Report and Recommendation of the President to the Board of Directors

Project Number: 39913
January 2006

Proposed Equity Investment in
Central Uttar Pradesh Gas Limited
India: Urban Clean Fuels 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 December 2005)

Currency Unit – Indian rupee (Re/Rs)
Re1.00 = $0.022
Rs45.7 = $1.00

ABBREVIATIONS

ADB – Asian Development Bank
APM – administered pricing mechanism
bcm – billion cubic meters
BPCL – Bharat Petroleum Corporation Limited
CNG – compressed natural gas
CSPU – country strategy and program update
CUGL – Central Uttar Pradesh Gas Limited
DMC – developing member country
DSCR – debt service coverage ratio
EIRR – economic internal rate of return
EMP – environmental management plan
GAIL – GAIL (India) Limited/Gas Authority of India Limited
HBJ – Hazira-Bijaipur-Jagdishpur pipeline
IEE – initial environmental examination
IIT – Indian Institute of Technology
km – kilometer
LNG – liquefied natural gas
M³ – cubic meter
MMBTU – million British thermal unit
MMSCM – million metric standard cubic meters per day
MoPNG – Ministry of Petroleum and Natural Gas
NOx – nitrous oxide
NGO – nongovernment organization
OIL – Oil India Limited
ONGC – Oil and Natural Gas Corporation Limited
PNG – piped natural gas
PSOD – Private Sector Operations Department
PPTA – project preparatory technical assistance
RRP – report and recommendation of the President
SARD – South Asia Regional Department
SIEE – summary initial environmental examination
SOx – sulfur oxide
SPM – suspended particulate matter
UP – Uttar Pradesh
NOTES

(i) The fiscal year (FY) of Central Uttar Pradesh Gas Limited and the Government of India ends on 31 March. FY before a calendar year denotes the year in which the fiscal year ends.

(ii) In this report, "$" refers to US dollars.

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I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed Indian rupee-denominated equity investment in Central Uttar Pradesh Gas Limited (CUGL). The company has been formed as a joint venture to introduce clean fuels, including compressed natural gas (CNG) for vehicles and piped natural gas (PNG) for domestic, industrial, and commercial users in the city of Kanpur, Uttar Pradesh (UP), India.

II. INTRODUCTION

2. Nearly two thirds of India's population lives in urban areas, and nearly half of the urban population is concentrated in 23 metropolitan areas with populations exceeding 1 million. Urban areas in India are significantly affected by air pollution, which consists of fine suspended particulate matter caused by emissions from mobile and stationary sources. The growth of cities and travel have greatly increased the number of gasoline and diesel vehicles on the roads. Congested living conditions and worsening pollution have resulted in chronic health problems that raise health costs and are a drag on economic productivity and efficiency. A 1997 World Bank study found a significant direct correlation between particulate pollution and non-traumatic deaths, including deaths from specific causes for certain age groups. The study projected that increasing total suspected particulates in New Delhi by 100 milligrams per cubic meter would result in the loss of an estimated 1,385 lives per year.\(^1\) Another World Bank study concluded that air pollution in Mumbai annually causes 2,800 premature deaths, as well as 60 million sick days and 19 million restricted-activity days due to respiratory problems, costing Rs18 billion.

3. The introduction of natural gas in Delhi was mandated by the Supreme Court of India after a public interest litigation application filed in 1985,\(^2\) drawing attention to the city's deteriorating air quality and the need for urgent action for redress. Noting the lack of effective voluntary action by government officials, the Supreme Court directed the Delhi administration to file an affidavit specifying the steps it will take to control air and noise pollution caused by vehicles. One of the recommendations put forward was using CNG to mitigate vehicular pollution. At the instigation of the Ministry of Petroleum and Natural Gas (MoPNG), GAIL (India) Limited (GAIL, formerly the Gas Authority of India Limited) initiated a pilot study to establish the feasibility of CNG as an alternative fuel for buses and light commercial and other vehicles. These pilot tests proved successful. The Supreme Court imposed directives that diesel buses, taxis, and auto-rickshaws in Delhi be converted to CNG. After some teething problems in the early years, there are now approximately 10,480 CNG buses operating in Delhi, and pollution has been substantially reduced. A similar program initially for taxis and auto-rickshaws was implemented in Mumbai and is also now operating successfully.

4. Regarding court directives issued for Delhi's conversion to CNG, the Supreme Court reported in May 2002 that Central Pollution Control Board data indicated that at least nine other cities in India, including Kanpur, had critical air quality problems. “But there appears no effective plan to address the problems of the cities,” the Supreme Court added. “If no immediate action is taken, then it may become necessary for some orders being passed so as to bring relief to the residents of these cities.” As a result, the Central Government in September 2003 directed GAIL to identify the pollution sources, assess the pollution load, and prepare an action plan for each city to control pollution from various sources, including automobiles and industry.

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5. **GAIL** conducted feasibility studies in September 2002 and has submitted action plans for six cities: Agra, Lucknow, Kanpur, Kolkata, Faridabad, and Pune. The six cities’ selection was based on a combination of air quality and proximity to existing supplies of natural gas or pipelines. In early 2003, the Government requested a project preparatory technical assistance (PPTA) grant from ADB to assist with the further preparation of these projects. In 2003, PPTA was processed, approved, and implemented by ADB’s South Asia Regional Department (SARD). During implementation of PPTA, it was agreed that the projects would instead be financed as private sector joint venture companies. Subsequently, ADB’s Private Sector Operations Department (PSOD) collaborated with SARD to finalize the PPTA report and prepare this public–private partnership. ADB issued concept clearance for the Project on 12 May 2005, and the project team fielded a due diligence mission in November 2005.

### III. BACKGROUND

**A. The Gas Sector in India**

1. **Supply and Demand**

6. According to MoPNG, current recoverable reserves of natural gas in India are estimated at about 920 billion cubic meters. However, production has been declining since the 1980s. At the current rate, India has a reserves/annual production ratio of less than 30 years. The majority state-owned Oil and Natural Gas Corporation Limited (ONGC) and Oil India Limited (OIL) dominate gas production with a share of 80%, followed by joint ventures (10%) and private sector companies (10%), with most production concentrated off the western shore. In 1986, the Government established GAIL to address the critical issue of gas infrastructure development. Until then, India lacked the necessary transmission facilities to use the natural gas produced with oil, and the gas had to be flared. In 1987 and 1988, the first large cross-country gas pipeline system, the Hazira–Bajaypur–Jagdishpur (HBJ) pipeline, was commissioned. The HBJ transmits up to 33.4 million metric standard cubic meters per day (MMSCMD) of gas from the west coast of India to central and northern parts of the country, including Delhi.

7. Natural gas represents less than 10% of total consumption of commercial energy in India. When consumption of such non-commercial fuels as biomass and waste is included, the share of natural gas in total energy consumption is even smaller. In 2002, this was estimated at 4% of the total primary energy consumed in India. Gas consumption in 2004 was estimated at 81 MMSCMD, or about 30 billion cubic meters per year, for power generation (40%); producing fertilizers (28%), petrochemicals (11%), and steel (5%); other industries (12%); and CNG/city gas (4%) (footnote 3). These figures show gas demand in India dominated by the power sector and fertilizers industry, which account for nearly 70% of total consumption.

8. Gas demand in India remains supply constrained, as there is a significant gap between gas requirements and available indigenous gas supplies plus liquefied natural gas (LNG) imports, for which terminals at Dahej and Hazira have come online in the past 18 months. Because of this constraint, indigenous gas supplies produced by ONGC and OIL on their own (known as administered pricing mechanism, or APM, gas) are allocated to different users by

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MoPNG based on the assessment of the inter-ministerial Gas Linkage Committee.\textsuperscript{4} The allocated gas is supplied by ONGC and OIL mostly to energy-intensive consumers in the power sector and fertilizers industry for less than international prices. The present official Government allocation of gas is about 120 MMSCMD.

2. Sector Reform and Policy Framework

9. Historically, the natural gas industry in India has been highly centralized and Government controlled. However, in the past few years the Government has initiated a number of reform and policy initiatives to make the industry more competitive and market oriented, incorporating both public sector oil and gas companies and private investors. In 2000, the Government constituted a group to chart a course for significantly developing the country’s hydrocarbon potential. Under the chairmanship of the finance minister, the group produced the \textit{Hydrocarbon Vision 2025 Report}, which detailed a roadmap for developing this sector. The report recommended pursuing LNG imports to fill the supply deficit. It suggested encouraging domestic companies to participate in the LNG chain, rationalizing customs duties on LNG, and leveling the field for all gas players. It also recommended creating a policy framework for cleaner fuels. The report sought to open the hydrocarbon market and so allow free and fair competition among public sector enterprises, private companies, and other international players, as well as establish a long-term fiscal policy to attract foreign investment in the sector. Such a competitive environment would also require a regulatory and legislative framework, including a rational tariff and pricing policy to ensure consumers affordable prices while at the same time gradually phasing out existing price subsidies.

10. The Government introduced the Petroleum Regulatory Board Bill in Parliament in May 2002 to establish an independent regulator for gas and petroleum products. The bill provides for establishing a Petroleum Regulatory Board to oversee and regulate the refining, processing, storage, transportation, distribution, marketing, and sale of hydrocarbon products, excluding the production of crude oil and natural gas. The basic objective of the bill is to provide a regulatory mechanism to facilitate uninterrupted supplies of petroleum, petroleum products, and natural gas for all parts of the country at a fair price. It also aims to promote competition in the market and access for all entities to the monopolistic infrastructure by making it a common, nondiscriminatory carrier. The bill includes provisions setting service obligations for retail outlets and marketing service obligations for companies. Further details on the gas sector and sector reform in India are in Appendix 2.

3. CNG in India

11. CNG is compressed to a pressure of 200–250 kilograms per cubic meter for practical storage in cylinders onboard vehicles. It is a clean fuel with relatively low emissions of sulfur oxide, nitrous oxide, and suspended particulate matter. CNG vehicles are increasingly gaining acceptance, particularly as urban taxis, buses, and delivery vehicles because they have lower running and maintenance costs than diesel and gasoline. GAIL introduced CNG in Delhi in 1994 under a pilot scheme. Based on this success, Indraprastha Gas Limited (IGL) was established as a joint venture company\textsuperscript{5} in December 1998 to take over the CNG implementation begun by GAIL under MoPNG directives. Initially, IGL was allocated 0.48 MMSCMD of gas in 1998, which

\textsuperscript{4} The committee includes the Planning Commission, Ministry of Finance, Ministry of Power, Ministry of Chemicals and Fertilizers, and Ministry of Steel.

\textsuperscript{5} IGL is owned 22.5% by GAIL, 22.5% by BPCL, 8.75% by Infrastructure Development Finance Corporation Limited, 8.75% by Infrastructure Leasing and Financial Services Trust Company, 5.0% by the Government of the National Capital Territory of Delhi, and 28.5% by public and other investors.
was eventually increased to 0.98 MMSCMD in July 2001 and to 2.00 MMSCMD in April 2002 based on the Supreme Court’s directive. The natural gas project is considered a success, and IGL remains very profitable. Driven by its success, IGL is expanding to the areas surrounding Delhi such as Noida, Greater Noida, Gurgaon, and Faridabad. Similar CNG implementation was carried out concurrently in Mumbai by Mahanagar Gas Limited.

4. Lessons Learned

12. Some problems were experienced in early years of CNG implementation. First, the move to CNG was driven by the Supreme Court decision rather than market economics, and the involvement of many Government agencies and departments slowed planning, coordination, and implementation. There was a mismatch between supply and demand, of both fuel and associated infrastructure, including insufficient vehicle conversion kits, the late delivery of new CNG buses, and the lack of safety inspectors for CNG cylinders. In addition, IGL was unsure how many vehicle conversions were taking place, and so only a limited number of CNG stations were constructed. At those that were built, the filling equipment experienced breakdowns. High demand reduced the pressure at daughter stations, which extended refueling time. This caused long queues once the Supreme Court restriction on diesel public transport came into effect. However, these problems were eventually overcome. There are now 134 CNG stations and over 94,000 vehicles using CNG, including 10,480 buses. Lessons learned from the IGL experience, and the Mahanagar Gas Limited experience in Mumbai, have been incorporated into the CUGL design in terms of timing the construction of CNG stations, using online stations rather than daughter stations, and providing for much wider availability in India of CNG-associated equipment and conversion kits.

13. For the successful introduction of natural gas, both CNG and PNG, adequate planning for physical infrastructure and financial incentives must be in place to ensure conversion occurs at the targeted rates. The conversion of buses was dictated by judicial intervention and supplemented by financial incentives by the Delhi Transportation Board, but conversion of taxis and auto-rickshaws was driven by market economics, namely the favorable price of CNG vis-à-vis gasoline and reasonable conversion costs. The conversion cost of buses was much higher, and the price differential between diesel and CNG was not sufficient to justify the longer payback period.

14. In the case of Kanpur, the state government of UP has proposed the draft UP Gas Uses and Distribution Policy (2005), which was formulated to ensure that the development and promotion of clean fuels is not stalled for lack of a legal framework and sufficient incentives. The policy would include

(i) establishing a single nodal state agency for clearances and coordination;

(ii) a 30–50% subsidy for kits to convert auto rickshaws, taxis, buses, and commercial vehicles, a 50% subsidy will be provided for kits to convert auto rickshaws and the smallest commercial vehicles (tempos), 40% for taxis, and 30% for buses and trucks.

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6 These stations experienced additional construction problems such as delays in land acquisition, statutory permissions, and electricity connections.

7 The mother station takes gas from the main supply pipeline, compresses it and delivers it to dispensers (online stations) and mobile cascades. Cascades are then transported to the daughter stations. The gas may be dispensed directly from the cascades or compressed with a small compressor to increase storage capacity. This latter arrangement is called a daughter booster station.


9 The Uttar Pradesh State Industrial Development Corporation will act as the Uttar Pradesh State Gas Development and Regulatory Agency until such time as a more formal UP regulatory board can be established.

10 A 50% subsidy will be provided for kits to convert auto rickshaws and the smallest commercial vehicles (tempos), 40% for taxis, and 30% for buses and trucks.
(iii) agency authority to levy a tax if required on such petroleum products as gasoline and diesel to generate funds for providing subsidies for CNG conversion; and
(iv) a trade tax waver for CNG conversion kits and an entry tax waver for natural gas.

In addition, the Road Transportation Office in Kanpur has indicated that public vehicles that have not converted to CNG will not receive new vehicle registration licenses or renewal. Regarding conversion to PNG, the program has been largely successful in Delhi solely because of the price discount relative to liquefied petroleum gas (LPG) and kerosene and the improved safety of PNG connections. It is envisaged that CUGL will price PNG at a minimum 10% discount to competing fuels.

B. ADB Operations

1. ADB’s Country Strategy for India

15. As for most ADB developing member countries, mainstreaming poverty reduction is the overarching theme of India’s Country Strategy and Program (CSP) and subsequent updates (CSPUs), the most recent of which was approved by the Board in November 2005. The documents draw upon the 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 by assisting fiscal consolidation, infrastructure development, and private sector development. The CSP emphasizes investments in publicly provided infrastructure, including hydrocarbons, to remove key bottlenecks where private investment is not forthcoming.

2. ADB’s Energy Sector Strategy for India

16. ADB’s assistance for the energy sector, as outlined in the 2005 CSPU, has six main priorities: (i) power sector reform; (ii) promotion of high-efficiency and low-carbon power sources; (iii) expansion and optimization of transmission and distribution systems; (iv) institutional strengthening to implement reforms required by the Electricity Act of 2003, including the development of more flexible power delivery and trading systems; (v) promotion of private sector participation; and (vi) encouraging energy conservation and ensuring environmental and social sustainability. The Project addresses several of these priorities, as it involves a private sector company implementing a city gas distribution system that offers direct environmental and safety benefits to the local population. The 2006 CSPU reinforces the importance of private sector investment for India’s growth and indicates that PSOD should focus on infrastructure sectors including energy (electric power, oil, and gas), transport, telecommunications, water and waste water, urban services, special economic zones, and soft infrastructure such as education, healthcare, and information technology. The program update also indicates that PSOD will work with SARD to develop public–private partnerships in the infrastructure sectors, specifically mentioning urban clean fuels projects.

3. The Project’s Consistency with ADB Strategies

17. The Project is in line with ADB’s country, energy sector, private sector development, and environmental protection strategies. As a public–private partnership, the Project is the first step toward the introduction of clean fuels in major cities other than Delhi and Mumbai, where such project implementation has proved successful. The Project augments the supply of clean, environmentally friendly natural gas, which will displace more polluting fuels such as diesel,

IV. THE PROJECT

A. Project Description

18. The Project involves constructing a city gas distribution network in Kanpur to deliver CNG for vehicles and PNG to commercial, industrial, and residential users. The Project has two main components: (i) constructing a limited natural gas distribution network within the city and PNG customer connections and (ii) establishing a CNG mother station and online filling stations to service cars, buses, taxis, and two- and three-wheelers that have been converted to use CNG. The gas will be supplied from a tap-off point 18 kilometers away, near Sachendi on the GAIL-operated HBJ pipeline, from which a feeder line then connects to the city gate station at Fazalganj. The feeder line from the tap-off point and city gate station has already been completed by GAIL, the gas supplier.

19. CUGL proposed to construct online stations with gas-driven compressors instead of daughter booster stations because the electricity supply required to power such a configuration is unreliable and traffic congestion would inhibit the safe transportation of the cascades. The gas pipelines shall be laid along road shoulders requiring permission only from state agencies and/or local authorities. The development of gas distribution connections also will be phased according to demand.

B. Ownership

20. A joint venture agreement between GAIL and BPCL was signed on 26 July 2004, and CUGL was incorporated on 25 February 2005 under the Companies Act 1956 with the objective of supplying natural gas initially in the city of Kanpur. As per the terms of the joint venture, the promoters shall have an equity participation of 22.5% each, and 5.0% of the equity has been reserved for the UP state government. The balance of 50.0% equity will be initially raised from financial institutions or strategic partners. Shareholding by majority-owned public sector undertakings will be limited to no more than 50.0%. While no decision has been made, an initial public listing of shares is contemplated around the fifth year of operations, which could involve a combination of listing existing shares, a rights issue and/or issuing fresh shares.

21. Various synergies link the two promoters. While BPCL contributes its marketing and retailing expertise, GAIL has enormous experience in gas transportation and distribution. GAIL and BPCL have earlier implemented successful city gas distribution in Delhi and Mumbai. Both GAIL and BPCL are majority owned by the Government but were conferred navaratna status in July 1997. This designation provides the companies with strategic and operational autonomy, including the freedom to engage in investment, capital expenditures, and raising funds at home and abroad without Government approval or interference. They do not benefit from Government budgetary support or sovereign guarantees. They operate under the Companies Act 1956 like other private sector companies in the energy sector.

22. GAIL is India’s principal gas transmission and distribution company, and 57% of its outstanding shares are owned by the Government. It was established in 1984 to create gas sector infrastructure for the sustained development of a gas market in India. It owns and operates 4,600 kilometers of gas transmission pipelines, including the world’s longest LPG
pipeline, measuring 1,269 kilometers. Apart from its core business of natural gas transportation, GAIL carries out operations in gas processing, petrochemicals, LPG transmission, and telecommunications. BPCL is a Government undertaking formed on 24 January 1976. The Government still retains 66% of its outstanding shares. Its current activities are refining, storing, marketing, and distributing petroleum products. In addition, BPCL has diversified into petrochemicals, using certain refining streams as feedstock. More information on CUGL’s organizational structure and its main sponsors is in Appendix 3.

C. Key Implementation Arrangements

1. Supreme Court Directives and Government Order

23. A public interest litigation under Article 32 of the Constitution of India was filed in 1985 by M.C. Mehta, then chairman of the Environmental Protection Cell operating at Delhi, concerning air pollution in the capital. From this case, the Supreme Court ordered the phasing out of non-CNG buses from Delhi, and an order dated 2 April 2002 made mandatory across India the conversion of the transport sector to CNG to reduce air pollution. In another landmark case, known as the Taj Trapezium case, the Supreme Court issued various orders to GAIL, ONGC, and the state government of UP to ensure natural gas was provided to industries near the Taj Mahal or relocating to UP to prevent further pollution in the vicinity of Agra. The Constitution provides that decisions and orders of the Supreme Court are binding on Parliament, state courts, and tribunals throughout India and enforceable in the same manner as any law made by legislators.

24. Based on the Supreme Court directives, an executive order was issued in June 2005 by the director for natural gas of MoPNG that mandated GAIL and BPCL to jointly pursue such city gas distribution projects as a joint venture. As there is no current legislative and regulatory framework for gas distribution, there is no explicit licensing process by which the firms operate.

2. Gas Purchase Agreement

25. The Gas Linkage Committee has instructed MoPNG to allocate 0.10 MMSCMD of APM gas for CNG use in the Project. Consequently, CUGL signed a gas purchase agreement with GAIL on 31 October 2005 for supplying natural gas at the city gate station in Kanpur for 10 years, a period that can be extended by mutual agreement.

3. Project Management and Engineering Consultants

26. J.P. Kenny Triune Engineering Private Limited (J.P. Kenny) has been appointed project management consultant. J.P. Kenny is part of the Wood Group, an international energy services company based in the United Kingdom. It has $2 billion in annual sales, employs 13,000 people, and operates in 35 companies. J.P. Kenny carried out the detailed design study for IGL’s implementation of the city gas project in Delhi. Tractebel Engineering and Construction Private Limited was the design engineering consultant for the city gas network and developed the operation and maintenance (O&M) plans for CUGL. Tractebel Engineering is a division of Suez-Tractebel, which is one of Europe’s major engineering companies.

4. Operational Arrangements

27. Based on the O&M plan developed by Tractebel, CUGL will carry out its own O&M at its CNG stations and on its gas distribution pipeline. CNG station operations will be monitoring through a supervisory control and data acquisition system and central control room. A stock of
equipment spares and supplies has been included in the capital cost estimates. Staff with experience in gas pipelines will be seconded from GAIL to manage the O&M program.

D. Environmental Aspects and Social Dimensions

1. Environment

28. As this Project is classified environmental category B, an initial environmental examination (IEE) was undertaken primarily as part of an ADB technical assistance project\(^1\) and has been developed based on the findings of a consultant report completed in December 2004. To supplement the IEE, a second site visit was undertaken in August 2005 to verify that the IEE findings were still current. The project is designed to reduce air pollution and improve ambient air quality by switching vehicles from gasoline and diesel to CNG and residential, industrial, and commercial users from kerosene and LPG to PNG. Except for short-term disturbances during construction of CNG stations and pipeline digging and backfill operations within the road right-of-way, no direct negative environmental impacts are anticipated. Additionally, the Project has a strong positive impact that more than offsets any negative impacts. Public consultations were held on 30 November 2005 with people living along the pipeline route, and information in local language was distributed about construction. The summary IEE is attached as Appendix 4.

2. Resettlement

29. The Project is classified involuntary resettlement category B because of possible impacts affecting people from the construction of the CNG stations and gas pipelines. However, further investigation has verified that no land will need to be acquired for those components already identified. The land being acquired for the CNG mother station and three online stations is all unencumbered government land, as verified by the project team. Resettlement or compensation for identified CNG components is not required, as there are no affected people. For the gas pipeline component, no land will be acquired, as the pipeline will be laid under the shoulder of existing city roads. If there are any structures adjacent to the shoulder, CUGL will either reroute the pipeline or use underground boring techniques to mitigate impacts. The same conclusion has been substantiated by the detailed engineering survey of the pipeline corridor. For future CUGL components, a resettlement framework has been prepared to address any impacts that may occur. If necessary, short-term resettlement plans will be prepared and submitted to ADB for approval before construction begins. For any future components that may involve involuntary resettlement, CUGL will prepare resettlement plans and submit them to ADB for approval before awarding civil works contracts. No current or future components will have an impact on indigenous peoples. The resettlement framework is attached as Appendix 5.

3. Impact on Poverty Reduction

30. The proposed equity investment will contribute directly to two strategies for achieving the ultimate objective of reducing poverty in India. First, the Project contributes to enhancing economic growth by developing infrastructure. Providing natural gas to small-scale industries at a lower cost than alternative fuels may have an immediate impact on job creation by increasing production and/or attracting energy-intensive industries to the area. Second, the Project contributes to human and social development by reducing health risks caused by using inferior fuels and air pollution indoors and out. Low-income people are particularly exposed to transport

\(^1\) ADB. 2003. Technical Assistance to India for the Urban Clean Fuels Project. Manila (TA 4182-IND).
pollution because they often live close to major roads. In addition, the poor have limited access to medical services they cannot afford, which makes their general health vulnerable. Lowered mortality and morbidity from respiratory diseases will not only improve people’s well-being but also bring such economic benefits as reduced healthcare expenditures and higher household productivity, as fewer days are lost to such illnesses as tuberculosis, bronchitis, asthma, and possibly even cancer.

E. Economic Analysis

31. An economic analysis was conducted to measure the Project’s economic benefits and costs. All costs and benefits are expressed in domestic price numeraire at constant 2005 values. The main objective of this analysis is to identify the net benefits accruing to the economy from the use of CNG and PNG in Kanpur. The net benefits of the Project are the difference between its cost and the economic benefits it generates. CNG demand from the transport sector and PNG demand from domestic, commercial, and industrial users is assumed to be both incremental and non-incremental, as CNG replaces existing fuels. After identifying the Project’s costs and benefits, an economic valuation of these costs and benefits was carried out by converting market and local costs and prices (especially for non-traded goods and services) to economic costs and prices and adjusting market and local values to a common basis by using estimated conversion factors. Based on the assumptions explained in Appendix 6, the Project has an economic IRR of 36.4% and a net present value of Rs2,211.7 million. When health benefits are included, the economic IRR increases to 56.4% and the net present value to Rs6,852.9 million.

V. THE PROPOSED ADB ASSISTANCE

A. ADB Equity Investment

32. The proposed ADB equity investment is up to a 20.0% share in CUGL, which is estimated to cost Rs120.0 million ($2.6 million). The ADB equity investment will be provided from ADB’s ordinary capital resources in Indian rupees.

33. The proposed equity investment will be documented in appropriate share subscription and shareholder’s agreements, which will contain terms and conditions suitable for this transaction and protecting ADB’s minority shareholder rights. ADB’s equity subscription agreement will be subject to conditions precedent, including all the necessary governmental, creditor, and shareholder approvals and consents, and any contractual and financial arrangements satisfactory to ADB. ADB will have the right to appoint an independent director. The subscription agreement will include mandatory exit rights for ADB should CUGL fail to comply at any time with ADB’s environment and social safeguard policies or if India ceases to be a member of ADB.

B. Justification for ADB’s Assistance

34. The Project merits ADB’s support for the following reasons:

(i) The Project will have a direct impact on the ambient air quality in urban areas by reducing pollution from diesel and gasoline vehicles and by switching industrial and commercial establishments to piped natural gas. Improved air quality will reduce public health costs from treating illnesses caused or worsened by air pollution. In addition to improving ambient air quality, vehicles running on clean
natural gas will improve safety conditions on urban roads and reduce noise pollution.\(^{13}\)

(ii) The Project is in line with ADB’s private sector operational strategy to promote private sector participation in infrastructure development. Furthermore, ADB’s CSPU for India (2006–2008) confirms ADB’s support for private sector participation in clean fuel projects and gas distribution. The Project supports several key priorities of ADB’s energy sector strategy in the previous CSPU, namely (i) expanding, de-constricting, and optimizing transmission and distribution systems; (ii) promoting private sector participation; and (iii) ensuring environmental and social sustainability in the sector.

(iii) The Project is structured as a public–private joint venture company, and public–private partnerships are strongly encouraged by ADB’s energy policy as an efficient means of improving infrastructure in developing member countries. In 2003, ADB provided a PPTA grant to help the Government of India prepare such projects for implementation. India’s largest gas companies and the UP government together will own 50% of CUGL, with ADB and local financial institutions owning the remaining 50%, making it a private company under the Indian Company Act 1956. Through PSOD, ADB has successfully supported a similar public–private partnership in the Petronet Dahej LNG Project.\(^{14}\)

(iv) By providing PPTA to examine the benefits and costs, and by being directly involved in structuring the Project since 2004, ADB has helped ensure that key environmental and social safeguard requirements are addressed early in its design phase.

C. Compliance with Investment Limitations

35. The proposed ADB investment of $2.6 million equivalent in CUGL will be the 19th project in India supported by PSOD. Once approved, it will represent less that 0.1% of PSOD’s total exposure and increase its investment in the energy transmission and distribution sector from 4.2% of total exposure to 4.4%.\(^{15}\) The proposed investment is within ADB’s aggregate, country, industry, group, and single project exposure limits for private sector projects.

D. Assurances

36. A framework agreement relating to ADB’s status, privileges, and immunities with respect to its equity investments and lending operations in the private sector are in effect between ADB and the Government of India. In line with the ADB Charter, the Government of India will be asked to confirm that it has no objection to the proposed assistance to CUGL. No shares will be subscribed until ADB receives such confirmation.

\(^{13}\) Natural gas offers greater safety in combustion, because it has a higher flashpoint than gasoline, and quieter operation, with less vibration and odor than diesel fuel.

\(^{14}\) ADB. 2003. *Report and Recommendation of the President on a Proposed Equity Investment and Partial Credit Guarantee for the Dahej Liquefied Natural Gas Terminal Project (India).* Manila.

\(^{15}\) Exposure is defined as the total outstanding plus undisbursed commitments (with signed legal agreements) and is based on data as of 30 September 2005.
VI. RECOMMENDATION

37. I am satisfied that the proposed equity investment would comply with the Articles of Agreement of ADB and recommend that the Board approve an equity investment of up to a 20.0% share in Central Uttar Pradesh Gas Limited for the Urban Clean Fuels Project from ADB’s ordinary capital resources at the cost of approximately Rs120,000,000 on terms and conditions as are substantially in accordance with those set forth in this report, and as may be reported to the Board.

Haruhiko Kuroda
President

16 January 2006
### DESIGN AND MONITORING FRAMEWORK

<table>
<thead>
<tr>
<th><strong>Design Summary</strong></th>
<th><strong>Performance Targets/Indicators</strong></th>
<th><strong>Data Sources/Reporting Mechanisms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impact</strong></td>
<td>• Progressive improvement in air quality, in particular reducing suspended particulate matter content</td>
<td>• Central Pollution Control Board and Environment Protection Control Authority Reports</td>
</tr>
<tr>
<td>• Improve the ambient air quality in Kanpur and health of urban citizens, especially the poor.</td>
<td></td>
<td>• Ministry of Public Health</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>• Progressive increase in the share of natural gas used relative to alternative fuels such as diesel, gasoline, and kerosene.</td>
<td>• Reports of new CNG registration from Kanpur regional transportation office</td>
</tr>
<tr>
<td>• CNG used as an alternative fuel for automobiles in Kanpur</td>
<td>• Increase in vehicles converted to use CNG by about 1% per year for private vehicles</td>
<td>• Marketing and sales reports from CUGL</td>
</tr>
<tr>
<td>• PNG used as an alternative fuel for industries, commercial establishments, and domestic consumers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td>• Combined CNG and PNG sales in line with company targets.</td>
<td>• Marketing and sales reports by CUGL.</td>
</tr>
<tr>
<td>• Sales of CNG to vehicle owners</td>
<td></td>
<td>• ADB annual field mission or desk review reports</td>
</tr>
<tr>
<td>• Sales of PNG to industrial, commercial, and domestic consumers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities with Milestones</td>
<td>Inputs</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1. Completion of mother and three online stations by April 2006. Expansion by three online stations per year thereafter until year four and by two online stations commissioned per year until year six.</td>
<td>• CUGL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ADB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cofinanciers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Beneficiaries/Customer</td>
<td></td>
</tr>
<tr>
<td>2. Completion of natural gas pipeline network by April 2006. In year one, Domestic, commercial, and industrial connections in line with Company estimates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Further domestic, industrial and commercial PNG connections as demand dictates.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CNG = compressed natural gas, CUGL = Central Uttar Pradesh Gas Limited, MMSCMD = million standard cubic meters per day, PNG = piped natural gas.
A. Supply and Demand

1. Introduction

India has one of the world’s largest and fastest growing economies and is the sixth largest consumer of energy in the world. In the South Asia region, it is the largest economy and by far the largest energy consumer. In 2003, India’s consumption of commercial energy was equivalent to about 350 million tons of oil. Due to the abundance of coal resources relative to other energy resources, coal continues to account for more than half of the country’s commercial energy consumption. However, natural gas now occupies a quickly growing share of India’s energy balance.

2. Indigenous Gas Supply

The first gas discoveries in India occurred in the state of Assam in the late 1880s, but the first deliveries of indigenous gas supplies from this state did not take place until 1959. They were followed in 1964 by gas supplies from the Cambay Basin in the state of Gujarat. In 1974, the state-owned Oil and Natural Gas Corporation Limited (ONGC) made a major hydrocarbon discovery at Bombay High off the western coast of India.

In the second half of 2002, or about 30 years after the Bombay High discovery, the privately owned Indian group Reliance, in association with the Canadian company Niko Resources, made a large gas find in the Krishna-Godavari Basin off the coast of eastern Indian state of Andhra Pradesh. According to the Ministry of Petroleum and Natural Gas (MoPNG), the Krishna-Godavari discovery may hold gas reserves in excess of 840 million cubic meters (30 trillion cubic feet), which has not yet been verified. In January 2004, ONGC made a second gas discovery in the Krishna-Godavari Basin, but it was less important than the major Reliance find. Other gas discoveries were made by the Gujarat State Petroleum Corporation, Niko Resources, ONGC, and Cairn Energy on the western coast of India, and by Oil India Limited (OIL) in the northeastern state of Assam.

Discoveries in the Krishna Godavari Basin by Reliance and other companies are expected to contribute significantly to the country’s future indigenous supply of gas. According to MoPNG, India’s recoverable reserves of natural gas were estimated at about 920 billion cubic meters (bcm), or about 33 trillion cubic feet, during the first quarter of 2004. In fiscal year (FY) 2004, India’s total gross production of natural gas reached 32 bcm, with two state-owned companies, ONGC and OIL, accounting for 80% (ONGC 74% and OIL 6%) of the country’s total gas production. At present, about 70% of the country’s gas production is concentrated in the western offshore region. Onshore, the current gas production centers are located in the states of Gujarat, Assam, and Andhra Pradesh.

3. Gas Infrastructure

From the mid 1970s, when the first gas discoveries were made, until the late 1980s, India suffered from an absence of gas infrastructure. During the initial years of hydrocarbon production, associated gas had to be flared. In 1984, the Government established the Gas Authority of India Limited, now called GAIL (India) Limited (GAIL), to address the critical issue of gas infrastructure development. FY1988 saw the commissioning of the first large cross-country gas pipeline system, the Hazira–Bijaipur–Jagdishpur (HBJ), which was developed by GAIL.
6. With a present total length of 2,800 kilometers and a design capacity of 33.4 million metric standard cubic meters per day (MMSCMD), the HBJ is India’s main gas pipeline. The HBJ transmits gas from the western coast of India to the central and northern parts of the country and the capital, New Delhi, with extensions to the states of Haryana and Uttar Pradesh. GAIL has also developed smaller gas networks in Andhra Pradesh, Assam, Gujarat, Maharashtra, Pondicherry, Rajasthan, Tamil Nadu, and Tripura.

7. In addition to the existing gas pipeline, two new liquefied natural gas (LNG) import terminals were commissioned in Gujarat in early 2004 and 2005. One is located at Dahej and the other at Hazira, at the starting point of the HBJ In order to transport the regasified gas from the Dahej terminal, GAIL completed in FY2004, a new 610 kilometer gas pipeline from Dahej to Bijaipur.

4. Gas Consumption

8. Natural gas in India accounts for less than 10% of total consumption of commercial energy. When consumption of such non-commercial fuels as biomass and waste is included, the share of natural gas in total energy consumption is even smaller. In 2002, it was estimated at 4% of India’s total primary energy consumption. Gas consumption in 2004 was estimated at 81 MMSCMD, or about 30 bcm per year, structured as follows: (i) power 40%, (ii) fertilizers 28%, (iii) petrochemicals and liquefied petroleum gas extraction 11%, (iv) steel 5%, (v) other industries 12%, and (vi) compressed natural gas (CNG)/city gas 4%. As these figures show, gas demand in India is dominated by the power sector and fertilizer industry, which account for about 70% of total consumption. Gas supplies for the transport sector (as CNG) and city gas distribution for the domestic, commercial, and industrial use account for only 4% of the current consumption of natural gas. In 2004, the consumption of natural gas supplies for CNG and distribution by pipeline was 1.2 MMSCMD in Delhi and 0.9 MMSCMD in Mumbai. The transport sector accounts for over 90% of the gas consumed in Delhi and 60% of the gas consumed in Mumbai.

5. Gas Allocation

9. Gas consumption in India remains strongly constrained by supply, as a significant gap exists between gas requirements and indigenous gas supplies plus LNG imports through the new terminals at Dahej and Hazira. Because of this constraint, indigenous gas supplies produced by ONGC and OIL on their own, known as administered pricing mechanism (APM) gas, are allocated to different users by MoPNG based on the assessment of the inter-ministerial Gas Linkage Committee. The allocated gas is supplied by ONGC and OIL mostly to energy-intensive consumers in the power sector and fertilizer industry at below international prices. The present official government allocation of gas totals about 120 MMSCMD (or about 44 bcm per annum), but there is only about 70 MMSCMD (or about 26 bcm per annum) available for these allocations.

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1 The committee includes the Planning Commission, Ministry of Finance, Ministry of Power, Ministry of Chemicals and Fertilizers, and Ministry of Steel.
2 The present gas allocation for Indraprastha Gas Limited in Delhi is 2 MMSCMD. For Mumbai, Mahanagar Gas Limited’s gas allocation is 1.5 MMSCMD.
B. Gas Pricing Issues

1. Historical Context

10. In the 1960s, the prices of the first supplies of natural gas were fixed by the producing companies. By the early 1970s, prices were fixed by ONGC on a negotiated basis with different categories of gas users, and in 1974 gas producers adopted a pricing mechanism based on a thermal equivalence with coal. Beginning 4 years later, from 1978 until 1986, the pricing approach was changed and the concept of replacement cost of alternative or substitute fuels was adopted. The Government later assumed direct control of gas prices through a system of uniform Government-administered prices. Under this system, producing companies reported increasing production costs and requested an increase in gas prices.

11. In 1997, a gas pricing order was issued by the Government that introduced a phased linkage of consumer gas prices to a basket of low-sulfur and high-sulfur fuel oils. This fuel oil price linkage applies only to gas produced by the state-owned companies ONGC and OIL (i.e., APM gas) on their own and not by joint ventures with local or foreign companies or through the new exploration licensing policy process. From April 2002, when the petroleum industry was expected to be fully deregulated, gas prices were planned to be set at 100% parity with a basket of fuel oils. However, the dismantling of the APM for petroleum products was not followed by deregulation of gas prices, and the 1997 gas pricing order remains in place.

2. Current Situation

12. Recently, the Government’s Cabinet Committee on Economic Affairs decided to raise the consumer ceiling price from Rs2.85 per cubic meter (m$^3$) to Rs3.20/m$^3$. For Indraprastha Gas Limited (IGL) customers in Delhi, the end user price for APM gas purchased for CNG and pipeline gas distribution is derived by taking this base price and adding a (i) royalty of 10% of the producer price, (ii) purchase tax, (iii) transportation charge, and (iv) local connection charge.

13. With regard to non-APM gas, and as part of the opening up of the country’s upstream sector to encourage investment in producing oil and gas, the Government allows gas supplies produced from the different new exploration licensing policy blocks by private or joint venture companies to be sold at market-determined prices. Certain private supplies are now sold to GAIL and other customers at prices well above APM gas prices. The price recently paid by GAIL for certain supplies is $3.86 per million British thermal units (MMBTU), or about Rs6.60/m$^3$. With the introduction of imported Qatari LNG in January 2004, there is now a third mechanism of gas pricing in India based on the terms and conditions of the gas sales agreement between Petronet LNG and Qatar’s RasGas. The price of the regasified LNG at the exit of the Dahej LNG terminal is reported to be $3.86/MMBTU on a net calorific basis. At the end-user point, the regasified LNG price is reported to be above $4.5/MMBTU, or above Rs7.70/m$^3$ on a net calorific value basis. This is nearly double the gas purchase price of Rs4.20/m$^3$ (before the recent 12% price increase mentioned above) for APM gas supplied to IGL for its CNG and pipeline gas distribution operations.

C. Sector Reform and Policy Framework

14. The natural gas industry of India has historically been highly centralized and Government controlled. However, in the past few years the Government has initiated a number

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3 To be set at 55% parity in 1998 and gradually increase to 85% parity by 2001.
of reform and policy initiatives to make it a more competitive and market-oriented industry, including both the public sector oil and gas companies and private investors.

1. **Sundararajan Committee and Strategic Planning Group**

15. The Government constituted the Sundararajan Committee in 1994 to provide a framework for developing a market-determined pricing mechanism. The following year, it set up the Strategic Planning Group for restructuring the oil industry. The objective of the committee was to advise the Government on developing an internationally competitive and financially sound hydrocarbon sector. It suggested that GAIL should be responsible for laying down the main trunk transmission pipeline, while the private sector or joint venture companies should be allowed to lay down spur lines. The private sector and foreign companies should be given the freedom to import LNG, construct associated pipelines, and market its products. A regulatory body should be set up to establish rules governing setting up in the industry, operations, and access to pipelines. It further recommended that a gas regulatory authority should be established. The main objectives of the body would be to establish, coordinate, and monitor the technical aspects of natural gas exploration, production, and transportation and ensure fair competition, price stability, fair returns on investment, and transparency.

2. **Hydrocarbon Vision 2025**

16. In 2000, the Government constituted a group to chart a course for the country to significantly develop its hydrocarbon potential. Under the chairmanship of the finance minister, the group came out with the *Hydrocarbon Vision 2025 Report*, which laid down the roadmap for developing this sector. The report recommended pursuing LNG imports to meet the supply deficit. To achieve this objective, it suggested (i) encouraging domestic companies to participate in the LNG chain, (ii) rationalizing customs duty on LNG and LNG projects, and (iii) leveling the field for all gas players. It also recommended creating a policy framework for cleaner fuels. The report sought to open up the hydrocarbon market so that there would be free and fair competition among public sector enterprises, private companies, and international players, and to establish a long-term fiscal policy to attract foreign investment in the sector. Such a competitive environment would also require a regulatory and legislative framework, including a rational tariff and pricing policy to ensure consumers affordable prices coinciding with the gradual phasing out of existing price subsidies.


17. On 25 September 2001, the Government constituted a committee of experts to (i) recommend an automotive fuel policy for major cities, (ii) devise a road map for its implementation, and (iii) recommend suitable auto fuels, automobile technologies, and fiscal and institutional measures. The underlining principle of the policy is to achieve the twin objectives of (i) providing assured supplies of fuels at minimum cost and (ii) meeting environmental concerns by making available liquid fuels of specified quality as the main automotive fuels throughout the country and as alternative automotive fuels in cities with high vehicular pollution.

18. As per the policy, the quality requirements on gasoline and diesel are to be made more stringent over the next few years. At present, vehicles across the country have to comply with Bharat I (equivalent to Euro I) standards. In 11 cities identified as having critical air pollution problems, vehicles have to comply with Bharat II (equivalent to Euro II) standards. Fuel quality also has to meet these requirements. The various specifications for improving fuel quality to
meet these stringent standards include, for gasoline, improving the octane rating and reducing benzene, sulfur, and olefin and, for diesel, improving the cetane rating and adding diesel hydro treatment units. The document estimates refinery investments of around Rs1,800 billion by 2005 and additional Rs1,200 billion by 2010 to meet the emission standards.

19. Regarding alternative fuels like CNG and liquefied petroleum gas, motor vehicle rules have been amended to allow their use in the transport sector. The policy suggests that using these fuels should be encouraged in cities highly affected with vehicular pollution. This would give vehicle owners a choice for combining fuel and vehicle technology to meet tighter emission standards.


20. The Government introduced in Parliament in May 2002 the Petroleum Regulatory Board Bill to establish an independent regulator for gas and petroleum products. The bill provides for establishing a Petroleum Regulatory Board to oversee and regulate the refining, processing, storage, transportation, distribution, marketing, and sale of hydrocarbon products, excluding the production of crude oil and natural gas. The basic objective of this bill is to provide a regulatory mechanism to facilitate uninterrupted supplies of petroleum, petroleum products, and natural gas in all parts of the country, including remote areas, at fair prices. It also aims to promote competition in the market and make the monopolistic infrastructure accessible to all entities as a common, nondiscriminatory carrier. The bill includes provisions setting service obligations for retail outlets and marketing service obligations for companies. The upstream oil and gas exploration and production business has been left out of the purview of the regulator, and these aspects will continue to be under the director general of hydrocarbon.

21. The main functions outlined for the regulatory board are as follows:

   (i) Protect the interest of consumers by fostering fair trade and competition among entities.

   (ii) Authorize entities to market petroleum and petroleum products, establish and operate liquefied natural gas terminals, and build and operate common carriers (i.e., pipelines).

   (iii) Regulate pipeline access and related transportation charges and other associated levies.

   (iv) Ensure adequate availability of petroleum and petroleum products and monitor activities of such retail providers (e.g., prices, equitable distribution, service standards, etc.).

5. Petroleum and Natural Gas Regulatory Board Bill

22. Based on recommendations from a parliamentary standing committee, a number of amendments were suggested. MoPNG has rejected some of the recommendations and proposed that some others be clarified or incorporated in the rules and regulations to be framed.

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4 The board will include a chairman and maximum of four members to be appointed by the Government from among people of eminence in various fields.

5 Pipelines will be deemed as common carriers, but the entity laying the pipeline will get right of first use and remaining capacity may be used as common carrier, subject to the discretion of the board (section 20 of the bill).
subsequently. The bill has been renamed the Petroleum and Natural Gas Regulatory Board Bill. Some of amendments incorporated are as follows:

(i) **Central authority over state gas distribution networks.** The Government has decided to bring state gas distribution networks under the central regulatory regime. Further, the definition of common carrier transmission pipelines has been amended to include local gas distribution activities.

(ii) **Separate regulation of natural gas.** Separate from petroleum, the board will regulate the natural gas sector within the policy framework of the Government. It is further clarified that the board will issue authorization for natural gas pipelines in accordance with the overall policy guidelines of the Government.

(iii) **Price monitoring.** On the basic principles relating to cartelization and profiteering, the new bill says that these two issues will be covered in detail in the regulations to be framed by the board based on widely accepted practices. It has also been clarified that the board shall monitor prices and maintain an information bank on activities related to the petroleum sector.

23. Some potential issues remain. Careful perusal of the bill suggests the possibility of excessive interference from the Government, and the board has been granted discretionary powers on a host of critical issues that may impair the functioning of the sector. Nonetheless, with the recent change in the Government, the earlier bill has lapsed and will have to be presented again in Parliament. MoPNG is in the process of getting cabinet approval for the bill so that it can be tabled in Parliament in December 2005.

6. **Draft Policy for Development of National Gas Pipeline Networks**

24. As a result of recent gas discoveries off both of India’s coasts and onshore in Rajasthan, and with the commencement of LNG imports at the Dahej LNG terminal in Gujarat, the Government identified the urgent need to promote investment in natural gas transmission pipelines and to provide interconnectivity between regions, consumers, and producers. In September 2003, the Government issued its Draft Policy for Development of Natural Gas Pipeline Networks to address issues related to developing and regulating the gas pipeline network. The Government has proposed interim guidelines until the Petroleum Regulatory Board Bill is passed by Parliament and notified for enforcement. The objective of the policy on natural gas pipelines is to secure equitable distribution of natural gas by (i) increasing the gas supply, (ii) broad-basing the transmission and distribution networks, (iii) promoting competition among entities, and (iv) securing consumer interest. This policy will provide guidelines for granting rights-of-use permission for laying natural gas pipelines. The Government will also perform other regulatory functions related to this subject until the Petroleum and Natural Gas Regulatory Board is set up.
COMPANY AND SPONSOR BACKGROUND

A. Central UP Gas Limited

1. Introduction

1. GAIL (India) Limited (GAIL) and Bharat Petroleum Corporation Limited (BPCL) have promoted a joint venture company called the Central Uttar Pradesh Gas Limited (CUGL). The joint venture agreement was signed on 26 July 2004. The company was incorporated on 25 February 2005 under the Companies Act 1956. Initial capital was contributed by the sponsors in 2004 and 2005 as advances against equity. Its registered office is in Kanpur. The proposed shareholding is as follows:

<table>
<thead>
<tr>
<th>Shareholder</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAIL</td>
<td>22.5</td>
</tr>
<tr>
<td>BPCL</td>
<td>22.5</td>
</tr>
<tr>
<td>State government of Uttar Pradesh</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total Stake of Government Entities</strong></td>
<td><strong>50.0</strong></td>
</tr>
<tr>
<td>ADB</td>
<td>20.0</td>
</tr>
<tr>
<td>Other financial investors</td>
<td>30.0</td>
</tr>
<tr>
<td><strong>Total Stake Private Entities</strong></td>
<td><strong>50.0</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

As a result of the ownership structure described above, the total equity participation of majority-owned public sector undertakings is limited to no more than 50.0%. Under the Companies Act 1956, CUGL is classified as a private sector company.

2. Management and Organization Structure

2. As per the articles of association, the board of directors consists of not fewer than four and not more than 12 directors. One additional board director will later be appointed from those minority shareholders holding more than 15% of shares (one member each from the Asian Development Bank and other financial investors as necessary). The chairman of the board shall be the nominee of the chairman and managing director of GAIL or BPCL, by rotation every 2 years.

3. The day-to-day affairs of CUGL are handled by the managing director and director (commercial). They are assisted by a team of eight other management personnel seconded from GAIL and BPCL and experienced in the disciplines of finance, marketing, human resources, construction management, operations and maintenance, and corporate planning. Additional personnel will be added to the company based on the implementation schedule of the Project. CUGL proposes to recruit people directly as well as on secondment from the sponsor companies.
B. GAIL (India) Limited

1. Background

4. GAIL (formerly the Gas Authority of India Limited) is India’s principal gas transmission and distribution company. It was established by the Government of India in 1984 to create gas sector infrastructure for sustainable development of the country’s gas market. Apart from its core business of natural gas transportation, GAIL has expanded its operations into gas processing, petrochemicals, liquefied petroleum gas (LPG) transmission, and telecommunications. The company has also extended its presence in power, liquefied natural gas (LNG) regasification, city gas distribution, and exploration and production through equity and joint venture participation.

5. GAIL owns and operates India’s largest gas transmission networks, with 4,600 kilometers (km) of pipelines.\(^1\) It owns the world’s longest LPG pipeline (1,269 km) and has seven gas processing facilities with an aggregate capacity of 1.3 million metric tons per annum of LPG, propane, and pentane. GAIL has India’s largest gas-based petrochemical complex with an installed capacity of 310,000 tons per annum of polyethylene. It owns an optic fiber cable network of more than 8,000 km to offer bandwidth as a carrier’s carrier in the telecom sector.

6. GAIL has many achievements to its credit. It entered the LPG business in February 1991, setting up its first LPG plant at Bijaipur, which operated at 125% of designed capacity in its first year. GAIL began regional gas distribution in June 1992, taking over Oil and Natural Gas Corporation Limited pipelines in western, southern, and northeastern India. GAIL now operates over 1,800 km of regional pipelines. GAIL began its distribution of clean and environment-friendly energy through Mahanagar Gas Limited, its joint venture with British Gas Group (UK) and the government of Maharashtra, in Mumbai in July 1995.

7. GAIL has an International Organization for Standardization (ISO) certification of ISO 9002 and ISO 14001 for adherence to environmental standards for its pipeline system and LPG plants. For the past 5 years, the company has won the excellent performance award from the Indian Government. GAIL has also been awarded navaratna status, which grants its board significant autonomy on operating and strategic decisions.

2. Shareholding

8. As per its annual report, GAIL’s authorized share capital is Rs10 billion (1,000 million shares worth Rs10 each), and its current paid-up capital amounts to Rs8,456.5 million (845.6 million shares worth Rs10 each fully paid up), of which the Government holds 57.35% and others the remaining 42.65%. GAIL’s stock is listed on the Delhi, Mumbai, and national stock exchanges in India, as well as on the London Stock Exchange.

3. Financial Summary

9. The table below outlines the key financial performance indicators of GAIL for the past 3 fiscal years.

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\(^1\) www.gailonline.com
Table A3.2: Financial Summary of GAIL (India) Limited  
(Rs million, unless otherwise noted)

<table>
<thead>
<tr>
<th>Item</th>
<th>FY2003</th>
<th>FY2004</th>
<th>FY2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross sales</td>
<td>106,419.9</td>
<td>112,956.7</td>
<td>129,270.7</td>
</tr>
<tr>
<td>Net profit</td>
<td>16,391.1</td>
<td>18,693.4</td>
<td>19,539.1</td>
</tr>
<tr>
<td>Net worth</td>
<td>63,365.7</td>
<td>74,107.0</td>
<td>85,596.5</td>
</tr>
<tr>
<td>Net fixed assets</td>
<td>62,621.0</td>
<td>81,428.8</td>
<td>78,458.8</td>
</tr>
<tr>
<td>Debt equity ratio</td>
<td>0.32</td>
<td>0.29</td>
<td>0.23</td>
</tr>
<tr>
<td>Dividend</td>
<td>5,919.6</td>
<td>6,765.2</td>
<td>6,765.2</td>
</tr>
<tr>
<td>Book value per share (Rs)</td>
<td>74.96</td>
<td>88.04</td>
<td>102.0</td>
</tr>
<tr>
<td>Earnings per share (Rs)</td>
<td>19.38</td>
<td>22.11</td>
<td>23.1</td>
</tr>
</tbody>
</table>

FY = fiscal year, Rs = rupees.

Source: GAIL (India) Limited annual reports.

C. Bharat Petroleum Corporation Limited

1. Background

10. BPCL, a Government of India undertaking, came into existence on 24 January 1976. The current activities of the corporation are refining, storing, marketing, and distributing petroleum products. In addition, BPCL has diversified into petrochemicals, using certain refining streams as feedstocks. BPCL is one of the single-digit Indian representatives on the Fortune 500 and Forbes 2000 listings.

11. BPCL's objective is to participate fully in realizing the growth potential of the Indian market. Towards this end, the corporation has incurred since 1976 capital expenditure of Rs40,804 million, of which Rs35,917 million is from internal resources. In July 1997, the Government decided to categorize BPCL as one of the navaratna nine (later 11) leading public sector undertakings on the basis of its performance. The companies selected were those that had potential to become world-class competitors.

12. BPCL produces a diverse range of products, from petrochemicals and solvents to aircraft fuel and specialty lubricants, and markets them through its wide network of gasoline stations, kerosene dealers, LPG distributors, and lube shops—besides supplying fuel directly to hundreds of industrial plants and several international and domestic airlines.

13. 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 adherence to environmental standards.

2. Shareholding

14. The current paid-up share capital of the corporation, as per its annual report, is Rs3 billion (300 million equity shares worth Rs10 each), of which the Government holds 66.2%. BPCL's stock is listed at on the Calcutta, Chennai, Delhi, and Mumbai stock exchanges.

3. Financial Summary

15. The table below outlines the key financial performance indicators of BPCL for the past 3 fiscal years. The figures indicate that BPCL has grown consistently over the years in terms of profit as well as net worth.
<table>
<thead>
<tr>
<th>Item</th>
<th>FY2003</th>
<th>FY2004</th>
<th>FY2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross sales</td>
<td>475,844.0</td>
<td>529,828.0</td>
<td>633,500.0</td>
</tr>
<tr>
<td>Net profit</td>
<td>12,500.2</td>
<td>16,946.0</td>
<td>9,658.0</td>
</tr>
<tr>
<td>Net worth</td>
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<td>58,497.2</td>
<td>63,884.3</td>
</tr>
<tr>
<td>Net fixed assets (including CWIP)</td>
<td>63,662.0</td>
<td>74,535.0</td>
<td>83,487.0</td>
</tr>
<tr>
<td>Debt equity ratio</td>
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<td>0.5</td>
<td>0.6</td>
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<tr>
<td>Dividend</td>
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<td>5,250.0</td>
<td>3,750.0</td>
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<tr>
<td>Book Value per Share (Rs)</td>
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<td>195.0</td>
<td>213.0</td>
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<tr>
<td>Earnings per Share (Rs)</td>
<td>41.7</td>
<td>56.5</td>
<td>32.2</td>
</tr>
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</table>

CWIP = construction works in progress, Rs = rupees.

Source: Bharat Petroleum Corporation Limited annual reports.
SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

A. Introduction

1. This appendix summarizes the benefits, adverse effects, and recommended mitigation and monitoring measures related to constructing and operating the Urban Clean Fuels Project (the Project) in Kanpur, India, undertaken by Central Uttar Pradesh Gas Limited (CUGL). The initial environmental examination (IEE) was undertaken primarily as part of an ADB technical assistance project\(^1\) and has been further developed based on the findings of a consultant report completed in December 2004. To supplement the IEE, a second site visit was undertaken in August 2005 to verify that its findings were still current. The primary purpose of the IEE is to provide a tool for incorporating environmental concerns into the Project. The process adopted for assessing potential environmental impacts has been to focus on compliance with current and known future Indian regulations, including international agreements to which the government of India is a signatory, and ADB guidelines. This report is the summary IEE.

B. Project Description

2. The Supreme Court of India directed the Government to effectively address ambient air pollution in 16 of the country’s most polluted cities. With the on-going development of India’s natural gas sector through imports of liquefied natural gas (LNG) and the future exploitation of gas discoveries off the country’s east coast, natural gas is expected to play a key role in reducing India’s air pollution problem. The Supreme Court on April 2002 and May 2003 ordered the preparation of a scheme for improving air quality in cities other than Delhi that are equally or more polluted. Kanpur emerged as one of four highly polluted cities requiring further studies to prepare an action plan for improving air quality.

3. The Project has two main components for constructing and operating (i) one mother station and several online stations to provide compressed natural gas (CNG) for vehicles and (ii) a piped natural gas distribution system to serve residential, industrial, and commercial users. Sixteen CNG stations are expected to be installed and become operational within the 6 years of project implementation. Projected gas demand in the initial stages is 0.03 million metric standard cubic meters per day, gradually increasing to 0.40 in 15 years. Gas is currently being transported from Gujarat by GAIL (India) Limited through the Hazira–Bijaipur–Jajdishpur (HBJ) pipeline to Sachendi, where a 23 millimeter (8 inch) feeder line carries gas the final 12 kilometers to the city gate station in Kanpur.

C. Description of the Environment

1. Land Use

4. Kanpur runs east to west along the south bank of the River Ganga, with growth to the south restricted by the River Pandu. Most of Kanpur’s commercial areas are in the heart of the city, with industrial areas expanding to the west. Kanpur is home to a number of well known educational institutions including the Indian Institute of Technology, which occupies a significant area of land. Very small forested areas exist in Kanpur city, but none to these will be directly affected by the Project.

\(^1\) ADB. 2003. Technical Assistance to India for The Urban Clean Fuels Project. Manila (TA 4182-IND).
2. Climate

5. Kanpur has a sub-tropical climate. The hottest months are May and June, when temperatures reach 40–45 °C. During December and January, the temperature falls as low as 6–10 °C. The relative humidity during summer is 35–70%, in winter 55–86%, and in the wet monsoon 60–93%. Annual rainfall is nearly 833 millimeters per year, with the three months of July, August, and September accounting for 77% of the total. Gentle winds prevail between November and February. The average wind speed during this period is 5–10 kilometers (km) per hour coming from the north-northeast. In summer, light winds occur with speed range from 5 to 20 km per hour from the north-northwest. Occasional dust storms occur with high winds in summer. Winds are relatively stronger during the wet monsoon, coming from the south-southwest at 10–30 km per hour.

3. Air Quality

6. The Central Pollution Control Board reports six ambient air quality-monitoring stations at Fazalgunj, Deputy ka Padav, C.S. Azad Agricultural University, the head post office, Lajpat Nagar, and the Forest and Training Center at Kidwai Nagar. Ground concentration data from the air monitoring stations located at Kanpur indicate that sulphur dioxide (SO$_2$) and nitrous oxide (NO$_x$) concentrations are well within the national acceptable limits. However, respirable suspended particulate matter (RSPM) and suspended particulate matter (SPM) concentrations have exceeded the annual average standards for residential areas at Deputy ka Padav and Kidwai Nagar. At these stations, the range of annual average values of SPM and RSPM is 396–570 nanograms per cubic meter ($\mu$g/m$^3$) and 168–242 $\mu$g/m$^3$, respectively. These values are 3–5 times the maximum residential area standards.

7. Particulate matter is the pollutant of primary concern for this Project. The average ratio of the annual RSPM to SPM values at Kanpur is 0.52, which is within the expected range for urban environments. A summary of recent studies like the Central Pollution Control Board’s environmental management plan (EMP) for Kanpur, comprehensive action plan for environmental improvement of Kanpur, and report of the expert committee on auto fuel policy are presented in detail in section 4 of the IEE.

4. Surface and Ground water

8. Kanpur is bounded by the River Ganga on the north and the River Pandu on the south, which are significantly polluted by municipal wastewater. The Ganga is also a source of drinking water for the city. Unfortunately, nallahs upstream of the drinking water intake at Bhairoughghat contaminate the river. A major untreated stream from Sisamau meets the same channel downstream of Bhairoughghat, making the stretch of the Ganga along the city highly polluted. Ground water is generally fit for drinking, though in a few areas it is contaminated with toxic heavy metals and other pollutants, which is attributed to past indiscriminate ground dumping of toxic industrial waste by chemical companies. This damage is almost irreversible.

5. Population and Demographics

9. Kanpur is the 10th most populated urban agglomeration in India, with a population of 2.7 million in 2001 in an area of 299 square km, for a population density of nearly 9,000 people per square km.
6. Human Health, Educational, and Other Facilities

10. In 2002 there were 99 allopathic, 24 aurvedic, 19 homeopathic, and 4 other hospitals, clinics, and dispensaries. There were 52 primary health centers and 31 family, mother, and childcare centers. Kanpur is known for its solid base of higher educational and research institutes. Forested land accounts for 0.5% of the district, and the gross agricultural area is 193 hectares, of which nearly 133 hectares was irrigated area in 2001.

7. Energy Use

11. Kanpur has nearly 500,000 domestic liquefied petroleum gas (LPG) connections and 1,100 commercial connections. According to the EMP, average daily consumption of LPG is nearly 91 tons, of coal 70 tons, of kerosene 105 kiloliters, and of wood 30 tons. Approximately 195 tons of gasoline and 385 tons of diesel are consumed by an estimated 60,000 vehicles in Kanpur, 88% of which use diesel fuel. The Project will see a portion of this consumption switching to CNG, as old vehicles are converted and new CNG vehicles are bought.

8. Physical and Cultural Heritage

12. Notable tourist points within the city are Bithoor, Ganga Ghats, J.K. Temple, and a zoo meeting international standards. Portions of ancient structure and monuments of the time of King Yayati survive in Jajmau, and there is a museum in Phool Bagh.

D. Anticipated Environmental Impacts and Mitigation Measures

13. The Project is designed to reduce air pollution and improve ambient air quality by switching vehicles from gasoline and diesel to CNG and residential, industrial, and commercial users from kerosene and LPG to piped natural gas. Except for short-term disturbances from construction, no negative direct impacts are anticipated from project design, location, or operations. The Project has a net positive impact to offset any negative impacts.

14. The primary benefits of the Project will be improvements in air quality. It is predicted that the annual average ambient SPM value in Kanpur will be reduced by 57 µg/m³ if CNG is successfully introduced in the transport sector and that further reductions are possible if piped natural gas finds wide use in the industrial sector. Benefits will accrue to general health and human welfare, including reductions in morbidity and mortality, respiratory illnesses, and hospital visits associated with these ailments. Other environmental benefits include

(i) air quality improvements from reduced SO₂, volatile organic compounds such as benzo(a)pyrene, and particles measuring 10 microns or less;
(ii) reduced groundwater contamination from underground fuel storage tanks at filling stations;
(iii) reduced gasoline and diesel run-off from roads and filling stations; and
(iv) the opportunity to install oil separators and traps in new dual-fuel filling stations.

15. There will be socioeconomic benefits from the Project, including (i) construction employment for manual and skilled labor and operational employment at CNG filling stations and other facilities; (ii) new skills training for workers during construction and operation; (iii) indirect benefits to industries and businesses from CNG vehicle sales, regular inspections of CNG cascade tanks, and vehicle testing. Benefits may also extend to manufacturing piping material and associated equipment vendors and specialist paint producers. Improving air quality
will bring benefits for buildings and other physical infrastructure. Given that heritage sites have been damaged by air pollution, protecting the built environment is vital to the future of the city. Potential negative impacts and mitigation measures are summarized in Supplementary Appendix B.

E. Institutional Requirements and Environmental Management Plan

16. Monitoring the EMP is expected to occur prior to construction to establish a baseline, during construction and commissioning, and into the operation phase of the Project, ensuring that all project activities undertaken by CUGL or its contractors are environmentally sound and comply with national environmental regulations. CUGL will be responsible for monitoring the construction impacts. There are six existing ambient air quality stations around Kanpur which regularly monitor emissions. These stations are run by the UP State Pollution Control Board in accordance with the national ambient air quality monitoring program as set out by the Central Pollution Control Board. Data on SO₂, NOₓ and SPM is regularly submitted to the Central Pollution Control Board and will form the baseline for this project. This information should be periodically submitted to ADB by CUGL. The EMP aims to cover all the direct and indirect influences identified in the project IEE and to prevent, control, or mitigate adverse impacts on the environment. It is expected that this EMP will continue to be developed throughout detailed design and adjusted to include mitigating action as required by revised design criteria. An EMP is included as Supplementary Appendix B.

17. Environmental awareness training is an important part of an effective environmental compliance program and is an integrated part of the EMP. A project-designated environmental training coordinator should be assigned to deliver information on site safety and environmental rules. Topics may include (i) general site maintenance, (ii) waste management rules and requirements, (iii) environmental regulatory rules, (iv) handling hazardous waste, (v) erosion and sediment control, (vi) protecting sensitive areas, (vii) reporting unanticipated discoveries, (viii) material and waste disposal, and (ix) preventing and responding to spills. Approximately Rs30 million has been allocated for the environmental and social costs of the project, including training.

F. Public Consultation and Disclosure

18. Disclosure on the Projects can be traced back to the 2002 Supreme Court directive, initiated by public interest litigation, to the Government to make pollution norms applicable to motor vehicles and further public orders to prepare schemes for supplying CNG to other polluted cities in India, including Kanpur. More specifically to Kanpur, public consultations have been undertaken with certain stakeholder groups. In mid 2005, a consultation was held by the Kanpur City Regional Transportation Office with all public transportation groups (taxi owners, taxi drivers, and bus companies) and individual vehicle owners to discuss the introduction of CNG. Feedback from these stakeholders was positive in that the experiences in Delhi and Mumbai have been very publicly discussed, and drivers appreciate that CNG is economical. Most expressed willingness to convert to CNG.

19. Public consultations were held along the pipeline route on 30 November 2005 with people who live and work in the vicinity. Advertisements were placed in five local newspapers on the same day. Information pamphlets in the local language were distributed to a total of approximately 300 persons at five meetings. While the meetings explained the details of trench digging, laying pipelines, etc., questions from the local residents related more to using natural gas: can scooters run on CNG? can natural gas be supplied to small commercial
establishments? and when will supply begin? Many people were interested in natural gas and indicated that current delivery of LPG is not timely.

G. Findings and Recommendations

20. As with any major gas infrastructure project, this Project possesses two distinct aspects regarding environmental issues:

(i) **Construction phase.** Temporary disturbance to the environment lasting up to a few days along any section of the city route and no longer than 6 months at the CNG stations. The duration of construction of the identified components is not expected to last longer than 2 years.

(ii) **Operational phase.** Ongoing impacts, typically negative impacts associated with facility maintenance, are of a much more limited nature but extend throughout the operating life of the project. However, beneficial impacts including improvements in air quality and public health resulting from fuel switching are expected to be significant (refer to Kanpur IEE Appendix C for details).

21. The extent of any negative environmental impacts associated with the Project can be minimized by appropriate consideration during its design and planning for construction. An environmental management plan must be developed, updated, and executed by CUGL as the Project progresses from detailed design to implementation. Based on findings from the IEE summarized here, no full environmental impact assessment is required if the EMP is implemented as presented.
RESETTLEMENT FRAMEWORK

A. Introduction

1. The Urban Clean Fuel Project (the Project) for the city and region of Kanpur, is being developed by Central Uttar Pradesh Gas Limited (CUGL), which is a joint venture company with equity participation initially from GAIL (India) Limited and Bharat Petroleum Company Limited (BPCL). Its main objective is to improve ambient air quality and public health in focal cities of India by providing clean piped natural gas (PNG) and compressed natural gas (CNG) to transport, industrial, commercial, and domestic users.

2. The proposed Project adopts an involuntary resettlement approach similar to a sector loan. The components identified for implementation in the first year of the Project do not involve involuntary resettlement. This resettlement framework has been prepared to cover any future, as-yet-unidentified components that may involve involuntary resettlement impacts as defined under ADB’s Policy on Involuntary Resettlement. The resettlement framework outlines the objectives, policy principles and procedures for acquisition of land (if any), compensation and other assistance measures for affected persons, and procedures for the preparation of additional components under the project. CUGL will be the project sponsor and responsible for preparing resettlement plans for all project components which involve involuntary resettlement (if any) in accordance with this framework and will submit them to ADB for review and approval prior to the award of civil works contracts for each component.

B. Resettlement Policy and Framework

3. In India, public land acquisition and related compensation is governed by the Land Acquisition Act 1894, as amended in 1984. In accordance with the act, the legal process for land acquisition is initiated by project sponsors applying to the competent district authority. Additional to the Land Acquisition Act is the National Policy on Resettlement and Rehabilitation (NPRR), which was approved by the Government of India in February 2004. Neither adequately provides mitigation to many project-related impacts.

4. In view of the above, following the national laws and regulations on land acquisition and incorporating ADB’s Policy on Involuntary Resettlement as well as the national policy, the basic principles for the Project include the following elements with respect to each subproject, including core subprojects:

   (i) Land acquisition and other involuntary resettlement impacts will be avoided, or where this is not feasible, minimized as much as possible.
   (ii) Any land acquisition and/or resettlement should result in improvement or at least restoration of the affected people’s pre-project income and living standards.
   (iii) Affected people will be consulted on compensation options, and the preparation of the resettlement plan will be carried out in accordance with this framework.
   (iv) Payment of compensation for acquired assets will be at full replacement costs.
   (v) Payment of compensation for lost land, housing, assets, and resettlement allowances will be made in full prior to the contractor taking physical possession of the land and commencement of construction.

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2 Replacement costs is defined as the method of valuing assets to replace the loss at market value, or its nearest equivalent, plus any transaction costs such as administrative charges, taxes, registration and titling costs.
(vi) Resettlement assistance will be provided to affected people, including non-titled people (e.g., informal dwellers, squatters, and encroachers), prior to acquiring the land and commencing construction.

(vii) Provision will be made for income restoration and rehabilitation.

(viii) Special attention will be paid to vulnerable groups.

5. In cases where ADB’s involuntary resettlement requirements are more extensive than those provided under national or state law, ADB’s requirements, as laid out in this resettlement framework, will be followed.

6. The Land Acquisition Act defines the role of the competent authority, which is the district collector or Land Acquisition and Resettlement Department officer under the district collector’s office who has the authority to issue notice for land acquisition and award compensation to affected people. For this Project, land can be acquired by the competent authority for CUGL, in which case compensation is awarded by CUGL through the competent authority. CUGL also needs to provide additional assistance to project-affected communities in line with ADB resettlement policy and principles. A second way of procuring land is by direct purchase from the private owner by CUGL at replacement value.

7. The initial survey will be done by CUGL, and the land requirements will be submitted through a formal application process to the competent authority. The competent authority, following the relevant sections of the Land Acquisition Act, will issue notifications for land acquisition and verify title to the land before awarding compensation.

8. Regarding eligibility for compensation, all affected people will be provided with compensation and rehabilitation if (i) their land is reduced, (ii) income sources are adversely affected, (iii) their house is partly or fully demolished, or (iv) other property such as crops, trees or other facilities are lost or damaged. Lack of legal documentation defining customary rights of occupancy or absence of formal legal title shall not affect people’s eligibility for compensation. Any such losses resulting from changes in project design during construction shall also be compensated in keeping with this resettlement framework.

9. When land-for-land is not a feasible option, the resettlement framework stipulates paying compensation at the assessed value of the land and structure to the affected people. In addition to compensation payments made by the competent authority, affected people will receive

   (i) additional assistance to match replacement costs, which is the difference between the market value and the assessed value, if any, for lost land and houses,
   (ii) transaction costs such as stamps and registration costs, in the case of replacement land purchase, and
   (iii) other cash grants and resettlement assistance such as shifting allowance and compensation for lost workdays or income caused by dislocation.

In addition to the above, female-headed households and other vulnerable households, such as those with scheduled tribes or castes, disabled, or elderly, will be eligible for further cash assistance for relocation and house reconstruction.

10. Income restoration assistance by CUGL shall be made available to all those losing their main source of livelihood as a result of the Project. The income restoration strategy will focus on
economic activities that provide a sustained source of income to restore or improve the affected people’s standard of living. A detailed inventory of losses will be made. In addition, a detailed assessment of affected people’s existing skills will be made to guide skills development and training. Assistance will be provided for income-generating vocational training and skills upgrading, including starting suitable production or service activities in the project area. Affected squatters shall be reorganized and relocated depending on the severity of the impact. Enterprise development shall be especially promoted among affected people to contribute to sustainable income restoration.

11. The entitlement matrix (Supplementary Appendix A) lists various types of losses, identification and eligibility requirements, and entitlements, and provides basic parameters for preparing compensation and resettlement benefits. The matrix applies to identified and additional project components.

C. Procedures for Resettlement Plan Preparation

12. Each additional project component will be prepared, and the additional detailed design of each component will be undertaken, by the CUGL in keeping with the following:

   (i) Social impact assessment surveys, including a census survey and an socioeconomic survey of 20% of affected people, will be carried out for each of the components based on preliminary technical designs.

   (ii) If impacts of a component are found to be significant, a full resettlement plan will be prepared for approval prior to awarding contracts for that component.

   (iii) If impacts are less than significant, a short resettlement plan will be prepared for that component for approval prior to awarding contracts.

   (iv) The resettlement plan will include measures to ensure that the socioeconomic conditions, needs, and priorities of women are identified, and that the process of land acquisition and resettlement does not disadvantage women.

13. The project implementation team conducting preparatory studies for all project components involving land acquisition or involuntary resettlement should include a resettlement specialist familiar with ADB policy and procedures for preparing additional component resettlement plans. The resettlement plans must comply with ADB’s Policy on Involuntary Resettlement and other social safeguard guidelines. When impacts on indigenous people are identified, an indigenous people’s development plan must be prepared in keeping with ADB’s Policy on Indigenous People. CUGL will submit the resettlement plans to ADB for approval, prior to award of contracts for civil works.

D. Institutional Responsibilities

14. The resettlement plan will include adequate institutional arrangements to ensure effective and timely design, planning, consultation, and implementation of compensation, resettlement, and rehabilitation. CUGL will bear primary responsibility for preparing and

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3 Involuntary resettlement category A: significant means 200 or more people will experience major impacts, which are defined as (i) being physically displaced from housing or (ii) losing 10% or more of their productive assets. Category A projects require a full resettlement plan. Some of these projects may require a resettlement framework prior to the full resettlement plan. Involuntary resettlement category B: not significant includes involuntary resettlement impacts that are not deemed significant and require a short resettlement plan. Some of these projects may require a resettlement framework prior to the short resettlement plan. Source: Asian Development Bank Operations Manual Section F2 – Operational Procedure on Involuntary Resettlement, 29 October 2003.
implementing resettlement plans. CUGL would ensure that resettlement plans are prepared and approved prior to awarding contracts for each component and for monitoring any changes design that may require re-evaluation of the need for and adequacy of the resettlement plan. CUGL will create a cadre of in-house resettlement officers with experience implementing resettlement and rehabilitation to supervise and monitoring implementation. In addition, CUGL will hire experienced nongovernment organizations and agencies to help prepare and implement resettlement plans. The resettlement officers and NGO and agency staff will undergo orientation and training in resettlement management. Training will focus on (i) the principles and procedures of land acquisition, (ii) public consultation and participation, (iii) entitlements and compensation disbursement mechanisms, (iv) redressing grievances, and (v) monitoring resettlement. An independent monitoring agency and/or expert will be hired by CUGL in agreement with ADB to undertake external monitoring for the entire Project. CUGL will further ensure resettlement budgets are delivered on time to the competent authority and the implementing NGOs for timely resettlement plan implementation.

E. Disclosure, Consultation, and Grievances

15. Consultation and public disclosure will continue to be integral to the Project. Each resettlement plan will be prepared and implemented in close consultation with the stakeholders and will involve focus group discussions and meetings, particularly with the affected households. The resettlement framework will also be made available in the local language(s) during the public meetings. Copies of draft resettlement plans will be made available at local public offices prior to awarding civil works contracts. A summary of the resettlement plan will be disclosed on the ADB website, and consultation will continue throughout project implementation.

16. Complaint and grievance procedures will be outlined in each resettlement plan. The grievance redressal committee will redress all grievances locally in a consultative manner and with the full participation of affected households or their representatives, project officials, and local government representatives. The committee shall include members of the revenue department and representatives of affected people including women and vulnerable groups. Grievances will be redressed within 2–4 weeks from the date they were made. All costs incurred in resolving the complaints will be borne by the Project.

F. Monitoring and Evaluation

17. For components with resettlement plans or short resettlement plans, CUGL will conduct regular internal monitoring of resettlement implementation and prepare quarterly progress reports to be made available to an independent monitoring expert. The reports will describe progress made in resettlement plan implementation with particular attention to compliance with its principles and matrix. The report will document consultation activities and provide a summary of issues or problems identified and actions taken to resolve the issues. It will provide a summary of grievances or complaints lodged by households and actions taken to redress such complaints. An independent agency or monitoring expert will be engaged and carry out biannual monitoring during project implementation. The biannual monitoring report will be submitted directly to ADB.
ECONOMIC EVALUATION

A. Introduction

1. The economic evaluation of Urban Clean Fuels Project (the Project) is based on Asian Development Bank’s guidelines economic analysis of projects. The main objective of this analysis is to identify the net benefits accruing to the economy from the use of compressed natural gas (CNG) and piped natural gas (PNG) in the transport and non-transport sectors in Kanpur. The net benefits of the project are estimated based on the economic benefits generated by the Project less its economic costs. It is assumed that CNG demand from the transport sector and PNG demand from the domestic, commercial, and industrial sectors are both non-incremental and incremental (i.e., CNG and PNG replace existing fuels used in those sectors and new customers and vehicles consuming fuel). The Project’s benefits and costs will depend on the retained assumptions for switchover from existing fuels to CNG and PNG.

2. Following the identification of the Project’s costs and benefits, an economic valuation of them is carried out by converting market and local costs and prices (especially for non-traded goods and services) into economic costs and prices and adjusting market and local values to a common basis with the use of estimated conversion factors. The shadow exchange rate factor is estimated at 1.16. The shadow wage rate factor is estimated at 0.60.\(^1\)

B. Identification of Economic Rationale

3. The economic rationale of the Project is based on the overall net economic (as opposed to financial) benefits to the local and national economies from the introduction of natural gas in the transport and non-transport sectors. The net savings from natural gas are estimated for each of the sectors as shown in Table A8.1. The fuel cost savings for the transport sector are based on the difference between gasoline and CNG prices. For industries, fuel cost savings are based on the price difference between diesel and PNG prices, while for the domestic and commercial sectors the savings are based on the differences between liquefied petroleum gas (LPG) and PNG prices.

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\(^{m\(^3\) = \text{cubic meter, Rs = rupees.}}\)

Source: Consultant estimates

C. Identification of Project Benefits and their Valuation

4. The without-project and with-project benefits have been categorized into project output from incremental sales to new vehicles and new connections, fuel savings benefits, and health benefits. Project output and fuel savings are the direct benefits of the Project, while the other benefits are considered supplemental benefits, for which quantification is less certain.

1. Project Output

5. The direct output of the Project is the use of CNG and PNG replacing gasoline and diesel in the transport sector and mainly diesel and LPG in non-transport sectors. This substitution will have an impact on India’s balance of payments, as the country imports some of the petroleum products it consumes, namely LPG, and exports excess diesel and gasoline. This impact can be measured but is not incorporated into this project analysis. If natural gas supplies are priced competitively, the direct benefit of using CNG and PNG is the price difference between them and the fuels they replace.

2. Health Benefit

7. The health benefits of the Project were estimated based on assumptions of health costs with and without it. The health impacts were estimated based on the population expected to benefit from pollution reductions resulting from the Project. The criterion pollutant was particulate matter of aerodynamic diameter measuring less than 10 microns (PM$_{10}$), as this relatively easily passes into the human respiratory tract. The long-term net change of PM$_{10}$ was estimated and valued to show the health benefit from the Project. The net change of PM$_{10}$ depends on CNG switchover rates in the transport sector. The Project is forecast to have positive health impacts, particularly for the low-income people who are exposed to high pollution by living near major roads.

3. Fuel Cost Savings

8. Switching from conventional fuels to natural gas will create fuel cost savings as gas prices are set competitively compared to those of gasoline, diesel, and LPG. These savings are based on the estimated natural gas penetration of transport and non-transport sectors, the rate of conversion from alternative fuels, and the growth rates for both new vehicles and overall growth in population, applying the percentage of households using LPG, which is the target market (14.2%). Vehicle and household conversions rates were based on a detailed independent market survey carried out in 2005, and the company has incorporated conservative estimates in its business plans.

4. Other Benefits

9. Other indirect project benefits that cannot be quantified are (i) industries and businesses capitalizing on reliable gas supplies to improve their production efficiency and possibly expand operations and employment; (ii) household time savings from a constant gas connection that can improve the efficiency of women’s housework and the household economy; (iii) reductions in pollution and acid damage to buildings and heritage sites; and (iv) potential increases in amenity values to land and property and more tourism resulting from reduced pollution.

D. Identification of Costs and their Valuation

10. Economic costs as a result of the Project are assumed to be incremental. This section estimates in economic terms the incremental capital and operating expenditures for gas pipelines and CNG stations and the conversion costs for vehicles and non-transport sector applications. In addition, air quality and emissions-testing equipment are included in the economic analysis.
1. **Pipeline and CNG Stations**

11. Using modern gas-distribution technology, detailed engineering was carried out by an independent firm to design an optimal gas distribution network for Kanpur to serve PNG customers and phase in CNG stations to meet demand in a least-cost manner. It was determined to construct online stations with 600 standard-cubic-meter-per-hour gas-driven compressors instead of daughter booster stations. The mother station shall have a 1,200 standard-cubic-meter-per-hour gas-driven compressor. Distribution pipes have been designed and sized according to the required pressure for estimated distribution lengths either directly from the steel network or through medium density polyethylene pipe. The system has been optimized based on demand projections.

12. Pipeline costs consist of estimated capital and operating expenditures. The major equipment at the mother and 15 online stations are gas compressors, cascades, dispensers, and metering skids. All capital expenditures for the Project are local costs sourced in India, but they are categorized into tradable and non-tradable items. Tradable items are equipment and materials, while non-tradable items are civil works, project management, detailed engineering, procurement and construction supervision, owner’s management expenses, and contingencies. Tradable items will be adjusted with the shadow exchange rate factor to derive the economic values of the Project’s capital and operating expenditures or costs. Non-tradable items, mostly labor costs, will be further identified as skilled and unskilled laborers. Unskilled labor is around 70% of total manpower but its cost per person is relatively low. Total unskilled labor cost is estimated at around 6% of total manpower cost.

2. **Vehicle Conversion Costs**

13. Vehicle conversion costs cover (i) the conversion cost of vehicles from diesel or gasoline to CNG and (ii) the cost of new CNG vehicles compared to diesel and gasoline vehicles. Estimated vehicle conversion costs were based on data collected from vehicle suppliers and dealers and the estimated actual costs experienced in New Delhi. As diesel vehicles are difficult to convert to CNG, these have higher conversion costs.

14. The conversion costs of light motor vehicles such as taxi and private cars running on diesel and three-wheelers running on gasoline were collected from Mahanagar Gas Limited (MGL) in Mumbai. The corresponding costs of original equipment manufacturer (OEM) CNG vehicles for the above categories were estimated based on information from Tata Motors and Baja Auto. The conversion cost of light commercial vehicles and buses was not considered as the Project assumed no conversion of existing diesel vehicles. The OEM costs for new CNG buses were collected from the Delhi Transport Corporation and for new CNG-fuelled light commercial vehicles from private industry. In estimating the economic cost of converting vehicles to CNG and the incremental cost of new CNG vehicles, it was found that tradable items comprise 90 percent of the cost, and non-tradable item 10 percent.

15. Estimates of conversion costs to PNG in the domestic sector were based on discussions with PNG suppliers such as IGL and MGL. This cost was then converted by the shadow exchange rate to give the economic cost, which is used in the economic analysis.

3. **Operating Costs**

16. The estimate of the operating costs of the natural gas pipeline; city gate distribution line for the domestic, commercial, and industrial users; and CNG stations are presented in the
following subsections. Operating costs include power and fuel costs to run the CNG stations and manpower, repair, maintenance, and insurance costs. Fixed costs have been assumed for power supply and fuel costs for the compressors. Repairs and maintenance have been estimated at 5% and insurance costs at 1% of sales.

E. Project Economic Analysis

17. The economic model is structured similarly to the financial model, but all inputs have been adjusted to economic prices. In addition, the economic model does not include financing costs and is independent of the debt and equity structure of the Project. Table A8.3 shows the economic net present value calculated on a 12% discount rate for the Project, together with the economic internal rate of return (EIRR), both with and without the health and social benefits. Based on the assumptions explained above, the Project has an EIRR of 36.4% and a net present value of Rs2,211.7 million. When health benefits are included, the EIRR increases to 56.4% and the net present value to Rs6,852.9 million. The sensitivity analysis is in Table A8.3.

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent change</th>
<th>EIRR (base)</th>
<th>NPV (Rs million)</th>
<th>EIRR (all benefits)</th>
<th>NPV (Rs million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case result</td>
<td></td>
<td>36.4%</td>
<td>2,211.7</td>
<td>56.4%</td>
<td>6,852.9</td>
</tr>
<tr>
<td>Sensitivities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Sales gas price</td>
<td>+ 15%</td>
<td>56.4%</td>
<td>4,899.1</td>
<td>72.1%</td>
<td>9,540.3</td>
</tr>
<tr>
<td>2 Sales gas price</td>
<td>− 15%</td>
<td>n/a</td>
<td>(475.7)</td>
<td>39.8%</td>
<td>4,165.5</td>
</tr>
<tr>
<td>3 Change in capital cost</td>
<td>+ 35%</td>
<td>23.7%</td>
<td>1,471.1</td>
<td>41.8%</td>
<td>6,112.3</td>
</tr>
<tr>
<td>4 Change in capital cost</td>
<td>− 35%</td>
<td>62.2%</td>
<td>2,952.3</td>
<td>85.2%</td>
<td>7,593.5</td>
</tr>
<tr>
<td>5 Decrease in demand</td>
<td>− 10%</td>
<td>30.4%</td>
<td>1,699.6</td>
<td>53.7%</td>
<td>6,608.5</td>
</tr>
<tr>
<td>6 Increase in demand</td>
<td>+ 10%</td>
<td>42.0%</td>
<td>2,691.0</td>
<td>63.2%</td>
<td>7,599.8</td>
</tr>
</tbody>
</table>

EIRR = economic internal rate of return, NPV = net present value, Rs = rupees.
Source: Asian Development Bank estimates.