies ADB's country and energy strategies, which emphasize supporting energy infrastructure development with private sector participation; (b) supports thematic priorities of economic development, private sector development, good governance, and environmental protection; (c) demonstrates good practices in public-private partnership in infrastructure development; and (d) will transfer the best available technology and know-how in LNG terminal operation.
- (v) ADB's loan will provide rupee-denominated long-term financing with a fixed interest rate, much needed for infrastructure development in India. Long-term, local currency, fixed interest rate financing enhances sustainability and affordability of projects and avoids a mismatch between the currency of borrowing and the currency of revenue. Indian financial institutions have limited capacity to provide long-term, fixed-rate funding.

²¹ ADB is also supporting construction of gas distribution networks in Kanpur to deliver compressed natural gas to vehicles and piped natural gas to commercial, industrial, and residential users. ADB. 2005. *Report and Recommendation of the President to the Board of Directors on a Proposed Equity Investment in Central Uttar Pradesh Gas Limited India: Urban Clean Fuels Project*. Manila.

- (vi) Consistent with ADB's mandate to mobilize financing from other sources, ADB's rupee-denominated loan will catalyze risk participation of KfW, which otherwise could not finance a rupee-needed project.

C. Anticorruption and Combating Money Laundering and the Financing of Terrorism

60. PLL was advised of ADB's policies on anticorruption²² and combating of money laundering and the financing of terrorism.²³ Consistent with its commitment to good governance, accountability, and transparency, ADB will require PLL to maintain and comply with internal procedures and controls following international best practice standards for the purpose of preventing corruption or money laundering activities or the financing of terrorism, and covenant with ADB to refrain from engaging in such activities. The financing documentation between ABD and PLL will allow ADB to investigate any violation or potential violation of these undertakings.

VI. REQUEST TO WAIVE CERTAIN INVESTMENT LIMITATIONS

61. The proposed loan of up to Rs6.750 billion to PLL will, once approved, represent 8.0% of the total exposure of ADB's private sector operations' portfolio and will exceed the single project, group, and sector exposure limits as shown in Table 6. However, if the portion of the loan guaranteed by KfW is deducted from the computation of the exposure to PLL risk, the residual net exposure to PLL's risk would be up to \$75 million equivalent, within the single project and group exposure limits. ADB's Risk Management Unit has considered these breaches and supports a waiver of each of these limits for the proposed ADB assistance. Board approval is requested on the waiver of the single project exposure limit. Management has endorsed this request and endorsed the waivers of the group and sector exposure limits.

²² ADB. 1998. *Anticorruption*. Manila.

²³ ADB. 2003. *Enhancing the Asian Development Bank's Role in Combating Money Laundering and the Financing of Terrorism*. Manila.

Table 6: Proposed Loan and Investment Limits

Limit	Proposed Loan	Limit	Remarks
Single project exposure limit	42.7% of total project cost and \$150 million equivalent	Lower of 25% of the total project cost or \$75 million	Not within the limit. With the KfW guarantee, ADB's net exposure to PLL risk will be up to 21.4% and \$75 million equivalent, within the single project exposure limit.
Group exposure limit	\$150 million equivalent	\$80 million	Not within the limit. With the KfW guarantee, ADB's net exposure to PLL risk will be within the group exposure limit.
Country exposure limit	The proposed loan will increase ADB's exposure to India to 22.5% of private sector operations portfolio	25% of private sector operations portfolio for any country	Within the limit.
Sector exposure limit	The proposed loan will increase ADB's exposure to conventional energy generation (other than hydropower) subsector ^a from 13.6% to 20.5% of private sector operations portfolio	15% of private sector operations portfolio for any subsector ^a	Not within the limit. If the KfW guaranteed portion is excluded from the computation, ADB's net exposure to energy sector would be 16.5% of private sector operations portfolio.

ADB = Asian Development Bank, KfW = KfW Bankengruppe, PLL = Petronet LNG Limited.

^a In calculating sector exposure limits, projects for which the government gives assurances that substantially reduce the credit risk of the project are excluded; ADB. 1994. *Provisions for Investment Losses in the Bank's PSO*. Manila (Rs15-94 dated 10 January, para. 35).

Source: Asian Development Bank estimates.

VII. ASSURANCES

62. A framework agreement relating to ADB's status, privileges, and immunities with respect to its equity investments, lending operations, and guarantee operations in the private sector is in effect between the Government and ADB. Consistent with the Agreement Establishing the Asian Development Bank, the Government will be requested to confirm that it has no objection to the proposed assistance to PLL. No funding will be disbursed until ADB receives such confirmation. ADB will enter into suitable documentation, in form and substance satisfactory to ADB, following approval of the proposed financing by the Board of Directors.

VIII. RECOMMENDATION

63. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and, acting in the absence of the President, under the provisions of Article 35.1 of the Articles of Agreement of ADB, I recommend that the Board approve

- (i) the loan of up to Rs6,750,000,000, supported by a partial credit guarantee from German development cooperation through KfW Bankengruppe, to Petronet LNG Limited for the Dahej Liquefied Natural Gas Terminal Expansion Project from ADB's ordinary capital resources with an interest rate to be determined based on the procedures applicable to ADB local currency loans for private sector operations; and such other terms and conditions as are substantially in accordance with those set forth in this report, and as may be reported to the Board; and
- (ii) the proposal that ADB's assistance for the Project exceed the single project exposure limit (para. 63).

Liqun Jin
Vice President

27 July 2006

DESIGN AND MONITORING AND DEVELOPMENT EFFECTIVENESS FRAMEWORKS

A. Design and Monitoring Framework

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
Impact <ul style="list-style-type: none"> • Increase energy supply • Support shift to clean energy • Diversify energy base 	<ul style="list-style-type: none"> • Meet new demand of about 4.41 MMSCMD • Meet switching demand from more polluting fuels of about 4.3 MMSCMD • Increase share of natural gas from 8% to 15% by 2011 	<ul style="list-style-type: none"> • Offtakers' sales reports • Publicly available statistics on energy 	Assumptions <ul style="list-style-type: none"> • Gas sector reforms • Competitive gas price • Domestic gas supply to increase • LNG supply to increase
Outcome <ul style="list-style-type: none"> • Increased natural gas supply to industrial and household users 	<ul style="list-style-type: none"> • 8.71 MMSCMD of natural gas supply 	<ul style="list-style-type: none"> • PLL's operating reports 	Assumptions <ul style="list-style-type: none"> • Due completion and operation of expansion facilities • Stable LNG supply • Due completion of the third LNG tanker • Due completion of gas distribution networks
Outputs <ul style="list-style-type: none"> • LNG terminal capacity expanded initially to 7.5 MMTPA and later to 10 MMTPA and duly operated 	<ul style="list-style-type: none"> • Completion as per the specification • Stated output 	<ul style="list-style-type: none"> • Completion certificates • PLL's operating reports 	Assumption <ul style="list-style-type: none"> • Finance raised
Activities with Milestones <ol style="list-style-type: none"> 1. Two engineering, procurement, and construction contracts for the expansion facilities were signed on 9 December 2005 and 23 January 2006. 2. Time charter agreement for the third LNG tanker was signed on 21 February 2006. 3. Financing documents for debt are to be signed by October 2006 and remaining equity to be generated in time for project expenditure. 4. The expansion facilities and the third LNG tanker are to be completed by March 2009 			Inputs <ul style="list-style-type: none"> • PLL • ADB • Cofinanciers

ADB = Asian Development Bank, LNG = liquefied natural gas, MMSCMD = million standard cubic meters per day, MMTPA = million metric tons per annum, PLL = Petronet LNG Limited.
Source: Asian Development Bank estimates.

B. Development Effectiveness Framework

Objectives	Impact	Performance Targets	Measurement
Private Sector Development	<p>A. Project Company Impact</p> <ul style="list-style-type: none"> • Brings managerial and operational skills • Sets new standards in business performance, corporate governance, health and safety, etc. • Creates employment <p>B. Beyond Company Impact</p> <ul style="list-style-type: none"> • Prepares for more private sector participation • Provides competitive pressure on other players to raise efficiency • Demonstrates innovation • Adds notable upstream and/or downstream linkages • Induces more private sector finance • Improves regulatory environment for private sector participation • Provides wider demonstration of new standards in corporate governance, health and safety, etc. 	<ul style="list-style-type: none"> • Professional and commercial management • Profitable business • High quality governance • About 200 permanent jobs <ul style="list-style-type: none"> • Follow-on projects on public-private partnership or other types of private sector sponsorship and finance in the energy sector of India and other countries • Competitive gas price • Improved efficiency in the energy sector • Expansion of gas transport and distribution infrastructure and gas user base • Increased number of participants in the gas industry • Further rationalization of gas price 	<ul style="list-style-type: none"> • Company's operating and financial performance • Number of jobs <ul style="list-style-type: none"> • Number of private sector investments in the energy sector in the region • Gas price • Gas supply and consumption volume • Capacity of gas transport and distribution infrastructure • Identity of gas users • Identity of gas industry players
Business Success	<ul style="list-style-type: none"> • Financially profitable • Sustainable operations 	<ul style="list-style-type: none"> • Financial internal rate of return greater than weighted average cost of capital • Return on equity 	<ul style="list-style-type: none"> • Financial ratios • Operations reports
Economic Sustainability	<ul style="list-style-type: none"> • Contributes to economic growth, improvement of environment, improvement of living standards, and government revenues 	<ul style="list-style-type: none"> • Economic internal rate of return greater than 12% 	<ul style="list-style-type: none"> • Economic internal rate of return

Source: Asian Development Bank estimates.

DIRECT ASIAN DEVELOPMENT BANK ASSISTANCE TO THE PRIVATE SECTOR IN INDIA
(\$ million)

Investment/ Loan No.	Date of Approval	Company	Equity Investment		Loan	Guaran- tees	Comple- mentary Loan	Total
			Under Line of Equity	Direct				
7014/833	16 Jul 1987	DCL Polyester Ltd. Textiles		3.00	16.00		5.00	24.00
	26 Jan 1994	DCL Polyester Ltd. Textiles		0.75				0.75
7016	29 Oct 1987	Industrial Credit & Investment Corp. of India Ltd.	5.00					5.00
7024/893	30 Jun 1988	Andhra Petrochemicals, Ltd.		3.00 ^a	4.00			7.00
7032/950	31 Jan 1989	Indian Acrylics Ltd.		2.24	5.90			8.14
7040	2 Nov 1989	IL&FS Investment Managers Ltd. ^b		0.80				0.80
	20 Sep 1994	IL&FS Investment Managers Ltd.		0.60				0.60
7058/1036	4 Oct 1990	Calcutta Electric Supply Company Limited I			17.80			17.80
7067	20 Dec 1990	Twentieth Century Finance Corp. ^c		1.83				1.83
	15 Oct 1993	Twentieth Century Finance Corp.		1.10				1.10
7082/1142	13 Dec 1991	Calcutta Electric Supply Company Limited II			32.00			32.00
7096/1280	7 Dec 1993	Twentieth Century Finance Corp.			20.00			20.00
7097/1281	7 Dec 1993	ICDS Limited			10.00			10.00
7098/1282	7 Dec 1993	Infrastructure Leasing and Financial Services Ltd.			15.00			15.00
7099/1283	7 Dec 1993	Kotak Mahindra Finance Ltd.			15.00			15.00
7103	21 Jul 1994	Centurion Bank Limited		8.10				8.10
7158	21 Jul 1994	TCFC Finance Limited ^d		0.10				0.10
7104	21 Jul 1994	Global Trust Bank Limited		3.20				3.20
7105	20 Sep 1994	SARA Fund		4.82				4.82
7117	14 Dec 1995	AIG Indian Sectoral Equity Fund LLC ^e		15.00				15.00
7118	14 Dec 1995	AIG Indian Equity Advisors LLC ^f		0.10				0.10
7120	19 Dec 1995	SBI Capital Markets Ltd.		21.20				21.20
7121	19 Dec 1995	SBI Securities Ltd.		(4.30) ^g				(4.30) ^g
7122	19 Dec 1995	SBI Gilts Ltd.		4.50				4.50
7130/1499	5 Dec 1996	Balagarh Power Co. Ltd.		(15.00) ^g	(25.00) ^g		100.00 ^g	(140.00) ^g
7138	14 Oct 1997	Infrastructure Development Finance Co.		15.46				15.46
7180	26 Nov 2002	India Mortgage Guarantee Company		10.00				10.00
7181	16 Dec 2002	Henderson India Infrastructure Fund Ltd.		15.00				15.00
7182/1975	17 Dec 2002	Max Healthcare Institute Limited			20.00			20.00
7183/1991	16 Jan 2003	Tala Delhi Transmission Project			62.00			62.00
7188 & 7189	18 Dec 2003	Housing Finance Projects in India			40.00			40.00
7192	13 Jan 2004	Petronet LNG Limited		9.70		65.30		75.00
7203	25 Nov 2004	Torrent Power Generation Limited		20.60	54.40			75.00

Investment/ Loan No.	Date of Approval	Company	Equity Investment		Loan	Guaran- tees	Comple- mentary Loan	Total
			Under Line of Equity	Direct				
7205	26 Nov 2004	Baring India Private Equity Fund II Limited		20.00				20.00
7207	10 Mar 2005	Actis Asset Reconstruction Company		5.60				5.60
7211/2169	19 Apr 2005	Infrastructure Development Finance Co.			50.00			50.00
7217/2179	23 Aug 2005	Subordinated Loan in Yes Bank			23.00			23.00
7223	23 Nov 2005	BTS India Private Equity Fund		15.00				15.00
7227	17 Jan 2006	Central Uttar Pradesh Gas Limited		2.60				2.60
7228	01 Feb 2006	IDFC Private Equity Fund II		45.00				45.00

^a Japan Special Fund.

^b Formerly IL&FS Venture Capital Ltd.

^c Formerly Twentieth Century Capital Corp.

^d New investment resulting from the Twentieth Century Finance Corporation (TCFC)/Centurion Bank Limited merger, ADB holds 439,999 shares (with a par value of Rs10 per share) following TFL's acquisition of TCFC's investment portfolio.

^e Formerly AIG Indian Sectoral Equity Fund.

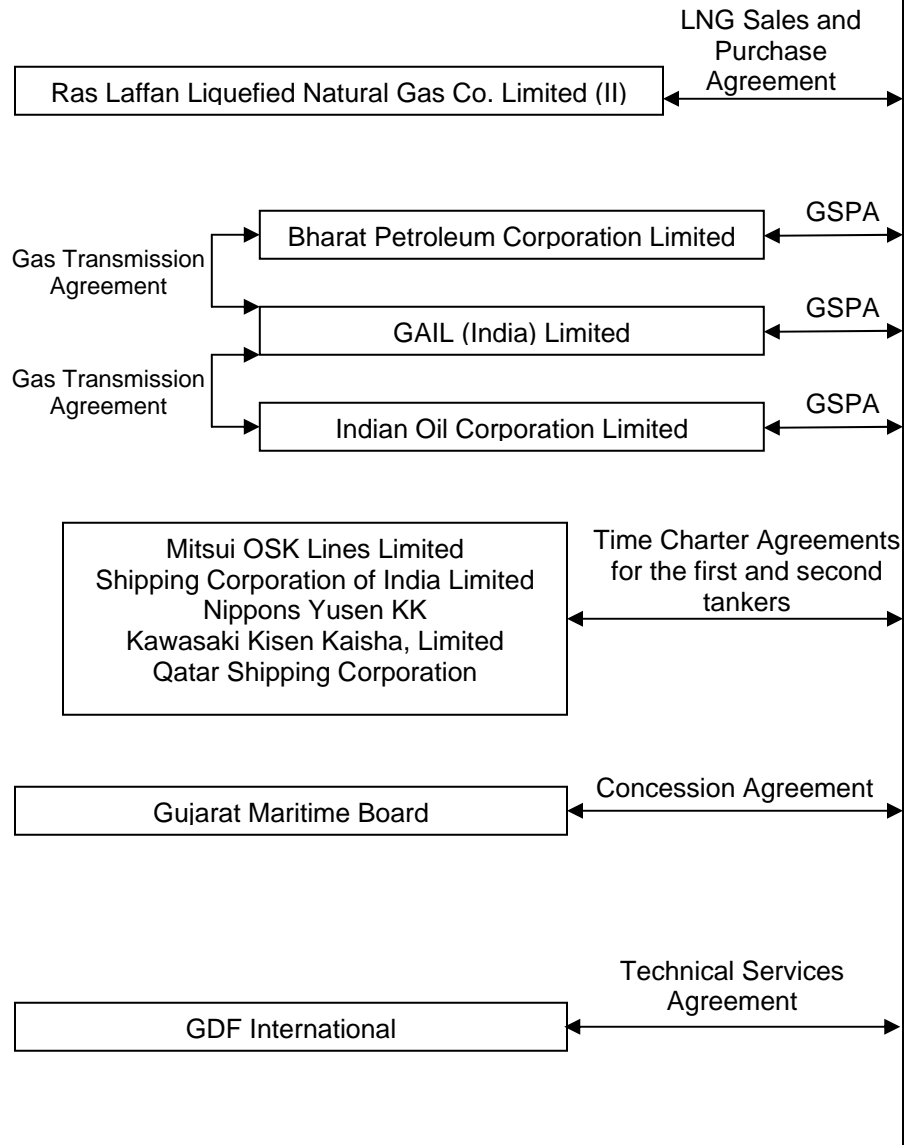
^f Formerly AIG Indian Equity Management Co.

^g Cancelled by the Asian Development Bank.

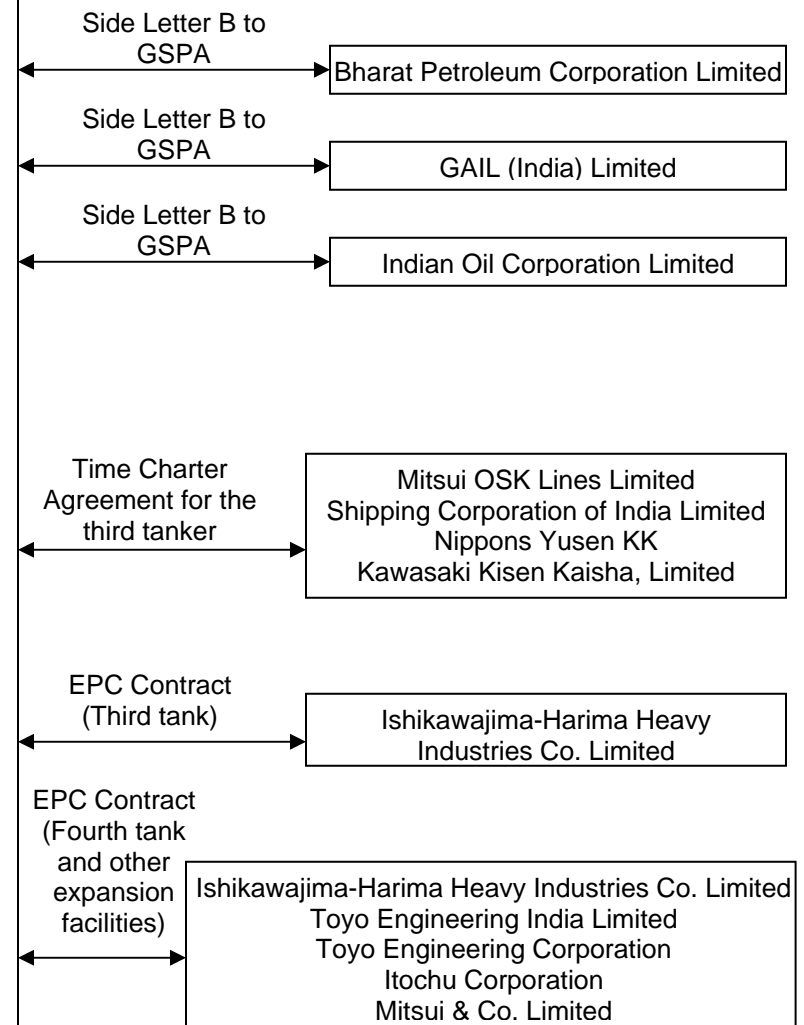
Source: Asian Development Bank.

PROJECT CONTRACTUAL STRUCTURE

Contracts for the First Phase Terminal



Additional Contracts for the Expansion Project



EPC = engineering, procurement, and construction, GSPA = Gas Sales and Purchase Agreement, LNG = liquefied natural gas.

GAS OFFTAKERS

A. Bharat Petroleum Corporation Limited

1. Bharat Petroleum Corporation Limited (BPCL) was formed in 1976 as a result of the amalgamation of Burmah Shell Oil Storage and Distribution Company of India Limited with Burmah Shell Refineries Limited. BPCL's paid-up capital as of 31 March 2005 was Rs3 billion, of which the Government held 66.2%. BPCL is listed on the national, Calcutta, Delhi, Madras, and Mumbai stock exchanges; and is rated AAA by the Credit Rating Information System of India Limited. It ranked 429th in the Fortune 500 list.

2. BPCL operates an integrated refinery, and markets petroleum products including lubricant and liquefied petroleum gas (LPG). It is India's second largest petroleum company, with about a 22% share of the domestic petroleum market. BPCL recorded crude throughput of 19.10 million metric tons per annum (MMTPA) (including BPCL's refinery at Mumbai, Kochi Refineries Limited [KRL] and Numaligarh Refinery Limited) and market sales of 21.8 MMTPA in FY2005. The group's net sales increased from Rs555.6 billion in FY2004 to Rs644.2 billion in FY2005. However, its net profit declined from Rs23.6 billion to Rs20.7 billion due mainly to the control over retail petroleum prices and reduction in marketing margin. BPCL's marketing business is required to purchase its products from refineries at import parity prices, while it is subject to government controls on retail prices. Nevertheless, the adverse impact on the marketing margin has been partially offset by the strong refinery margin due to a rise in petroleum prices. In addition, the Government has implemented measures to revive the deteriorating financial condition of oil marketing companies by allowing limited price increases in June and September 2005, and requiring upstream oil companies to offer discounts to oil marketing companies. These factors contributed to BPCL's stable financial performance. BPCL's consolidated financial statements are summarized in Table A4.1.

3. Currently, BPCL's organization structure consists of one asset-based strategic business unit, which is a refinery, and five customer interface strategic business units along its product lines, i.e., aviation, industrial and commercial, LPG, lubricants, and retail. BPCL recently merged with KRL, its subsidiary with a 54.81% stake. KRL benefited from a high refining margin in FY2005 and recorded net profit of Rs8.42 billion, an increase of 52% from the previous year. The merger will result in savings due to synergies in its operations and savings on sales tax, which KRL has been paying on its output sold to BPCL.

4. BPCL recently completed the expansion and modernization program of its Mumbai refinery, increasing capacity to 12 MMTPA from 6.9 MMTPA, and plans to set up a refinery with 6 MMTPA at Bina, Madhya Pradesh through its subsidiary, Bharat Oman Refineries Limited. Furthermore, it aims to expand its retail distribution network from 6,500 to more than 7,000 outlets. BPCL has received ISO 9002 certification for its refinery at Mumbai, LPG bottling plants, and lube blending plant. It has also received ISO 14001 certification for its environmental management system, and OSHAS 18001 certification for its occupational health and safety management system.

Table A4.1: Financial Summary of Bharat Petroleum Corporation Limited
(Rs million)

Item	FY2003	FY2004	FY2005
Income Statement Data			
Net Sales	503,770	555,630	644,248
Other Income	20,654	3,065	23,773
Total Income	524,424	558,695	668,022
Expenditures	482,649	509,219	626,758
EBITDA	41,775	49,476	41,264
Net Profit	18,225	23,644	20,741
Balance Sheet Data			
Current Assets	108,856	109,165	135,627
Fixed Assets and Intangible Assets	105,837	115,252	125,399
Total Assets	223,378	231,042	264,815
Current Liabilities	91,569	91,625	99,322
Loans	58,187	47,023	55,478
Total Liabilities	162,024	153,089	171,498
Shareholders' Equity	61,353	77,953	93,317
Ratios			
EBITDA Margin (%)	7.97	8.86	6.18
Net Profit Margin (%)	3.48	4.23	3.10
Long-Term Debt to Equity Ratio	1.15	0.79	0.77
Return on Equity (%)	29.70	30.33	22.23

EBITDA= earnings before interest, tax, depreciation, and amortization, FY = fiscal year.

Source: Bharat Petroleum Corporation Limited.

B. GAIL (India) Limited

5. GAIL (India) Limited (GAIL), the principal gas transmission and marketing company in India, was set up by the Government in 1984 to create infrastructure for sustained development of the market in the country. Since its establishment, GAIL has expanded into gas processing, petrochemicals, LPG transmission, liquefied natural gas (LNG) regasification, city gas distribution, exploration and production, and telecommunications. As of 31 March 2005, GAIL's paid-up share capital was Rs8.46 billion, of which the Government held 57.3%; its market capitalization was recorded at Rs179.45 billion. GAIL is listed on the Mumbai and national stock exchanges in India; as well as the London Stock Exchange. In 2005, GAIL was ranked among the top 10 Indian companies in terms of profits and revenues. It is rated AAA by the India Credit Rating Agency.

6. Currently, GAIL has a near monopoly position in the natural gas transmission business through its ownership and operation of India's largest gas transmission networks for the total length of 5,340 kilometers (km), representing 88% market share. In addition, it owns and operates the world's longest exclusive LPG pipeline with total length of 1,269 km; seven gas processing facilities with aggregate capacity of 1.3 MMTA of LPG, propane, and other liquid hydrocarbons; and India's largest gas-based petrochemicals complex.

7. GAIL is the sole transporter and the principal marketer of the regasified LNG from PLL. GAIL has constructed a 610 km long pipeline from Dahej in Gujarat to Bijaypur in Madhya Pradesh to evacuate LNG from the Dahej terminal. The Dahej-Bijaypur pipeline has increased the transmission capacity along the Hazira-Bijaypur-Jadgishpur corridor by 23 MMSCMD. Moreover, GAIL is now expanding its pipeline network by constructing the Dahej-Uran pipeline and Bijaypur-Kota pipeline. The Dahej-Uran 475 km pipeline, which is scheduled to be completed by December 2006, will link the two important gas markets of Gujarat and Maharashtra; and enable Maharashtra to have access to other gas sources than the currently

sole supply from the Bombay high fields, which is decreasing. The Bijaypur–Kota pipeline will be completed by December 2006 and will supply LNG mainly to Rajasthan.

8. The fixed transmission charges and subsidized price of natural gas, which is used as input in the LPG and petrochemical business, have contributed to GAIL's high profitability. During FY2005, GAIL exhibited growth in all its businesses. The sale of gas rose from 21.0 billion cubic meters in FY2004 to 22.8 billion cubic meters in FY2005. Other petroleum products also recorded an increase in sales. The company's total revenues increased from Rs122.3 billion in FY2004 to Rs139.1 billion in FY2005, while its net profits registered a slight increase from Rs28.1 billion to Rs28.7 billion. With strong operating cash flows and low working capital requirements, GAIL has been able to finance its capital investments through minimal use of debt. GAIL's financial statements are summarized in Table A4.2.

9. Going forward, GAIL plans to expand its national gas transmission network and its growth in other downstream activities. It will be subject to the recently approved Petroleum and Natural Gas Regulatory Board Bill, which allows open access in transmission infrastructure. Additional regasification capacity of PLL through the expansion of the Dahej terminal and construction of the Kochi terminal will increase the volume of its LNG marketing business. Given the substantial unmet demand for LNG in India and price competitiveness of LNG compared with other more expensive fuels such as naphtha, the risks associated with LNG marketing are believed to be relatively low over the medium term. Aside from the LNG business, GAIL plans to expand the capacity of its petrochemical complex from 300,000 tons to 450,000 tons by 2007. Furthermore, GAIL, through its wholly owned subsidiary GAIL Global (Singapore) Pte. Limited (GAIL Global), will continue to explore international business opportunities. During FY2005, GAIL Global acquired a 15% equity stake in National Gas, one of the largest local distribution companies in Egypt; and 8.5% participating interest in China Gas Holding Company, which provides natural gas supply to residential, industrial, and commercial sectors in the People's Republic of China. GAIL has been accredited with ISO 9002 and ISO 14001 for its pipeline system and LPG plants.

Table A4.2: Financial Summary of GAIL (India) Limited
(Rs million)

Item	FY2003	FY2004	FY2005
Income Statement Data			
Sales	99,982	105,418	120,373
Other Income	16,712	16,860	18,763
Total Income	116,694	122,278	139,136
Expenditures	83,678	103,174	118,062
EBITDA	33,390	36,138	39,530
Net Profit	25,100	28,118	28,723
Balance Sheet Data			
Current Assets	46,437	41,071	64,140
Fixed Assets and Intangible Assets	69,502	89,574	81,550
Total Assets	122,818	138,364	153,529
Current Liabilities	27,760	30,302	34,742
Loans	20,471	21,335	19,974
Total Liabilities	59,428	63,913	67,268
Shareholders' Equity	63,391	74,452	86,261
Ratios			
EBITDA Margin (%)	28.61	29.55	28.41
Net Profit Margin (%)	21.51	23.00	20.64
Long-Term Debt to Equity Ratio	0.50	0.45	0.38
Return on Equity (%)	39.60	37.77	33.30

EBITDA= earnings before interest, tax, depreciation, and amortization, FY = fiscal year.

Source: GAIL (India) Limited.

C. Indian Oil Corporation Limited

10. Indian Oil Corporation Limited (IOC) has engaged in the oil and gas business since its establishment in 1964 through the merger of Indian Oil Company Limited and Indian Refineries Limited. IOC refines and markets petroleum and its derivatives. It is currently India's largest company by sales with consolidated turnover of Rs1.51 trillion and net profits of Rs48.91 billion in FY2005. In 2005, IOC was ranked 170th in the Fortune Global 500 listing, the highest ranked Indian company. It was also the 18th largest petroleum company in the world and the first-ranked petroleum trading company among the national oil companies in the Asia-Pacific region. IOC's paid up capital as of 31 March 2005 was Rs11.68 billion, of which the Government held 82%. IOC is listed on the national and Mumbai stock exchanges. IOC's international credit ratings are Baa3 by Moody's and BB+ by Standard and Poor's, and its local credit rating by the India Credit Rating Agency is AAA.

11. IOC and its subsidiaries account for 56% market share of petroleum products among public sector oil companies, 42% of national refining capacity, and 69% of downstream pipeline throughput capacity. IOC's group owns and operates 10 of India's 18 refineries with a combined refining capacity of 54.2 MMTPA. The refinery business registered a record throughput of 36.63 MMTPA during FY2005 with capacity utilization rate of 88.6%. All refinery units are accredited with ISO 9002 and ISO 14001 certifications. IOC owns and operates the country's largest network of 8,892 km of crude oil and petroleum product pipelines for combined capacity of 60.42 MMTPA. Furthermore, IOC operates the largest and widest network of retail outlets in the country with the sale of 50.13 million tons of petroleum products, and has reached a significant milestone with the commissioning of the company's 10,000th petrol station in FY2005. Regarding its gas business, IOC has already been marketing 5.26 MMSCMD. In addition to the

investment in PLL, IOC along with its subsidiary Chennai Petroleum Corporation plans to develop an LNG import terminal at Ennore near Chennai.

12. Losses from the retail marketing business due to government price controls on LPG, diesel, and other petroleum products have been partly offset by improved refining margins and the stable contribution from its pipeline operations (Table A4.3). An increasing output of refined products from planned new capacities at a faster pace than domestic demand is expected to worsen the oversupply situation and negatively affect the refining margin. However, IOC has competitive advantage over its competitors given that over 67% of its refining capacity is in the northwest where demand is relatively vibrant and its ownership of a downstream pipeline enhances its ability to sell its products. Government ownership, along with IOC's integrated and diversified operations and its adequate financial profile are anticipated to mitigate the adverse impact on its marketing business if government controls on petroleum retail prices continue. IOC has set a revenue target of \$60 billion by FY2012 and plans to achieve this by continuing its vertical integration strategy forward into petrochemicals and backward into exploration and production of crude oil as well as diversifying its natural gas business.

Table A4.3: Financial Summary of Indian Oil Corporation Limited
(Rs million)

Item	FY2003	FY2004	FY2005
Income Statement Data			
Sales	1,010,132	1,134,015	1,316,440
Other Income	117,312	56,985	53,535
Total Income	1,127,444	1,191,000	1,369,975
Expenditures	1,006,191	1,055,351	1,261,688
EBITDA	121,253	135,649	108,287
Net Profit	66,627	78,374	59,009
Balance Sheet Data			
Current Assets	273,311	278,607	356,350
Fixed Assets and Intangible Assets	295,269	327,706	377,820
Total Assets	613,892	653,453	781,780
Current Liabilities	197,160	203,373	236,360
Loans	169,428	149,461	203,298
Total Liabilities	409,580	400,998	490,214
Shareholders' Equity	204,312	252,456	291,566
Ratios			
EBITDA Margin (%)	10.75	11.39	7.90
Net Profit Margin (%)	5.91	6.58	4.31
Long-Term Debt to Equity Ratio	1.04	0.78	0.87
Return on Equity (%)	32.61	31.04	20.24

EBITDA= earnings before interest, tax, depreciation, and amortization, FY = fiscal year.

Source: India Oil Corporation Limited.