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BANGLADESH

PROSPECTS FOR PRIVATE PARTICIPATION IN THE ENERGY SECTOR

March 9, 1990

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Industry and Energy Division
Country Department 1
Asia Regional Office

CURRENCY EQUIVALENTS

Currency Unit= Bangladesh Taka (Tk)
Taka 1.00= US\$ 0.03
Taka 33 = US\$ 1.00
Taka 1.00 = Paisa 100

FISCAL YEAR: July 1 to June 30

WEIGHTS AND MEASURES

Btu	=	British Thermal Unit (0.25 kcal)
mmBtu	=	million Btu
kW	=	Kilowatt (1.341 horsepower)
kWh	=	Kilowatt hour
MW	=	Megawatt (thousand kilowatts)
GWh	=	Gigawatt hour (million kWh)
MCF	=	Thousand cubic feet
MMCF	=	Million cubic feet
MMCFD	=	Million cubic feet per day
t	=	Ton
tpa.	=	Tons per year
l	=	liter

ABBREVIATIONS AND ACRONYMS

BKB	- Bangladesh Krishi Bank
BOI	- Board of Investments
BOGMC	- Bangladesh Oil, Gas and Mineral Corporation
BOL	- Bangladesh Oxygen Ltd.
BOOT	- Build-Own-Operate-Transfer
BPC	- Bangladesh Petroleum Corporation
BPDB	- Bangladesh Power Development Board
BSB	- Bangladesh Shilpa Bank
BSCIC	- Bangladesh Small and Cottage Industries Corporation
BSRS	- Bangladesh Shilpa Rin Sangstha
CCI	- Controller of Capital Issues
CNG	- Compressed Natural Gas
DSE	- Dhaka Stock Exchange
EPZA	- Export Processing Zones Authority
FY	- Fiscal Year
GOB	- Government of Bangladesh
ICB	- Investment Corporation of Bangladesh
IDA	- International Development Association
IPDC	- Investment Promotion and Development Corporation
IRR	- Internal Rate of Return
LPG	- Liquefied Petroleum Gas
LRMC	- Long-run Marginal Cost
MEMR	- Ministry of Energy and Mineral Resources
MOU	- Memorandum of Understanding
NCB	- Nationalized Commercial Bank
NIP	- New Industrial Policy
ODA	- Overseas Development Administration (UK)
PIP	- Priority Investment Program
REB	- Rural Electrification Board
SFYP	- Second Five Year Plan
TFYP	- Third Five Year Plan

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IN THE ENERGY SECTOR

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Following visits to Bangladesh in October 1988 and March 1989, this report was prepared by Karl G. Jechoutek (Mission Leader), Paul Hubbard (Sr. Financial Analyst), and Riaz Khan (Consultant). The report was updated following a visit to Bangladesh in December 1989.

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PROSPECTS FOR PRIVATE PARTICIPATION IN THE ENERGY SECTOR

EXECUTIVE SUMMARY

Role of the Private Sector

i. A general trend towards deregulation and involvement of the private sector has been evident in Bangladesh during the 1980s. This reflects an acknowledgement of the contribution that private investment can make to cost minimization, and improved operational efficiency. The greatest strides have been made in the industrial sector, where policies enacted since 1982 have generated a favorable climate for private investment. The newly created Board of Investment (BOI) is a further step in the direction of streamlining and facilitating private involvement. The energy sector has not experienced yet a similar surge of private sector interest, although modest private participation has existed for a long time. Apart from dominating the supply of traditional energy, private operators are involved in the transport and retail of petroleum products, and in selected exploration activities. The cooperatively owned rural electricity distribution networks are also an instance of energy supply not entirely operated by public enterprises. As a commercially oriented sector with viable economic rates of return, energy has the potential to mobilize fiscal resources from increased private activity. As a catalyst for sector efficiency and funding, private participation on a larger scale would contribute to the monumental task of developing the energy sector.

ii. Explicit and implicit Government policies for the energy sector postulate the primacy of public-sector supply for socio-economic and strategic reasons. The power sector remains reserved for public investment, with the exception of small standby and continuous process generation. The petroleum sector is theoretically open to private investment, but is dominated by public enterprises with wide-ranging responsibilities and powers. Recent initiatives in the hydrocarbons sector are likely to increase the private component of energy supply in some key areas: the recently approved standard contract for petroleum exploration will attract international interest if promoted vigorously; and BPC and a private partner have agreed to embark on a joint venture in LPG bottling and distribution.

iii. While initiatives are being taken to encourage the private sector, the structural obstacles to a substantial private involvement in energy remain. Unlike industry, the energy sector is perceived as naturally subject to public control. The capital-intensive nature of energy investments restricts local investors to marginal activities, and requires substantial foreign funding for major projects. Both wholesale and retail pricing of energy is subject to Government regulation, and is politically sensitive. Finally, the interaction between Government authorities, public enterprises, and potential private investors is not yet smooth enough to guarantee successful mobilization of private funds: the application of

policy to emerging subsectors is not transparent, and policy formulation is proceeding in parallel with ongoing negotiations with private partners. Recent examples of sluggish progress in the promotion of private investment are the long delays in launching a petroleum exploration promotion campaign, the slow pace of negotiations for the LPG joint venture, and the indecisive pace of discussions with the private promoter of the CNG venture. Delays of years have been experienced. These obstacles, however, will need to be overcome if new sources of local financing for the growing investment needs of the energy sector are to be found. The long-term needs of the sector will require bold initiatives to attract private investors, in order to control costs and introduce higher efficiency through competition.

Regulatory Environment

iv. The energy sector is governed by a set of Acts and Ordinances that define the respective roles of the major public enterprises in the subsectors. The regulations provide for exclusive rights in the power sector for BPDB and the REB/cooperative system, and ensure a strong position for BPC and BOGMC in the petroleum sector. The general regulatory framework, particularly for the industrial sector, has been gradually liberalized: after early relaxations of the nationalization priority in the 1970s, the New Industrial Policy of 1982 (expanded in 1986) represented a turning point in encouraging substantial new private investment. The investment climate for the private sector, both domestic and foreign, improved, and the areas reserved for the public sector shrank progressively. The new BOI understands its role to be a promotional one, and intends to act as a facilitator for private investment, assisting in the obtaining of approvals and services. While this increasing promotion of private investment will have an important encouraging effect on potential investors in energy ventures, it is clear that any participation in the energy sector will involve close cooperation with the sector's public enterprises, and dependence on the Government's energy policy.

Financing

v. A substantial pool of local private capital exists in Bangladesh. However, investor confidence in the past has not been strong. In addition, expatriate Bangladeshi funds are held abroad, in search of attractive investments. The business community estimates that about US\$15-20 million (Tk 500-650 million) could be raised annually for equity investment in promising new ventures. The Dhaka Stock Exchange, the main vehicle for such future public issues, suffers from its small size, and from the lack of financial and disclosure discipline. Nevertheless, it could become an important source of equity for new ventures in the energy sector which are in the range suitable for local investment. The commercial banks and the specialized industrial term-lending banks are the main source of loan funds for new ventures, but have been suffering through a debilitating crisis of arrears disputes and debt recovery difficulties. On the whole, confidence in the capital market and the banking system needs to be developed before significant local funding will emerge. The inflow of foreign investment has been modest, amounting to only about US\$4 million per year during the 1980s. Attractive contractual arrangements will be necessary to generate interest in the international investor community to invest in large-scale

energy sector projects. As ample foreign donor funding for energy exists, however, the main contribution of private investors would be the raising of local equity for smaller ventures or for participation in larger projects.

Pricing Policy

vi. The average levels of energy prices in Bangladesh are above their economic equivalents, with the exception of average power tariffs which are below LRMC (mostly due to subsidized supplies to small industries, residential consumers, and REB). While the average level of energy prices appears to be economically efficient, the relative prices of various fuels have shown significant distortions for long periods. In particular, the low price of diesel fuel and kerosene relative to gasoline (motor spirit) and LPG created incentives for automotive users to choose diesel, and for households to continue cooking with kerosene. The sharp reduction of gasoline retail prices in January 1990 diminished the gap between diesel and gasoline, and closed the margin available for CNG development. At current prices of competing fuels, small-scale LPG investment appears to be only marginally attractive, and CNG is likely to remain expensive unless oil prices rise. Any large-scale private investment in the downstream fuels market would require the existence of larger margins sufficient to make the investment attractive. Under current prices, private investment may remain marginal, unless ongoing studies demonstrate a lower production cost for LPG and CNG. In the case of LPG, this may be the result if significant condensate production would share the costs of a gas separation plant.

Potential Private Investments

vii. Petroleum Exploration. Early hydrocarbon exploration in Bangladesh resulted in numerous gas finds, but almost no oil discoveries. During the 1980s, only one company was exploring actively, but with little success. The poor interest among international companies led to the launching of an exploration promotion effort by the Government, with the centerpiece of a new model production-sharing contract. This new standard contract, approved in early 1989, encourages early drilling and provides a sound framework for negotiations with international oil companies. A number of major potential exploration companies have already expressed their interest to participate in the allocation of blocks in the course of 1989/90. Given the gas-prone nature of the acreage offered, a convincing geological case has to be made to compensate for the risks of poor oil prospects and small fields. Similarly, flexibility on the part of BOGMC and MEMR will be necessary to make the contract terms at least as competitive as those of other countries.

viii. Liquefied Petroleum Gas. Future large-scale production of LPG from natural gas depends critically on the development of gas demand by the major users such as power. If gas production allows, the current modest LPG production at the Chittagong refinery could be expanded by about 30 40,000 tons per year at the gas fields in the medium term, and more in the long term. However, at current kerosene retail prices, the financial and economic viability of this production is only answered if there is a significant decrease in the expected LPG production cost to create an incentive for households to switch to LPG cooking. In parallel, a

deregulation of the LPG retail price is essential, to provide the flexibility to raise the price above the current level of Tk 120 per cylinder, a level which is commercially unattractive. In addition, it should be considered to (i) encourage larger-scale bottling plants as they appear to yield a higher return, (ii) permit private investors to enter into upstream joint ventures, such as gas separation plants, and (iii) allow LPG use in the transport sector, to avoid further illegal leakage into this market. Both the forthcoming joint venture between BPC and a private partner in Khulna, and future privately financed LPG ventures would benefit from these policy measures.

ix. Compressed Natural Gas. Following a small pilot project in recent years, both BOGMC and private investors were proposing to go ahead with the establishment of filling stations and the sales of conversion kits to vehicle owners. While the financial case for substituting CNG for high-priced gasoline was strong, the more attractive, larger market for diesel substitution would require a bigger margin to allow penetration. The recent gasoline price reduction has eliminated the margin that is necessary to attract consumers to conversion. In the long run, therefore, the viability of expanded CNG distribution rests on an increase in the prices of diesel and gasoline, and on the possibility to reduce the production cost of CNG. An important policy decision affecting future private investment in CNG will involve the degree of incentives granted to the early investors. The negotiations with the private sector need to balance carefully the need for initial guarantees and franchise rights on the one hand, and the long-term aim of a competitive market with easy entry on the other hand. As in the LPG case, the investments in CNG projects are of a size and nature that would allow local investors to take the initiative, allowing the public sector to confine itself to a regulatory and promotional role.

x. Coal Development. The existence of significant reserves of steam coal in the Northwest holds the prospect of possible future coal-fired power generation, or even coal exports if the quality proves to be satisfactory. Substantial drilling and feasibility work still has to be conducted before adequate information will be available. However, preliminary estimates indicate that the economic and financial attractiveness of mining the reserves at Barapukuria are marginal at best, when compared to imported coal, and inferior to alternative fuels such as natural gas. However, gas reserves are likely to be committed early. The new technology of coal mining under difficult circumstances, and the large capital requirements will make it necessary to seek participation of international mining companies. As a ceiling on the coal price to BPDB will be imposed by alternative fuels available for power generation, appropriate incentives will have to be offered to foreign private investors to keep production costs low. This will only be worthwhile if the ongoing studies prove the project to be economically sound. A promotion campaign, patterned on the petroleum exploration effort, should be planned well ahead.

xi. Power Generation. While the power sector still remains reserved for public sector investment, recent initiatives point to a readiness to consider the involvement of private investment to benefit from possible cost reduction and efficiency gains that could be obtained. The needs of

BPDB to reduce costs and improve implementation performance in the 1990s will require the mobilization of resources from the private sector, both local and foreign. The possibilities for private investment in generation are (i) an expanded role for industrial self-generation, and (ii) major foreign investment in large new power plants. The former approach would need only a relaxation of the practice of approvals for standby and captive plant, and would find ready local investors who would operate small gas-fired plants for own use, for cogeneration, for sales to the grid, or for local industrial supply. Similarly, REB-sponsored small generation for rural supply with private participation can be envisaged. In the case of major generating plant designed to complement BPDB supply, foreign investors would have to be attracted to the concept of build-own-operate in Bangladesh. Attractiveness would hinge on the gas price available to the private venture, and the bulk power selling price to BPDB, guaranteed by Government. A clear policy stating that private investment in power generation is desirable, would reassure potential investors that the change in approach is serious.

xii. Power Distribution. In parallel with the expanding rural distribution network operated by cooperatives under the guidance of REB, the Government has perceived the need to separate urban distribution also from the overall BPDB operations, and establish independent publicly owned entities, starting with the Dhaka urban system. This could prove to be a first step in preparing parts of the distribution system for future private investment. Any potential future shareholders or concessionaires of distribution operations will look for an improvement of operational efficiency and system loss reductions prior to an offering of shares. Private participation in selected urban systems may eventually contribute to efficiency, and would be a suitable vehicle for the deployment of local investors' limited funds.

Scenario for Private Investment

xiii. A successful development of private participation in the energy sector will be characterized by the two-track approach of (i) introducing a consistent set of policy measures, and (ii) encouraging selected realistic private investment prospects. The necessary policy package, designed to build investor confidence, would include: (i) the definition of clear terms and regulations for the involvement of foreign investors in major projects, (ii) a liberal interpretation of existing regulations and laws, enabling increased private investment, combined with an acceleration and streamlining of the approvals and decision process in Government, (iii) close cooperation between the new BOI and energy sector authorities in the review of private proposals, (iv) a clear statement of policy that signals the opening of the power sector to private investment, and (v) a gradual adjustment of petroleum prices in line with economic principles and fiscal needs, to eliminate the major distortions in relative prices.

xiv. The key opportunities for private investment in the sector that present themselves in the short term include (i) petroleum exploration and development, (ii) LPG bottling and distribution on an economically sound scale, and (iii) industrial power generation. In the medium term, larger projects with foreign participation such as gas separation plants, major power generating plants, or coal development could be attractive areas for

international investors if the groundwork in terms of contractual arrangements is laid carefully. Proposals from foreign and local investors for such projects already exist, and should be acted on expeditiously. Other potential opportunities in the longer term are power distribution, CNG compression and retail, petroleum product distribution, petrochemicals, and equipment manufacture for the energy sector. An encouragement of private investment will create a healthy private component in the sector which will raise the efficiency of the sector, help develop the capital market, introduce more equity financing, and, most importantly, create a more competitive environment that will affect both supply quality and pricing.

I. THE ROLE OF THE PRIVATE SECTOR

Current Private Involvement

1.1 In the past, private sector involvement in the production and supply of commercial energy in Bangladesh has been confined to a limited number of downstream activities and some petroleum exploration. In the early 1970s, six companies were involved in petroleum exploration in the offshore of Bangladesh, and in 1981 Shell signed a production sharing contract with the Government for inland exploration of oil. The retail portion of the distribution of petroleum products consists of a large number of small private distributors. Electricity distribution in rural areas is the responsibility of consumer-owned cooperatives, which are essentially private but heavily dependent on technical and financial support from the public sector. Domestic investors are also involved in small standby and continuous process generation for industrial purposes. Finally, supply of traditional energy, amounting to 40% of total energy consumed is fully operated by private enterprise, and markets exist for fuelwood, charcoal and agricultural waste.

1.2 Recent developments in the hydrocarbons subsector point towards promising new prospects for the potential expansion of private involvement. The Government has recently approved a standardized model production sharing contract for petroleum agreements with potential investors and has launched an intensive promotional campaign to attract international oil companies to Bangladesh. The production sharing approach is promising for additional exploration activity and has already attracted considerable interest in the international petroleum community. Two new agreements for exploration (in addition to the ongoing Shell operations) have been signed with international companies recently. Proposals have been presented to set up a company to compress natural gas and manufacture and distribute CNG as vehicle fuel in competition with gasoline and diesel. The Government is also embarking on a joint venture for the establishment of a pilot LPG bottling plant and distribution in Khulna. In the power subsector, current discussions center on major power generation projects to be largely financed externally, with minority participation by local investors. In addition, domestic investors are able to raise sufficient funds for small standby or captive generation for industrial purposes.

1.3 Other promising avenues for greater private participation include the development of new energy reserves such as coal and peat for power generation, wholesale and retail distribution of petroleum products, and manufacturing and distribution of energy-related equipment such as LPG cylinders and electricity meters. These investments include a significant share of financing by local entrepreneurs, and the scope remains for additional funding by the foreign partners who provide the technology. If the quality and extraction cost of the coal deposits at Barapukuria and elsewhere in the Northwest prove to be attractive, this development would be a logical choice for inviting a major international concern to invest and to transfer mining technology. General interest in the energy sector is strong among Bangladeshi investors, and the business community is likely

to come forward if strong encouragement by the Government to do so becomes evident.

Government Policies Towards the Private Sector

1.4 The energy policies of the Government affirm the dominant role of the large public-sector agencies which together maintain an effective monopoly over most operations in the sector. Under the supervision of the Ministry of Energy and Mineral Resources, four main public-sector agencies are responsible for the production and supply of commercial energy. The prerogative for the public sector is firmly established, and the power subsector has been exclusively reserved in the past as public sector domain in all the relevant industrial policies and sector-specific regulations. Although the oil and gas subsectors are no longer reserved for the public sector, key regulations on petroleum operations emphasize the dominant role of the public sector entities. In the case of natural gas, BOGMC maintains an effective monopoly over all operations right to the final distribution of gas to actual consumers. The Government also maintains a wholesale monopoly in crude petroleum and petroleum products through BPC. While the primacy of the public sector in energy supply is a clear Government priority, current regulations and ordinances include provisions for the entry and participation of private investors in hydrocarbon operations.

1.5 Current regulations therefore permit private entrepreneurs to invest in all areas of energy except the power subsector, although full Government control remains unabated and no significant private investments in the sector have yet occurred. The application of the existing regulations often appears arbitrary and ambiguous, and private investment in the sector is constrained by the uncertainty facing potential investors. The strong control exerted by the Government agencies deters potential investors, as do the long delays in the approval of proposals for private investment. Several recent instances of erratic treatment of private investment opportunities confirm these perceptions: the formulation, review and approval of the petroleum exploration model contract and promoting campaign took an inordinately long time; the negotiations of the public/private joint venture for LPG bottling and distribution faced numerous delays; and the discussions between a private company and Government authorities on CNG development were stalled for lack of a clear public sector negotiating position that could have responded to the demands for incentives. The scale of activity permissible for the private sector sometimes appears to be too small to be profitable for domestic and foreign investors: Shell Bangladesh retreated from an involvement in LPG distribution because of the small scale of the operation and the uncertainty of supply. The business community awaits a clear statement of policy that private investment is welcome in the energy sector, and that the practice will match the policy.

Industrial Policy

1.6 Prior to 1982, policies and regulations guiding industrial activity emphasized the expansion and development of the public sector, and established the monopoly of public agencies in the various industrial subsectors. The power and hydrocarbon subsectors were among the eighteen industrial categories which were included in the reserve list for the

public sector. Private involvement was limited to licenses and patents, and private investment activity was effectively curtailed. Industrial policies enacted since 1982 have departed from the earlier emphasis on the public sector and have sought to develop an investment climate which encourages greater private participation in the economy. The general opening up of the industrial sectors and the relaxation of Government controls over industrial activity provides an interesting precedent for further development of new prospects and proposals for increased private involvement in the energy sector. In recent years, significant privatizations and deregulation in industry have generated a strong private investment activity. A further step was taken in 1988/89 by the establishment of the Board of Investments (BOI), which is designed to be a promotional and facilitating agency for investment ventures with private ownership majority.

Energy Investment Needs

1.7 The Government has increased the share of public expenditures allocated to energy and natural resources substantially during the 1980s, despite the general climate of fiscal restraint. Under the FY89 Budget Allocation, the sector's share of total public expenditures was estimated at 9.3%. Energy and natural resources' share of total public expenditures in the Indicative FY95 Budget Allocation ranges from 9.3% (High Growth Case) to 11.0% (Low Growth Case). In nominal terms, growth of investments in the energy sector increased by 14% per annum for the period FY81-89, and by 3.4% per annum in real terms. During the Second Five Year Plan (SFYP), annual average growth targeted for power was 19.4%, and for oil, gas and minerals a higher 22.6%. However, the record indicates an actual growth of 7.9% per annum for power and 1.16% for oil, gas and minerals over the SFYP period. The ambitious program of a rapid expansion of energy investments through the public sector, therefore, did not materialize.

1.8 Both in nominal and real terms, the power subsector has remained dominant in energy. The Second Five-Year Plan indicated that the oil, gas and minerals subsector's share of total sectoral investment was to increase to 45%. While the subsector's share did go up from 26% in 1981 to 39.5% in 1983, it subsequently fell to 18% in 1986 and stayed around this level in the following years. The Priority Investment Programme indicates no change in emphasis among subsectors (Annex 1.1):

SHARES OF INVESTMENT ACCORDING TO THE PIP 1989-91

	<u>Power</u>	<u>Oil, Gas & Minerals</u>
1989	78%	21.0%
1990	81%	18.7%
1991	79.5%	20.5%

1.9 Future energy sector investment plans, amounting to some TK 40 billion (US\$1.2 billion) for the three years 1988/89-1990/91, are limited to priority projects. Two thirds of the PIP is to be financed from foreign loans and the remaining third through budget allocations and internal cash generation. Similarly, preliminary BPDB estimates for the Fourth Plan include a foreign exchange component of 55-60%. The Government has

enhanced its revenue generation capacity during the late 1980s, increasing the tariff level for BPDB by 5% per annum in real terms, and the average price of natural gas by 20% per annum. Further increases are anticipated. However, the difficulty of mobilizing Taka funds for energy investment remains, and is reflected in the restraint of the priority program 1989-91, which represents a reduction of the original expectations of the ongoing plan. Additional mobilization of local funds will have to come primarily from enhanced cost recovery, but can be complemented by the tapping of private domestic finance.

Obstacles to Private Participation

1.10 Private investment in energy will, however, continue to be limited by certain constraints specific to the sector. The energy sector is generally perceived to be of strategic importance, and thus subject to strong government control. Unlike manufacturing and commercial activities, energy-sector investments are typically capital-intensive and long-term, and require high capital outlays. Moreover, the deregulation carried out in the industrial sector has yet to take place in energy. For some time to come, private investment in the sector is likely to be closely linked to the program and operations of the public sector, and subject to tight Government regulation.

1.11 Major private involvement in the power subsector in the future would require significant legislative changes. Similarly, primacy of public-sector agencies in the oil and gas subsector is also firmly established, although key regulations contain provisions which could form the basis for an expanded role for the private sector. However, the application of these regulations is not yet transparent enough to encourage private investment. Energy pricing policies are subject to tight Government control, and individual companies remain vulnerable to shifts in the relative prices for their products. The large capital needs for undertaking energy-sector investments, combined with the limited domestic pool of long-term capital, also serve to limit private investment in the sector. Finally, the relative strength and response of the labor unions is likely to affect the nature and degree of private participation in the energy sector operations, and may limit it to ventures in newly emerging subsectors where public-sector interest is not yet firmly established.

II - REGULATORY AND FINANCIAL ENVIRONMENT

2.1 Except for the power subsector, the present framework of laws and regulations affecting investment in Bangladesh does not preclude participation by private entrepreneurs in the energy sector. However, where potential does exist for private involvement, particularly in the oil and gas subsectors, an investor would normally need to enter into a contractual relationship with a government sector corporation. In addition, the investment proposal would be vetted by the Ministry of Energy and Mineral Resources (MEMR) and require its de facto approval prior to any contract being signed. Thus, the ease and speed of the investment sanctioning process in the energy sector depends both on the readiness of the investor's proposal and the time taken by sector corporation and government energy officials in making decisions. By comparison, investors in other areas of industrial activity may expect relatively more assistance and a truncated decision making process from the "one stop" streamlined approach of GOB's newly created Board of Investments (BOI). The Government's stated policy objective in creating the BOI is to facilitate and promote new investments in Bangladesh. However, since the BOI only commenced its operations in early 1989, it is too soon to judge whether the apparent improvements in the sanctioning process will be extended to energy authorities as well.

2.2 The capacity of Bangladesh financial markets is considered adequate to support attractive energy investments costing up to about US\$15-20 million equivalent. This implies that less complex downstream activities, such as CNG and LPG bottling and distribution, could be undertaken entirely by local entrepreneurs. However, the higher-cost upstream capital intensive investments in power, oil and gas, requiring foreign expertise and technology in any case, would be dependent upon foreign private funds.

Inventory of Existing Relevant Laws and Regulations

2.3 Since its beginning in 1972, the Government of Bangladesh has promulgated a number of policies, regulations, acts, ordinances and guidelines which have shaped the regulatory environment for capital investment in the economy as a whole and the energy sector in particular. Private sector investment in the energy sector is broadly influenced by the various regulations affecting general industrial activity and more specifically by several enactments which describe the role of Government, vis-a-vis the private sector, in meeting the country's energy needs.

2.4 The most important Government documents on industrial policy are: the Nationalization Order (1972) Industrial Investment Policy (1974 & 1975), Foreign Investment Act (1980), New Industrial Policy (1982), Industrial Policy (1986) and the Board of Investment Act (1988). In addition, there are a number of documents through which the Government has retained almost exclusive control over most activities in the energy sector. Annex 2.1 provides an annotated listing of these regulations. Current regulations permit private entrepreneurs to invest in all areas of the energy sector except the power subsector.

2.5 In the power subsector, the Bangladesh Power Development Board (BPDB) and the Rural Electrification Board (REB) retain responsibility for the generation, transmission and distribution of electricity throughout the country via three principal documents: the Electricity Supply Act 1910, the Bangladesh Water and Power Development Board Order of 1972 (establishing BPDB as successor of EPWAPDA), and the Rural Electrification Board Ordinance of 1977. Private sector participation in the power subsector has been limited to investments in relatively small standby and captive generation plants.

2.6 In the petroleum subsector, the Petroleum Act of 1974 and Bangladesh Petroleum Corporation Ordinance of 1976 provide for complete Government control over all major activities including exploration, development, production, processing, refining, and marketing of petroleum. However, the downstream transportation and retailing activities are almost fully private, and are carried out by a large number of small dealers and agents. Although the regulations permit the principal sector corporations, i.e., Bangladesh Oil, Gas and Minerals Corporation (BOGMC) and Bangladesh Petroleum Corporation (BPC), to enter into contracts with foreign or local private sector companies for the discharge of any of their functions, there remains strong government control over such activities. The Board members of both corporations are selected by the Government and most are concurrently ministers or high ranking officials in government service.

Evolution of Investment Regulations

2.7 The first Government of Bangladesh (GOB) laid major emphasis on the expansion and development of the public sector rather than the private sector. Many industries and companies were nationalized shortly after independence when the Nationalization Order was passed in 1972. The power subsector as well as the mineral, gas and oil subsectors were among the eighteen industrial categories included in the reserve list as being fully within the domain of the public sector. The Nationalization Order established the BOGMC along with nine other sector corporations to oversee and manage the various nationalized enterprises within each industrial subsector. Collaboration with the private sector was initially limited to licenses and patents without equity participation and, in effect, investment activity was severely curtailed. A short time later, under the New Investment policy of 1974, foreign investment became possible through joint ventures with GOB's sector corporations, provided that the latter held at least 50% of the equity shares. GOB increased the ceiling on private sector investment from Taka 3.5 million to Taka 30 million in 1974 and subsequently to Taka 100 million in 1975. Although in 1975 there was some further easing of restrictions on private sector investment and re-establishment of the Investment Corporation of Bangladesh (ICB) and start up of the Dhaka Stock Exchange, firm government control over investments in the energy sector, per se, did not change.

2.8 The New Industrial Policy (NIP) of 1982 represented a major turning point in the country's evolution of a policy environment conducive to greater private sector participation in the economy. The objective was to achieve greater industrialization by stimulating more participation by private sector investors particularly in manufacturing and limiting the role of the public sector to heavy and strategic industries. Many public

sector enterprises were denationalized, foreign investment was encouraged, sanctioning procedures were streamlined and a Foreign Investment Cell was established to provide information and services to investors.^{1/} The list of industrial categories restricted for public sector investment was reduced from 18 to 6 categories but continued to include the power subsector as within the exclusive domain of Government. Although private sector investment in oil and gas was permitted, the need for obtaining clearances from BOGMC and BPC meant that full government control was unabated and no significant private investments in the sector occurred. In general, the efforts to streamline procedures and facilitate investment were unsuccessful. The approval process remained uncertain and the decision making process was protracted.

2.9 The Industrial Policy of 1986 reinforced the trend of greater openness to the private sector. Further measures to streamline licensing and sanctioning procedures were introduced and some public sector enterprises were converted to public limited companies with up to 49% of their shares being available to the private sector. To date, the shares of 14 state owned enterprises have been offered for public subscription and it is expected that the shares of 9 more enterprises will be offered this year. The response has been tremendous as these offers have been over subscribed by about four times. Annex 2.3 provides details of the number of shares issued and amounts subscribed for 12 public companies as of January 1989.

New Board of Investment

2.10 In its latest effort to simplify the sanctioning procedure for new investments and stimulate greater private sector participation in the economy, GOB created the Board of Investments (BOI) which commenced operations on January 1, 1989. Prior to the inception of BOI, private sector investors faced a cumbersome and unclear sanctioning procedure involving several layers of government departments. All foreign investment proposals, irrespective of investment size, and all local investment proposals having a capital cost above Tk. 300 million had to be cleared by the Discussion Committee headed by the Minister of Industries and then put before the Standing Committee of the National Committee for Industrial Development headed by the President for final approval. Local investment proposals below Tk. 300 million, requiring permission, also had to be approved by the Investment Board headed by the Minister of Industries. With the creation of the new BOI in 1989, ten government departments, agencies, committees and boards, having a role to play in the above sanctioning procedure, were abolished. A listing of these is contained in Annex 2.4.

2.11 In establishing the new BOI, the Government's intention is to facilitate speedy processing of new investment proposals and for BOI to

^{1/} Pursuant to the privatization policy of the Government, 563 industrial units, having a total investment value of Tk 2.0 billion (US\$63 million), were privatized up to March 31, 1989. Annex 2.2 gives a summary listing by sector.

provide assistance to investors as a "one-stop" promotional agency rather than to act as a screening body preoccupied with regulatory aspects. However, various clauses of the Investment Board Ordinance, 1988 under which BOI was created, are vague and appear to give somewhat excessive powers and functions to the Board. The Government has acknowledged that BOI's scope is very broad and that there is an appearance of greater Government involvement in some areas (e.g. compulsory registration of small investments) but is confident that the overall effect will be to greatly minimize complications for investors. Further, GOB has indicated that the vagueness would be abrogated with the publication of implementation rules for BOI. A copy of the Investment Board ordinance is contained in Annex 2.5. It describes the functions of the Board and gives the composition of the 15 Board members and 7 member Executive Council.

2.12 Details of BOI's sanctioning procedures for capital investments are summarized below.

- (i) All private sector industries, both foreign and domestic, will be required to register, except those in the Export Processing Zones Authority (EPZA), Bangladesh Small and Cottage Industries Corporation (BSCIC) and textile industries set up by their own finance. Industries so registered shall be deemed as approved by the Board. This appears contrary to previous steps taken to liberalize investment sanctioning procedures. (For example, under earlier reforms, most local investments up to Tk. 300 million required no special approval.) However, in discussion, GOB indicated that the registration procedure would be automatic and only for record keeping purposes in order to establish an information base for the benefit of the investment community; in addition, there would be no limit on the size of local investments permitted.
- (ii) BOI approval of an investment having foreign participation is not required if (i) the total project cost does not exceed Tk 100 million (approximately US\$3.3 million; (ii) the foreign equity does not exceed 49%; and (iii) the proposed industry does not fall within the purview of the discouraged list of investments.
- (iii) Local investments over Tk 300 million and foreign and joint venture projects not falling under the conditions noted in (b) above require approval of the Board, headed by the President. Up to 100% foreign equity may be permitted.

2.13 According to BOI, its approval of a project also includes assurance of all facilities required by the investor to implement the project. At the time of approval BOI gives a time limit to the agencies concerned with: (i) electricity, gas and water supply; (ii) sewerage connection; (iii) all kinds of telecommunications; (iv) customs clearance

for imported machinery, spares and raw materials; (v) clearance regarding environmental pollution; and (vi) all other services and facilities required for speedy setting up of an industrial undertaking.

2.14 While it is too early to judge the effectiveness of BOI in streamlining sanctioning procedures, shortening the processing time, obtaining services from other agencies and stimulating investment activity, the initial signs are encouraging. It remains to be seen whether BOI will have the intended influence on other Government departments and agencies to facilitate importations through customs and provision of services such as electricity, water and telecommunications, etc., but clearly the approach is an important step in the right direction. The creation of the BOI represents mainly a procedural streamlining rather than the introduction of substantive new incentives.^{2/} The challenge for BOI will be to instill a spirit of cooperation with the private sector that will make this reform work.

2.15 It is important to note that for potential private investors in the energy sector the impact of the BOI will be less meaningful than in other sectors such as manufacturing. Because most aspects of the energy sector fall under the jurisdiction of the Ministry of Energy and Mineral Resources and its sector corporations such as BPDB, REB, BOGMC, and BPC, private entrepreneurs would usually need to enter into commercial arrangements with these entities in order to conduct business. Therefore the speed and ease of the sanctioning process would continue to depend mostly upon the speed and adroitness of energy sector authorities in making decisions. Instead of confining itself to broad policy issues, GOB has been substantially involved in the day-to-day functioning of these entities in such matters as budget proposals, consultant selection, award of contracts, etc. This is expected to continue in the near to medium term, and will constitute an additional hurdle for potential investors.

Taxation

2.16 Equity investment is generally attractive, as dividends are free of individual income tax. The corporate income tax is a substantial 50% for private companies, but an export-oriented venture can claim a significant rebate. This consideration is relevant for energy sector investments with export potential such as petroleum development, coal production, or gas-based petrochemicals. An issue of concern for private investors is the level of sales tax and customs duty for purchased and imported equipment. For industrially advanced regions of the country, this cost element amounts to 20% of equipment value, supplemented by a 6% development surcharge and a 3% import license fee. This substantial front-end payment can be mitigated by paying part in "customs debentures" (i.e. delaying payment by 7-10 years), but could form a negotiating issue for large projects.

^{2/} Information on the facilities for repatriation of funds to foreign investors, and fiscal and other incentives are described in BOI's promotional pamphlet attached as Annex 2.6.

2.17 A perception of economic instability among private investors in the past has led to an accumulation of large private funds. Current Government policy attempts to encourage the emergence of these funds by offering a tax rate of only 10% if they are declared and invested in industry directly. The response has not been enthusiastic, as the low tax rate does not apply to investments in shares and debentures. The business community estimates that more of these funds would be forthcoming if their application would be allowed across a broader spectrum of investments.

Arbitration and Labor Issues

2.18 The disputes between investment banks and corporate debtors in recent years, concerning the build-up of large arrears in debt servicing, illustrate the effects of a lack of an efficient arbitration mechanism. Disputes about accounting methodology and the definition of cumulative arrears have prevented a settlement of the issue and damaged the confidence of potential investors. An agreement on clear accounting principles, introduction of financial discipline, and the establishment of an agreed arbitration/settlement procedure are prerequisites for rebuilding investor confidence.

2.19 In the public sector, the labor movement has a traditionally strong base. Labor unions with individual political party affiliations show a strong concern about the maintenance of public ownership of key economic sectors, and play a significant role in influencing economic decision-making in this respect. In the energy sector, the most substantial labor influence exists in the Power Development Board, while the more recently created REB has no significant labor involvement. The progressive centralization and political affiliation of the labor movement has strengthened its influence in the traditional sectors, while smaller new ventures at the margins have not experienced pressure from organized labor. The central interest of the labor movement appears to be the prevention of a transfer from the public to the private sector, thus possibly endangering secure employment. This is significant for the energy sector, where it can be expected that the partial privatization of important subsectors (such as power) in the form of sales of public assets will encounter much more resistance than the opening of new subsectors (such as LPG or CNG) to private investment. However, divestment in the industrial sector has been successful in spite of initial labor resistance.

Capacity of Financial Markets

2.20 There is a domestic pool of investable capital in Bangladesh which is available to support private sector initiatives in the energy sector. However, a perception exists among financial executives in the country that only about US\$10 - US\$20 million (Taka equivalent) per annum in equity and loan funds could be raised locally in support of promising ventures. This would imply that the smaller downstream activities such as LPG and CNG bottling and distribution could be undertaken exclusively by local entrepreneurs but that the larger undertakings in the coal, oil, gas and power subsectors which would generally cost above US\$50 million, in any case, would be mostly dependent upon foreign parties with access to external resources.

2.21 Private investors have clear perceptions and preferences about the necessary conditions that would have to accompany an investment in the energy sector. These include (i) a return on investment of at least 20%, to provide a premium over fixed-term deposits; (ii) a potent foreign sponsor or partner to lend legitimacy; (iii) a solid technical and commercial venture with good market prospects; (iv) technology support to compensate for local investors' lack of experience in capital-intensive sectors; and (v) a clear Government policy to support private investment in energy.

2.22 The commercial banking system dominates Bangladesh's financial sector. Its four nationalized commercial banks (NCBs), eight domestic private banks and seven foreign banks have about 4100 branches and total deposits amounting to about 88% of broad money. Many of these banks, particularly the NCBs are facing serious problems and the sector is in urgent need of major reform. The NCBs have lost much of their capital through massive non repayment and defaults badly affecting their loan portfolio.

2.23 Eight Bangladesh financial institutions play a significant role in industrial term lending: Bangladesh Shilpa Bank (BSB), Bangladesh Shilpa Rin Sangstha (BSRS), Investment Promotion and Development Corporation of Bangladesh (IPDC), Investment Corporation of Bangladesh (ICB), Bangladesh Krishi Bank (BKB) and the three largest NCBs. In addition, the private banks also do some term-lending. The traditional development banks, BSB and BSRS, are suffering debilitating debt recovery problems and because of poor performance, donors have stopped providing foreign currency resources to them. Also, they have not been successful in raising long-term local currency resources. IPDC's operations are relatively small, BKB lends to agro-industry and ICB assists in raising equity for development bank projects through public offerings. These eight institutions disbursed about Tk 3.9 billion (i.e. about US\$118 million equivalent) or 28% of total public and private investment in industry for about 2,330 projects during 1984-86, but have experienced much slower growth in recent years.

2.24 The development of capital markets in Bangladesh has lagged behind development in the banking sector. While the number of institutions is adequate, institutional capabilities and the regulatory framework are generally weak. For the foreseeable future, the burden of investment financing will continue to be with the commercial banks and DFIs. The equity market has been growing quickly but total capitalization on the Dhaka Stock Exchange (DSE) was only about US\$450 million in 1988.

2.25 The institutional regulatory framework for the equity markets consists of the Controller of Capital Issues (CCI) which is the main body regulating the issuance and trading of securities and the Registrar of Joint Stock Companies, which is charged with the registration of companies. Enforcement of laws and regulations is weak mostly because of inadequate staff and low salaries.

2.26 The Dhaka Stock Exchange is one of the primary sources of equity capital. Although it is presently small, the DSE has been growing rapidly and, since 1984, new issues have been substantially oversubscribed indicating growing investor interest in stocks and suggesting that

additional funds would be available for investment in stocks if there were an adequate supply of sound issues. Annex 2.7 provides summary information for the past four years of DSE's available data on the growth pattern of listed issues, turnover of shares and debentures and public issues of listed securities. ICB has concentrated on providing underwriting/bridge finance to assist in raising equity for BSB and BSRS financed industrial projects and has organized a consortium for that purpose. ICB has not been able to achieve its potential and underwent a decline in the activities in the 1980s. It has experienced difficulty in taking companies it has financed to the public because of the non-availability of timely, reliable, audited financial statements, poor performance, and widespread default in their loans. 3/

2.27 As previously noted, larger private energy sector investments would require significant mobilization of resources by foreign partners. Yet, there are only about 78 enterprises with foreign investment operating in Bangladesh and the average direct investment capital inflow in the 1980s has been less than US\$4 million per year. The reasons for such low foreign investment include past Government restrictions, pervasive state enterprises and inadequate legal and investment protection safeguards. Although the Government has undertaken various domestic measures and entered into various international agreements there is still a perception of a significant gap between investment protection policy and actual investment protection.

2.28 In order for outside investors to contemplate an energy sector investment which may cost more than US\$50 million it is clear that the Government would need to demonstrate a strong commitment and support for the project. The Ministry of Energy and Mineral Resources and its concerned agencies would need to join BOI in working closely with the foreign investor so that satisfactory contractual commitments (probably in a joint venture set-up) would be established.

3/ The shortcomings of DSE, ICB, commercial banks and DFIs as well as other areas of Bangladesh's financial sector are presently being addressed through the development of a Program for Financial Sector Reform being jointly developed with IDA. An IDA green cover sector report was issued in December 1987 and approval of a Financial Sector Credit is planned for FY91.

Pricing Policy

2.29 In recent years, energy prices in all major subsectors have been increasing substantially. Petroleum product prices rose dramatically in the early 1980s, and stayed at high levels since then ^{4/}. Well and retail prices of natural gas have been rising at about 20% per year to reach an average of about Tk 41 (US\$ 1.24)/MCF in 1989. Finally, electricity tariffs have been increased at an annual rate of about 14-15% during the 1980s, and the average revenue of BPDB amounts to about Tk 2 (US\$ 0.06)/kWh. This development is the result of a conscious policy on the part of the Government to reduce the distortions which have plagued the energy sector in the past. Overall, the current average price levels represent an attractive basis for private investment, being much closer than before to a rational system that allows longer-term commercial planning (Annex 2.8).

2.30 A comparison of nominal prices with economic ones is generally favorable (Annex 2.9). Domestic retail prices of petroleum products are well above their CIF equivalents, contributing to revenue generation and presenting an opportunity for competing fuels. In late 1988, retail prices of diesel and kerosene were about 60-80% above CIF levels, and gasoline prices were about three times the CIF equivalent. Even at the somewhat higher international price levels of 1989, the retail prices retained a margin above CIF values. The domestic retail price of LPG cylinders lies within the possible range of economic prices. Natural gas prices are above long-run marginal cost, but the prices for some consumer categories (power and fertilizer, small industry, and residential) do not cover both LRMC and a depletion premium. Forthcoming gas price increases will make all prices except those for residential consumers equal to an economic cost consisting of long-run marginal cost (LRMC) and depletion cost. In the power sector, tariff rates for industrial and commercial consumers exceed LRMC, while those for residential consumers and cooperatives fall short of recovering economic cost. On average, power tariffs reach about 70% of LRMC.

2.31 While average price levels of the main energy sources are above or close to economic levels, relative prices of competing products show significant distortions (Annex 2.10). Until late 1989, the most significant in 1989 were (i) the large price differential between gasoline and diesel, and between the price of gasoline and the cost of potential alternative motor fuels; this differential has since been drastically reduced; (ii) the large price difference between natural gas and fuel oil/diesel as process fuels; and (iii) the low cost of natural gas for household use compared to kerosene, LPG, and fuelwood. However, the Government has recently reviewed with IDA the impact of present prices and other charges associated with petroleum products on petroleum product consumption patterns, choice of end-use technologies and the Government's resource mobilization efforts. There was no evidence that the present price structure was causing significant distortions to resource allocation.

^{4/} In December 1989, the Government reduced the price of gasoline by about 42%, in order to mop up the country's surplus of this fuel. The retail price remains above international price levels.

Thus, although the price of gasoline was about twice that of diesel fuel, the high tax on diesel engines acted to prevent an unjustified emphasis on diesel-fuelled motor vehicles. In the case of the gap between prices of process heat fuels, fuel oil is about twice as expensive for industrial consumers as natural gas, yielding a substantial rent for the user. Finally, the residential demand for cooking fuel is influenced by the significant cost advantage offered by natural gas, where households are connected to the piped supply system. In areas where piped gas supply is not available, LPG and kerosene use is considerably cheaper than commercially purchased fuelwood.

2.32 Looked at from the point of view of the private investor, these distortions present both opportunities and deterrents for investment. For example, the high relative price of gasoline acted as an incentive for proposals to establish CNG filling stations for vehicles, particularly as the natural gas for this purpose can be obtained at a low price. Another incentive created by the low gas price is the possibility to produce petrochemicals competitively, generate process heat for energy-price-sensitive production, or generate power for own consumption or for the grid. On the other hand, potential LPG distributors face stiff competition from kerosene sold at an attractive relative price to households: the costs of penetrating the market, building up a stock of cylinders and LPG-using equipment, and of transport and distribution infrastructure could lift the perceived cost to the consumer beyond that of continuing use of kerosene, if the cost of producing and distributing LPG can not be kept low.

2.33 Although regulations and ordinances provide a number of different procedures for price determination, energy prices are set de facto by Government decision. For high-profile prices such as electricity tariffs, and petroleum product prices, formal or informal Cabinet approval is sought before a change. The high absolute prices of petroleum products, and the low relative price of natural gas reflect deliberate Government policies and priorities. Policy favors gas-based fuels compared to imported liquid fuels and scarce traditional fuels. The effect of this policy is to (i) promote the use of indigenous gas at the expense of imported fuels, and (ii) draw private investors into selected areas of the sector, as the profitability of investments that exploit the margin becomes apparent. Such investments, based on low-cost gas, could eventually cover CNG stations along gas pipelines, local piped gas distribution, petrochemicals production, power generation, etc. Thus, the existing relative price differentials are opportunities for private investment in the sector. The risk of investing in these market niches, of course, would rest with the private investors who would base their decisions on their forecasts of continuing or disappearing price differentials. A beneficial effect of strong investment in this window of the sector would be a gradual increase of the pressure to reduce the price differentials, as demand for low-cost gas increases and that for high-cost fuels weakens. A reduction of price differentials achieved in this manner over time may be more stable in the long run than one established by fiat, as market forces would gradually replace the system of administered prices.

Regulatory Priorities

2.34 The above review of the regulatory environment and pricing policies indicates that the reforms and changes of recent years are creating an increasingly favorable basis for private investment in the energy sector. The expansion of the area open to private investors, the creation of the BOI and the increase in equity issues, are steps in the direction of a greater involvement of potential private investors. The next steps will need to be:

- (i) Clear signals from the Government that proposals from private investors to participate in energy sector ventures will be dealt with expeditiously and in the spirit of the BOI concept, with energy sector officials contributing actively to the encouragement and to a smooth approvals process;
- (ii) An expansion of the Industrial Policy to include the power sector in the set of sectors open to private investment;
- (iii) Close cooperation between MEMR, BOI and public enterprises in the sector to facilitate joint venture and offtake negotiations, and to ensure that necessary agreements are obtained in time;
- (iv) A strengthening of the Dhaka Stock Exchange and financing and underwriting institutions, to enable the local mobilization of the substantial funds required to participate in energy sector ventures;
- (v) An active campaign to inform and attract major foreign investor groups, in order to secure the large private investments which cannot be mobilized domestically, patterned on the petroleum exploration promotion effort; and
- (vi) A move to more transparent, market-determined pricing systems, as more private investors enter the energy sector, to replace the administrative price-setting and to avoid an inconsistent accumulation of separate price agreements with numerous private partners. Automatic adjustment formulae monitored by independent regulatory bodies eventually will have to be introduced.

III. POTENTIAL PRIVATE INVESTMENTS

3.1 Against the backdrop of an improving investment atmosphere, a number of serious private investment proposals have been floated, some of which have already proceeded to an advanced stage. The following paragraphs examine the most promising of these proposed ventures in detail, and provide an outlook for other possibilities not yet put forward in a formal manner. The major proposals dealt with here are (i) petroleum exploration, (ii) LPG separation and distribution, (iii) CNG compression and retailing, (iv) coal development, and (v) power generation and distribution. Given the current institutional and regulatory structure of the energy sector, it is apparent that the main opportunities for private investment in the medium term lie in new types of activities, which add products or bring in new resources or skills, and an expansion of supply which would improve efficiency or relieve financial constraints. This kind of innovative investment can "write its own rules" as it develops, while the penetration of established markets served by the public sector requires delicate adjustments in the rules of the game, achievable only with a high degree of consensus among all interested parties. Attractive opportunities, therefore, already exist for the private sector in petroleum exploration, LPG and coal. Private participation in power supply is an area where the seeking of a strategy is beginning, and private investors may find a niche as soon as a policy decision is made, and the ground rules are clear

Petroleum Exploration

3.2 Background. Bangladesh, being a sedimentary basin, has a high potential for hydrocarbon development, which has been recognized early. Exploration activity until 1980 had resulted in the discovery of eight gas fields with a total proved and probable reserve of at least 10 TCF. While it is likely that continuing exploration will increase the known gas reserves, the projections for discovery of oil are more risky. Based on experience so far (a modest oil discovery was made in Sylhet recently), there is some likelihood of finding small oil fields in the range of 10 to 100 million barrels. Given the current volatility of the crude oil price, the chance of a field at the lower end of the reserve range to be financially viable is relatively small, while larger fields would yield attractive returns even with crude prices at US\$15 per barrel. However, the risk of oil exploration is balanced against the fact that a likely gas find during the exploration phase would provide adequate returns, even if none of the gas were exported (Annex 3.1). Although international oil companies place priority on crude discovery for export, this mitigating fact may provide an incentive to take the relatively high oil exploration risk.

3.3 Before 1989, the framework governing petroleum exploration in Bangladesh consisted first of the Mines, Oil Fields, and Mineral Development Act 1948, and the Oil and Gas Development Corporation Act, 1961. In 1974, this early concession-based system was replaced by the Petroleum Act, providing guidelines for petroleum agreements between

Government and private parties. Such production-sharing agreements were concluded with several oil companies in 1974, and with Bangladesh Shell Petroleum, an affiliate of Royal Dutch Shell, in 1981. The early production-sharing contracts were patterned after the standard Indonesian contract format, adding sliding-scale cost recovery and profit oil production-sharing formulae. The main features of the contracts were:

- (i) a term of 4 years for exploration, appraisal and development, followed by 15 years of commercial production;
- (ii) a gradual relinquishing of the contract area over 8 years to the field plus 1000 square miles;
- (iii) provision of all finance and technical expertise by the contractor;
- (iv) percentage of oil produced applicable towards cost recovery decreasing from 30% to 20%;
- (v) profit oil share of the contractor decreasing from 24% to 10% with increased production;
- (vi) crude oil prices valued at FOB price;
- (vii) contractor subject to income tax only, assumed to be paid in terms of Petrobangla's profit oil share.

3.4 The main new feature of the 1981 Shell contract was a more sophisticated gas clause, stipulating more specific obligations and time periods in the case of a significant gas discovery. The early exploration efforts of Shell in the Chittagong Hill Tracts concession area were unsuccessful, and had to be abandoned because of local unrest. Shell's exploration activity shifted to the Northwest where no significant developments occurred. Faced with stagnating exploration activity in the mid-1980s, the Government began to develop a petroleum exploration promotion campaign with Bank assistance. The heart of this effort was the preparation of promotion documents and the drafting of a new standard production sharing contract. While the drafting and review was in progress, the Government concluded a new exploration contract for the Sylhet area with Scimitar Exploration Ltd. in 1987. This contract is similar to the earlier ones, providing for a 25-year term and excluding existing BOGMC areas of operations within the contract area. The sliding scale for cost recovery is somewhat more favorable for the contractor, and the production-sharing provisions are tailored to a small field, the contractor's share declining to 10% for the production exceeding 50,000 barrels per day. Scimitar was expected to start drilling in March 1989, and is likely to incur expenditures of about US\$20 million for 3 wells in the first 2 years. In February, 1989, the new Model Production-Sharing Contract was approved by Cabinet.

3.5 The New Contract. As its predecessors, the new model contract is a production-sharing one, but places more emphasis on early drilling activity.

- (i) The initial exploration period is shortened to 3 years, while the total contract term continues to cover 25 years for oil fields, and provides 30 years for gas fields.
- (ii) The relinquishing of contract area is accelerated to seven years, but the drilling of a minimum aggregate well depth in the first three years relaxes the provisions.
- (iii) The minimum exploration work obligations in the early years are spelled out in detail, including an obligation to drill.
- (iv) The scales for cost recovery and production sharing are to be bid and negotiated.
- (v) The natural gas clause provides for the possibility of export, and for BOGMC's taking over gas discoveries in the Western Zone for purposes of supplying local demand.
- (vi) A pipeline agreement on a build/operate/transfer basis can be entered into by the contractor and the Government.
- (vii) The contractor is subject to income taxes and taxes on goods and services provided by public sector companies.
- (viii) There is an administration fee of \$100 per square km in addition to the usual discovery and production bonuses.

3.6 On the whole, the new model contract encourages the development of marginal fields, obliges contractors to engage in substantial early exploration activity, and may be biased towards larger companies with the necessary funds to incur high exploration expenses for high-risk ventures. Possible issues for negotiations with potential contractors could include (i) the percentages for cost recovery and production sharing, (ii) the administration fee, being a form of signature bonus, (iii) the early drilling obligation, and (iv) the Government's right to decide that a certain part of the crude is to be refined in the country. The latter provision may be easily acceptable for emergency situations, but is unlikely to be attractive for international companies as a general provision enabling BOGMC to retain crude for domestic refining according to demand. Although payment for the crude to the contractor would not be affected, long-term crude supply arrangements that he may have entered into may be disturbed.

3.7 Current Expectations. During the drafting and approvals process for the new contract in 1988/89, a number of international exploration companies expressed interest to participate in the promotion of exploration blocks. Among these groups are Unocal, Texaco, Shell, Anglo-Scandinavian, Hunt, Husky, and BHP, all of whom visited Dhaka to collect information and hold preliminary discussions. Other inquiries included Amoco, Exxon, BP, Marathon, Mobil, and several small exploration groups. Anglo-Scandinavian is already engaged in negotiations concerning blocks 8 and 11 in the Mymensingh area, but are likely to join others for the general bidding process that is scheduled to be completed by January 1990. In general, the major potential contractors appear to be comfortable with the proposed

contractual arrangements, and a good response to the promotion is expected. A total of 21 blocks are being offered, covering all of Bangladesh onshore and offshore territory with the exception of the areas currently contracted by Shell and Scimitar. Given the strong emphasis on accelerated exploration activity, the expectation is that perhaps US\$10 million of exploration expenditure will be incurred per block during the first three years. The three operational rigs currently available to BOGMC could be used in providing exploration services to contractors competitively.

3.8 Given the gas-prone nature of the area to be offered for exploration, it remains to be seen whether the terms of the model contract will prove attractive enough to compensate for the risk. In general, the terms do not appear to be significantly more liberal than those offered by countries such as Thailand, Malaysia, Pakistan, Colombia or Bolivia. A convincing geological case will have to exist in order to obtain real oil company commitment rather than only expressions of interest. Any oil fields discovered are likely to be relatively small, and may include a significant involvement of the contractor with natural gas. The gas clause of the contract provides for production-sharing, and is detailed enough to serve as a basis for negotiations. The significant element here is the concept that the private contractor may have active involvement in gas production and pipeline transport, in partnership with BOGMC. Considerable flexibility on the part of BOGMC and MEMR will be called for to ensure that such partnerships are attractive and efficient.

Liquefied Petroleum Gas (LPG)

3.9 Background. The current production and consumption of LPG in Bangladesh is negligible in comparison to the total consumption of petroleum products. Of a total annual consumption in 1987/88 of about 1.9 million tons, LPG accounts for only about 9,000 tons or 0.5% (Annex 3.1). All LPG is produced in the Chittagong refinery (currently about 10,000 to 12,000 per year), and retailed in the Chittagong area after bottling at the site. Only a small part of the production is transported in cylinders to other locations. Bulk transport of LPG does not exist. The distribution to areas other than Chittagong is dictated by regional equity considerations rather than economic ones, as demand in Chittagong could easily absorb all of the limited production. Government policy calls for (i) shifting of LPG supply to areas not served by piped natural gas, (ii) a significant expansion of LPG production from natural gas, (iii) the introduction of bulk shipping of LPG to distribution depots, and (iv) the involvement of the private sector.

3.10 Future development of natural gas consumption is the critical element in determining the possible volume of LPG recovery from the raw gas stream. Total gas consumption has been growing rapidly in recent years (18% between 1986/87 and 1987/88 alone), but is likely to be limited by the pace of development of the pipeline system and other distribution infrastructure in the medium term. The growth rate during the ongoing fiscal year 1988/89 is estimated to have slowed to an annual rate of about 7%, and progress on the planned North-South Pipeline and Brahmaputra Basin transmission and distribution system is slow. About 80% of sales are accounted for by 17 large plants in the power and fertilizer sectors: further increases in these sectors depend on investments with long

gestation periods and large funding requirements. Therefore, apart from the already producing Bakhrabad gas field, a realistic projection of LPG supply from natural gas from the eastern gas fields at Sylhet will have to be more modest than expected earlier. Pending confirmation through new sampling and analysis of the relatively lean Bangladesh gas during 1989 and 1990, current data on gas compositions suggest that the aggregate LPG potential from currently known fields is about 120,000 tons per year, with about 60,000 tons recoverable from a Kailashtila operation alone. The current production at Bakhrabad is 150 mmcf, and is expected to reach more than 200 mmcf by the mid-1990s, if current re-evaluation of reserves yields a positive result.

3.11 If a major LPG recovery option at the gas fields (e.g. at Kailashtila or Bakhrabad) is implemented, the total availability of LPG for shipment, bottling and distribution in the mid-1990s would be about 70 to 80 thousand tons per year (including production from the refinery). Without a major new separation plant, total availability from the Chittagong refinery after upgrading will be about 18,000 tons per year, of which a decreasing amount will be used in Chittagong itself (due to replacement by piped gas). Consequently, about 10,000 tons could be made available for distribution in the Western zone. The demand for this fuel would come mainly from households, to replace kerosene and woodfuels for cooking, and from the transport sector, to replace gasoline. Pricing of both LPG and alternative fuels will play a major part in this substitution process. In the household and commercial sectors, a clear incentive exists for users of commercially purchased fuelwood, which, on an energy-delivered basis, is substantially more expensive than all alternatives. No incentive for substitution exists among users of piped natural gas and of agricultural residue: natural gas has a clear price advantage, and collected fuels are perceived by rural consumers as low-cost. The critical replacement, particularly at the early stage of market penetration in urban areas, is that of kerosene, a current market of some 500,000 tons per year (Annex 2.10). The current financial cost to the consumer per unit of energy delivered by LPG is somewhat below that of kerosene, but little incentive would exist to switch unless this gap increases to cover the initial investment in equipment. As the current LPG price of about Tk 120/cylinder appears to be below the lower bound of profitability for private investors (see below), LPG promotion will have to involve a low ex-plant price of bulk LPG to the distributor. The transport sector is barred from using LPG, but leaks into this market occur even at the small volumes sold now, because of the (until recently) substantial price differential between LPG and gasoline. Although the substitution is attractive for gasoline users, it would increase the existing gasoline surplus, brought about by the artificial differential between diesel and gasoline. A closing of the gap between gasoline and diesel prices may expand the gasoline market substantially from the present 77,000 tons per year by taking over some of the 800,000-ton diesel market. This would leave room for alternatives such as LPG and CNG, if they can be priced competitively.

3.12 Bottling and Distribution. At present, LPG production and bottling are the responsibility of BPC's subsidiaries, while the retail distribution is performed by private retailers. In addition to the local distributors, Bangladesh Oxygen Ltd. (BOL) delivers about 200 tons per year to commercial consumers in Dhaka and Khulna. BOL, a local company owned

60% by British Oxygen, buys directly from the refinery and distributes with own transport, the cost of which is borne by the distribution of their other products. Based on an ex-refinery price of Tk 3,960/t (Tk 49.50/cylinder), BOL sells to its consumers at Tk 11.11/kg (Tk 139/cylinder). All distribution from the Chittagong refinery and bottling plant is in cylinders by truck, a relatively costly method for long distances such as to the Western depots in Khulna or Baghabari.

3.13 In anticipation of greater availability of LPG in the early 1990s, BPC and its subsidiary, LPG Ltd., have embarked on a program to introduce bulk transport and decentralized bottling of LPG. The program includes (i) public-sector-owned bottling plants in Kailashtila and Baghabari with an aggregate capacity of about 12,000 tpa, (ii) public sector bulk transport facilities such as barges and trucks, and (iii) a joint venture with the private sector to establish a bottling plant in Khulna. The total cost of the two public-sector filling plants and the bulk transport equipment is estimated to be about Tk 280 million (US\$8.5 m), of which about Tk 50 million is earmarked for the barge and 3 tanker trucks (Annex 3.3). BPC's estimates of the total project's internal rate of return are about 15%, based on the current LPG sales price of about Tk 113-120/cylinder. The cost of empty cylinders is substantial, as about 60,000 cylinders at a total cost of about Tk 65 million are needed to start the operation.

3.14 The joint venture for the Khulna bottling plant had a slow start, as the new concept of both the fuel substitution and the private participation required lengthy clarification of negotiating positions. The first potential private partner, Shell Bangladesh Ltd., pulled out of the discussions because of (i) the small initial scale of this operation which did not appear commercially attractive, and (ii) the uncertainty of LPG supply from BPC if major LPG separation facilities at the gas fields would not be established in time. The latter risk still exists: if or major separation plant is not implemented for some time, and if Chittagong consumption of LPG does not decrease rapidly, to free the supplies from the refinery, the Khulna and Baghabari operations could be starved of supplies long enough to become uneconomical. The only option in this case would be imports of LPG to satisfy the market which has been created by substitution, a possibility which carries a substantial risk in an environment of chronic foreign exchange shortages.

3.15 Negotiations with a second partner, BOL, proved more fruitful and resulted in an agreement to launch the joint venture. Nevertheless, the discussions were protracted and focused on the following issues:

- (i) the bulk supply price from BPC to the joint venture, and the margin necessary for the operator;
- (ii) an improvement of safety standards of the operation, as BOL considered their guidelines superior to the existing BPC ones;
- (iii) the assurance that BOL can remit dividends abroad, as it is a local company subject to Bangladesh Bank approval of every remittance; such approvals are currently not governed by

clear guidelines, and delays of three to ten months are frequent:

- (iv) the time during which technology transfer fees are paid, as BOL was arguing for a long transfer period.

3.16 Having resolved some of the issues, a memorandum of understanding between BPC and BOL, establishing the procedure to set up the joint venture company Bangladesh LPG Ltd. was signed in April 1989. The MOU has the following key features:

- (i) An initial capacity of 5,000 tpa, with a possibility of later expansion to 20,000 tpa.
- (ii) Project completion by December 1990.
- (iii) 70% of the share capital to be subscribed by BOL, 30% by BPC.
- (iv) Maximum initial investment of Tk 120 million.
- (v) BPC support for assuring dividend remittance abroad.
- (vi) The managing director and CEO of the company is to be the MD of BOL, the Chairman of the Board the Chairman of BPC.
- (vii) Exclusive marketing rights for Khulna Division through the company's own dealer network, with BPC responsible for preventing leakage of its subsidiaries' LPG into the franchise area.
- (viii) BPC responsibility for ensuring approvals, licences, permits, visas, and foreign exchange availability.
- (ix) Provision for excluding the company from restrictive provisions of the Petroleum Act and the BPC Ordinance.
- (x) A non-discriminatory bulk purchase price of LPG of Tk 3960/t ex refinery with automatic annual escalation, combined with a deregulated retail price at the discretion of the company. Bulk LPG can be delivered either at the refinery or in Khulna including freight.
- (xi) Guaranteed LPG supply increasing from 3,000 t in year 1 to 20,000 t in year 10, regardless of origin including imports.
- (xii) Import duty exemptions and reductions for project equipment.

3.17 Having agreed to the principles, the partners have obtained approval of the MOU from MEMR, and are proceeding to float the company via a Promoters' Agreement, followed by the drafting of a Memorandum and Articles of Association, according to Bangladesh Company Law. No further approval from BOI is necessary, as the proposal has already been approved by the Ministry of Industry under special policy procedures. Given the

unfamiliar nature of the venture for all parties, the agreement is an evenhanded document that provides enough incentives to compensate for the risk. The key issue is likely to be the retail price that can be achieved, and the consequences for profitability.

3.18 The Financial Case. For a private venture, the problem is straightforward. The current pricing structure for LPG presents itself as follows:

Ex-refinery price Tk 3,960/t or	Tk 49.50/cylinder
Retail price Chittagong	Tk 120.00/cylinder
Bottling and local dealers' margin	Tk 70.50/cylinder.

Taking this margin as representative for the bottling and distribution operations, the split between bottling and retailing can be estimated by conducting a simple cost/benefit analysis of the proposed Khulna plant (Annex 3.4). Given the ex-Chittagong price of bulk LPG of Tk 50/cylinder, and estimated transport costs of Tk 1,600/t or Tk 20/cylinder, the bottling operation requires a minimum ex-plant price of Tk 120/cyl. to achieve an internal rate of return of 11%, at a plant capacity of 5,000 tpa. This implied minimum bottling margin of Tk 50/cyl. leaves about Tk 20/cyl. for local distribution, indicating a minimum retail price in Khulna of Tk 140/cyl. The retail price needed to achieve parity with kerosene is about Tk 160/cyl. (Annex 2.10).

3.19 This cost and price structure is only conducive to a penetration of the household cooking market, if the cost of initial investment in LPG cooking equipment is perceived to be covered by the savings of up to Tk 20/cyl.^{5/} When the pricing of LPG eventually is deregulated to allow the recovery of costs, there would be marginal incentives for consumers to switch to LPG. The "convenience premium" consumers may be willing to pay for the cleaner LPG fuel could compensate somewhat for the lack of a straight price advantage. The two measures to make this market more attractive to private investors are (i) a continuing low bulk LPG price in the neighborhood of Tk 50/cyl, or (ii) a significantly higher kerosene price. As kerosene is already priced above the economic level and GOB policy currently calls for kerosene and diesel prices to be treated as "social fuels", cost control at the supply end is the only realistic alternative. As the current main source still is imported crude, the lower bulk price only appears feasible if major gas-based separation plants can produce LPG at competitive cost in the long run, perhaps aided by joint production of condensate.

3.20 With increasing scale, a bottling operation becomes increasingly attractive for the investor. If the proposed expansion to at least 10,000 tpa in Khulna takes place, the internal rate of return of the venture (with the same bulk and retail prices) rises to about 14% (Annex 3.4). Increasing economies of scale may allow some reduction in the final retail

^{5/} Although there is considerable potential for LPG to replace commercially sold fuelwood for cooking, and bulk biomass use by the commercial sector (particularly in rural areas), private investors perceive the initial main target to be the urban kerosene market.

price, thus improving competitiveness with kerosene at its current retail price. A larger plant size would offer prospective investors a better incentive to participate.

3.21 The Economic Case. In economic terms, the case for LPG is relatively weak. In the long run, the opportunity cost of bulk LPG is determined either by the economic cost of producing it from domestic natural gas, or by the international market price plus handling and transport costs. Earlier consultants' estimates (Annex 3.5) indicated a range of costs for LPG ex separation plant of US\$290-449/t (Tk 9,000-15,000/t), depending on the assumptions concerning the economic cost of gas. More recent consultant estimates, using somewhat lower LPG recovery plant costs, would put the lower bound of bulk LPG ex separation plant at about US\$190/t or about Tk 80/cylinder. Adding transport and the bottling and distribution margin would mean a retail price of LPG of about Tk 170/cylinder, a level that could just be competitive with kerosene if the convenience premium is taken into account. In comparison, imported LPG in bulk form delivered to the bottling plant is estimated to cost about US\$ 209-329/t (Tk 7,000-11,000/t), depending on the handling and transport cost assumptions. The lower end of the range, representing short distances, amounts to a cylinder equivalent price of Tk 80-90, which again leaves only a relatively lean total margin for bottling and distribution before the ceiling of kerosene parity is met.

3.22 Prima facie, LPG production appears marginal. However, the data on which the preliminary calculations are based are tentative, subject to major revisions, and dominated by costs of small-scale operations. In the case of the cost of a major LPG recovery plant at the gas fields, much depends on the scale of the operation, and on the joint products made available in the process. In addition to LPG, products such as propane and condensates/distillates can be marketed in substantial quantities. Depending on the gas composition of the particular field, these joint products could provide enough additional net sales value to show a good internal rate of return for an investment in such a facility. If the output of joint products can bear a substantial share of investment costs, the price of bulk LPG could fall, thus enabling downstream operations to compete with a better margin. An ongoing study is now examining the technical and economic feasibility of LPG extraction and fractionation, and will yield recommendations on the optimal location and capacity of an LPG recovery operation, if it can be demonstrated that it is economically feasible.

3.23 Outlook and Lessons. Both the Khulna joint venture and the BPC bottling projects in Kailashtila and Baghabari are in the initial stages of planning and institutional formation. On the upstream side, only a small Kailashtila separation plant is under consideration, while any major future investment in LPG recovery from gas is awaiting the outcome of studies. There is, therefore, still enough flexibility in the LPG subsector to make fundamental decisions about the strategy to be pursued. The following issues should be considered:

- (i) The case for larger-scale bottling plants is more compelling than that for small ones. Given that time deposits in banks yield about 12-15% p.a., only a minimum capacity of

10-12,000 tpa in Khulna would yield a similar rate of return.

- (ii) As private investors are showing interest in the larger capacities, it should be considered to open up other locations to the private sector, including larger versions of the Kailashtila and Baghabari facilities.
- (iii) Private groups with foreign backing (e.g. Shell) are showing interest in majority participation in the proposed larger LPG separation plants at the gas fields. If the ongoing studies identify a chance that such a venture could be viable, private investors should be invited to share the risk of this investment.
- (iv) For initial penetration of the urban household market and competing with kerosene, a low bulk production cost of LPG is essential. Any future gas separation project will have to be tested carefully against its ability to provide LPG at retail well below kerosene parity. In the long run, the replacement of purchased fuelwood appears to present an attractive opportunity.
- (v) On the whole, the LPG subsector is eminently suitable to test the willingness of private investors to get involved in the energy sector. If the policy environment is attractive, this new type of venture with profit potential will release public sector resources for other investments where private interest is small. A modest role for the public sector will include the minimizing of approvals and agreements necessary, and a function as regulator rather than partner and risk-taker.

Compressed Natural Gas (CNG)

3.24 Background. In 1985, a pilot project to convert vehicles to CNG operation was initiated with about 50 vehicles, both gasoline and diesel-operated. Having experienced mixed results (the gasoline substitution proved successful), a larger project to convert at least 2,000 vehicles and establish compression and filling stations along existing gas pipelines was developed. Fuel substitution for river and rail transport also was to be included in the project. While the initial proposal called for a public-sector project implemented by BOGMC, a joint venture approach with private investors was soon considered and promoted. For this purpose, the CNG Company Ltd. was established as a fully-owned BOGMC subsidiary, to function as the partner for such ventures. The two most realistic responses to promotional advertising in 1986/87 came from BOL and from Asiatic Oil Company Ltd., a local company affiliated with Caltex. The Asiatic proposal dealt only with vehicle conversions, while the BOL proposal included also CNG distribution to households and commercial consumers. BOGMC and its CNG subsidiary decided to take up negotiations for a joint venture in automotive conversions with Asiatic, while other uses of CNG would be the subject of later ventures with other potential partners.

3.25 The negotiations proved to be protracted and continued through 1988 and into 1989. The original concept of a 51%/49% public/private share ratio later gave way to a 20%/80% split, and finally was discussed as a fully private operation with no BOGMC participation. A more difficult problem was presented by Asiatic's set of conditions that were to be satisfied before the project was to be implemented. These requirements included:

- (i) Exclusive rights for Asiatic for ten years to produce and market CNG in Bangladesh;
- (ii) Exclusive rights for Asiatic to franchise CNG retail operations;
- (iii) Duty-free imports of CNG-using vehicles;
- (iv) A seven-year tax holiday for the company;
- (v) A maximum guaranteed feed gas purchase price equivalent to that paid by power and fertilizer consumers (Tk28.5/mcf), and a minimum CNG retail price of Tk 184.5/mcf;
- (vi) A guarantee to maintain high retail gasoline prices to keep CNG competitive.

3.26 During 1989, these demands were under consideration by Government. However, while the full list of requirements was being circulated among various Government departments, relatively little effort appears to have been made by both parties to establish a mutually agreeable compromise. While some of the requirements may well be justified, there may be room to adjust others without significant damage to the viability of the project. While it may be appropriate to provide some incentives such as selected duty and tax exemptions, the franchising and exclusivity arrangements could be negotiated so that the operator is partially protected, but competition can take place. For example, the countrywide exclusivity should be avoided or reduced to one or two major markets.

3.27 As the review and approval process was continuing at a sluggish pace, BOGMC took a unilateral initiative to go ahead with establishing filling stations and conversion workshops for 500 conversion kits in Dhaka, the prime market, with Bank finance. This public-sector initiative was billed as a promotional effort, to create a momentum for CNG conversions while the private-sector project was stalled. As the initiative is small-scale, BOGMC did not appear to want to pre-empt the larger project. Nevertheless, the combination of slow review of the Asiatic proposal and the new BOGMC project created the impression of a preference for a publicly owned CNG program. BOGMC's subsidiary already operates a small CNG compression and filling facility, including a conversion workshop, in Dhaka. This remnant of the pilot project converts and serves primarily three-wheeler taxis, which are imported from Thailand and adapted to CNG operations by fitting suitable cylinder tanks. An addition of several filling stations would give BOGMC an important head start in this new subsector, while private ventures are awaiting delayed approval. In December 1989, the Government announced a decrease of the gasoline retail

price by about 42%, thus eliminating at a stroke the margin that had attracted the private proposals. Private investors are unlikely to pursue the CNG ventures further for the time being.

3.28 The erratic progress of this venture illustrates some of the difficulties of private sector participation in the unfamiliar terrain of energy supply. Approvals for the private investment and the agreed incentives have to be sought from MEMR, Ministry of Finance, Ministry of Law, the National Revenue Board, BOGMC, and others. Major policy issues are involved to ensure that the new subsector starts with a reasonable chance of success. Agreements have to be reached not only between the Government, BOGMC, and Asiatic, but also between the franchise holder and filling station operators who will allow the installation of CNG filling equipment on their premises against a commission. Similarly, the strategy for an expansion of CNG conversion to rail and river transport, and possibly for stationary use, needs to be formulated: the draft terms of reference for other transport use have already been circulated, and comments from inland water transport authorities have been received. Finally, the question of appropriate franchise areas for different private operators will have to be considered carefully, as further inquiries for automotive supply projects were being received from potential investors. Any excessive exclusivity granted to Asiatic would have had a negative impact on subsequent investments.

3.29 The Vehicle Conversion Project. The BOGMC proposal calls for the establishment of three filling stations at an investment cost of about Tk 18 million, and the purchase of about 500 conversion kits at about Tk 5 million. The Asiatic proposal includes 15 filling stations in the Dhaka/Chittagong/Comilla area within easy reach of gas pipelines at a cost of Tk 62 million, and 7500 conversion kits costing Tk 132 million. The cost per filling station therefore ranges from Tk 4-6 million, and the cost per conversion kit including cylinder tank lies within a range of Tk 10-18,000. The conversion cost to the consumer is estimated to be about Tk 20,000 per gasoline vehicle, including the kit. The proposal by Asiatic provides for the possibility of storing CNG in pressurized vessels and distributing it to filling stations not located directly at the pipeline, in CNG carrier vehicles. Five of the 15 retail outlets are proposed to be company-owned, the remainder being franchise operations agreed with operators of existing filling stations on the basis of a fixed commission. As an incentive for the operators to include CNG facilities in their filling stations, the commission for CNG sales would be Tk 2 per gallon equivalent, as compared to Tk 0.65/gallon for gasoline. The franchised retail outlets would pay fixed annual fees to Asiatic for expertise and services.

3.30 Asiatic estimates that, under the old gasoline price, about 7,500 vehicles would have been converted in the first 5 years, amounting to about 30% of the eligible vehicle population of the project area. This conversion rate would lead to an annual gas consumption of about 400 MMCF, or about 0.03% of the total BOGMC gas sales of 141,000 MMCF in FY88, a negligible fraction. Even if conversion of gasoline vehicles proceeds at a much faster pace than envisaged, the total gas consumption of the CNG program would remain very modest in relation to total gas sales. It could have, however, replaced about 10,000 t of gasoline consumption, currently

running at some 80,000 t. In order to maintain financial attractiveness of the venture, the Asiatic proposal called for a natural gas purchase price of Tk 29/MCF, equivalent to the price available for power and fertilizer consumers, and for a retail price of CNG of Tk 180/MCF.

3.31 Economic and Financial Viability. The economic case for CNG rests on the attractiveness of substitution for other motor fuels. At the proposed retail price of Tk 180/MCF, CNG costs the consumer only about 50% of the old gasoline price equivalent in Btu terms but about 80% of the new gasoline price (Annex 3.6). The prices of diesel and CNG are about equal at Tk 190/mmBtu, leaving no margin for conversion cost. Assuming that consumers wish to recover the cost of vehicle conversion in about one-two years, the proposed retail price of CNG would yield annual savings of almost Tk 15,000 as compared to gasoline at the old price, and thus represents a ceiling for making the conversion cost of Tk 20,000 attractive. At the new gasoline price, the annual saving shrinks to Tk 4,600, implying an unattractive payback period of five years. In the case of diesel, the higher conversion cost of some Tk 30-40,000 also cannot be recovered easily at current diesel prices, which yield an annual saving of only about Tk 6,000. Only a retail price of diesel which would be close to the old gasoline price, i.e. about 100% above the present price, would yield an annual saving of close to Tk 30,000 and thus allow adequate recovery of the conversion cost (Annex 3.6). A lower CNG price, of course, would serve the same purpose by opening up a wider margin to accommodate cost recovery.

3.32 Similar results are obtained when the CNG price is compared with international prices of the alternative fuels. Assuming that current CIF prices of diesel and gasoline are roughly equivalent to the diesel retail price, the margin to make conversion economically attractive would be negligible at the proposed CNG price. The question in economic terms has to be whether CNG can be produced and retailed at a sufficiently low economic cost to justify a large-scale conversion program. A preliminary cost/benefit analysis of the Asiatic proposal (Annex 3.7) indicates that a margin of about Tk 100/MCF between the purchase price of gas and the retail price of CNG would be sufficient to ensure a real internal rate of return for the project of about 15-20%. In economic terms, feasibility of the project would require the lowest possible gas prices, namely a purchase price of Tk 29/MCF and a retail price of Tk 130/MCF, to even begin to be competitive with internationally priced refined products. The old domestic retail price of gasoline would comfortably have allowed higher CNG price levels of about Tk 180/MCF, yielding a project IRR of almost 30% even with a gas purchase price of Tk 60/MCF, the current gas price to industries.

3.33 Following the drastic reduction in gasoline prices, there is no longer enough financial room for a gasoline-oriented CNG project. The bigger prize (both financially and economically) would be the diesel market. Total diesel consumption is about ten times that of gasoline, mostly imported, and used by 60% of the vehicle fleet. Depending on annual vehicle utilization (presumably significantly higher than gasoline vehicles), the price differential between CNG and diesel would have to be about Tk 150-200/mmBtu to induce vehicle owners to convert. Even if CNG could be profitably priced at Tk 130/MCF, this would mean raising the

diesel price to about Tk 8-9/1 to establish this differential. With CNG priced at Tk 180/MCF, the diesel price would have to approach gasoline parity to make CNG attractive to consumers. If, for reasons of regaining revenue neutrality, a fine-tuning of petroleum product retail prices is to take place, the optimal measure would be an increase of the diesel price closer to gasoline parity, so that low-cost CNG could become competitive. At current petroleum prices, the risk of developing and maintaining the CNG market therefore rests with the investor, and makes it unlikely that CNG will penetrate into the diesel market.

3.34 Asiatic's financial projections assume that, of the total funding requirement for investment and working capital of about Tk 100 million, about 27% will be available from internally generated funds, and the remainder will be financed with a debt/equity ratio of 80/20. This assumption, combined with the proposed bulk purchase and retail prices of Tk 29 and 180/MCF, respectively (escalating at 5% p.a.), yields a financial internal rate of return for the venture of about 39%. Under the new gasoline price scenario, the IRR would shrink below 20%, if CNG would be retailed at Tk 130/MCF. Even that may not be attractive enough for consumers, as it would imply a recovery period of 2-3 years. If the long-term aim is to reduce diesel imports, the bulk gas price should be kept to the economically justifiable minimum, encouraging the operator to keep CNG prices low if a relative diesel price increase would occur.

3.35 Other CNG Potential. Although the previous attempts to initiate CNG projects for rail and river transport fuel substitution had been abandoned, new efforts are being made to revive this program. Implementation will have to await cost estimates and pilot projects, but it appears that private investors who have made a start in automotive conversions, would find this extension to other bulk fuel users attractive. A second proposal, the retailing of CNG for stationary use by groups of households and commercial users, is dormant but deserves to be studied in more detail. BOL's original proposal called for the compression of about 650 MMCF per year in 5 stations, and the transport in pressurized vessels to batteries of protected cylinders for consumer use, at an investment cost of about Tk 75 million. The rationale would be to supply households, hospitals, commercial and other users with low-cost fuel where piped gas is not yet available. If safety issues of the higher pressure in the cylinders can be resolved satisfactorily, this could constitute a competitive alternative to LPG. In general, the risk of these new ventures should be borne by the private sector, with BOGMC and its subsidiaries in a more catalytic function.

3.36 Outlook and Lessons. As in the case of LPG, the penetration of the CNG market should be a natural area for private investors, relatively free of public sector intervention. It is a new subsector where flexibility and innovative marketing will be at a premium, and individual investment ventures can be tailored to the capital that can be raised domestically. Both the capital requirements for LPG distribution (Tk 120 m) and for CNG (Tk 100 m) are well within the best estimates of the capacity of the domestic capital market to accommodate individual ventures. Both proposals are backed by international partners with technological expertise, and by local companies with sector knowledge. In the CNG development program, the following issues should be kept in mind:

- (i) While BOGMC and its subsidiary should play a valuable promotional role, the thrust of the program should be to leave the investment and marketing to private investors as much as possible. If and when petroleum price developments allow vehicle conversions and CNG sales to take off, the public sector agencies could phase themselves out of this subsector.
- (ii) Although some of the potential private operators' more extreme conditions will need to be negotiated to a compromise, some incentives may need to be retained to kick off the program. However, it is important to open the substitution market to all qualified parties. Franchise exclusivity may be necessary temporarily in individual markets to encourage investors, but should be designed to last only a few years, and leave room for several operators in a competitive market in the long run.
- (iii) As in the case of LPG, a large-scale expansion of automotive use of CNG will require that major sector issues of fuel substitution be addressed first. If the long-term aim of CNG development would be the replacement of diesel fuel, all efforts should be made to minimize the retail cost of CNG and to bring diesel prices to gasoline parity, to compensate for the higher conversion cost.
- (iv) The CNG market in general, being well suited to the capacities of local investors with some foreign backing, should be encouraged through establishing a quick, responsive approvals process, the formulation of a clear strategy for the subsector, and a low profile of the public sector. Pending further changes in the petroleum product price levels, private interest in developing CNG will be weak, and the economic case for public sector involvement not convincing.

Coal Development

3.37 Background. During 1984/85, the Geological Survey of Bangladesh discovered seven seams of bituminous-quality coal at Barapukuria in Dinajpur district in the Northwest. Following preliminary drilling and sample analysis, a series of pre-feasibility studies was started in 1987 by Wardell Armstrong consultants with ODA finance, with the aim to arrive at a judgement whether the mining of the coal reserves is technically and economically feasible, and whether the coal can compete with alternative fuels. The consultants have conducted seismic surveys over about 27 sq.km of the area, delineating the reserves, and have prepared a pre-feasibility study in 1988. Of the seven seams, three appear to be suitable for coal extraction, holding reserves of about 285 million tons. However, the reserves lie below water-bearing strata which makes the mining technology more complicated, and extraction costs higher than elsewhere. Moreover, the calorific value of the coal is modest (about 10,300 Btu/lb), a fact that may preclude export of the mined coal. During 1989/90, the consultants are conducting the second phase of the studies, including drilling and sample analysis, and the preparation of a feasibility study. A draft of the study is likely to be available by October 1990. Other seams have been identified in the Northwest by the Bangladesh Geological Survey.

3.38 As Bangladesh does not have indigenous coal-mining expertise, any development of the coal reserves, if proved economically sound, will have to be left to a major foreign operator. During the first phase of the investigations, expressions of interest were received from several mining groups from the UK, USA, and Australia, and exploratory discussions were held with BOGMC. The locally represented Shell group has also done in-house preliminary analysis, and remains interested pending the findings of the second phase of the investigations. The coal division of BOGMC acts as the main interlocutor of potential foreign partners, and is monitoring the consultants' work. Its jurisdiction also extends to other potentially coal-bearing areas in the Northwest apart from Barapukuria: these areas may have seams at shallower depth, and thus could be likely to offer commercially attractive development options. Geological information on these areas is incomplete, and other feasible areas may be identified only with more thorough exploration. In late 1989, BHP Utah submitted a proposal for an exploration and development contract in the Northwest (excluding Barapukuria), based on production sharing. The proposal is under review by BOGMC and MEMR.

3.39 Economic Viability. The justification for mining Barapukuria and other northwestern coal depends on its use as fuel for power generation and, to a lesser extent, for brick kilns in the Northwest. As fuel for the power sector, indigenous coal would have to be demonstrated to be competitive with other fuels such as natural gas, fuel oil, or imported coal in a least-cost optimizing exercise for the PDB grid. So far, PDB planning has not introduced the Barapukuria coal option into its scenarios because of the continuing uncertainty, and lack of firm data. The consultants' pre-feasibility study also does not address this issue comprehensively, but compares a proposed mine-mouth power plant of 260 MW with similar plants using alternative fuels. Although this partial

analysis falls short of a full modelling exercise of the grid, it provides illustrative data for screening purposes.

3.40 The proposed project would produce about 785,000 tons per year at a capital cost of about US\$140 million, a total production cost of about US\$35/t (Annex 3.8), and an ex-mine selling cost of about US\$56/t. As an initial comparison, the consultants evaluate the costs of producing power for the grid from a 260 MW mining-cum-generating operation at Barapukuria, and those of a coastal generating plant near Khulna fuelled by imported coal. With CIF coal imports at about US\$48/t, the coal delivered at the Khulna plant is valued at about US\$51/t in economic terms (Annex 3.9). After taking into account various ancillary investments and externalities, the two options are about equal at a discount rate of 10-11%. At higher opportunity costs of capital, the imported-coal option is superior. Given the large error margin contained in the calculations at this stage, it can be assumed that BPDB would be indifferent between domestic and imported coal, *ceteris paribus*. A different picture emerges if the coal option is compared to alternative fuels. At current international prices of petroleum products and the economic cost of natural gas in power use, all alternatives appear to be lower-cost than the coal option, with the exception of the diesel-fuelled alternative (Annex 3.10). The gas-fired alternative in particular, appears to offer significantly lower generating cost. Even with the assumption that the economic cost of gas would increase steadily in real terms at about 3% per year because of an increasing depletion premium, the gas-fired option remains competitive.

3.41 Although this rough screening exercise yields relatively disappointing results for indigenous coal development, final judgement will have to be reserved until both the next phase of the coal field investigations and a revised power grid modelling exercise including the Barapukuria option are concluded. One consideration will be the available gas reserves: the current BPDB investment plan calls for the commissioning of at least 1,600 MW of gas-fired capacity in the 1990s, and the gradual introduction of capacity fuelled by imported coal around the turn of the century, as gas reserves may become fully committed. Furthermore, it may well be that grid balance considerations would dictate the establishment of significant generating capacity in the Northwest. If future revisions of the power system optimization yields a negative decision on Barapukuria generation in favor of imported coal, the only other major coal users would be the brick kilns. The proposed coal mine could supply the energy demand of the West Zone's brick industry for about ten years, replacing mostly fuelwood which provides about 87% of brick kiln fuel in the West. The consultants make the point that this substitution would be both economically advantageous and environmentally benign. However, the economic case is only clear-cut if the competing fuel is wood at Dhaka area market prices. Fuelwood prices in the Northwest are significantly lower (Annex 2.8), and the current Rangpur wood price of about Tk 93/mmBtu is not much higher than the estimated price of Barapukuria coal of about Tk 82/mmBtu ex mine. Delivered at some distance from the mine, the selling price of coal would reach fuelwood parity. Given the error margin of the mining cost estimate, the incentive for the brick industry to switch fuels is modest, unless progressing deforestation would drive fuelwood prices steeply higher. In this case, a comparison between the development of Barapukuria coal and the extension of the gas grid to the West may yield a

competitive advantage for gas as brick industry fuel, as already demonstrated in the East. On the whole, therefore, the economic case for coal mining must rest on the possibility that it may become part of a least-cost power investment plan.

3.42 Financial Issues. At a production cost of about US\$35/t, a selling price ex mine of US\$56/t yields a gross margin of about 36% for interest, taxes, and profit--not overly impressive in view of the anticipated high interest costs. Similarly, the project yields a return on investment of only 9% before interest and taxes on a discounted-cash-flow basis. As the financial prices of competing fuels impose a ceiling on the coal selling price, there is not much room to improve the financial attractiveness of the venture. It appears that the project represents an investment possibility at the lower end of the range of attractiveness, and foreign investors will be looking for appropriate incentives to reduce the risk. The probable dearth of exportable-quality coal makes the venture essentially a project for the domestic market, further decreasing its attractiveness for potential investor groups.

3.43 Incentives to attract the private sector should only be employed if the project is economically sound, and should aim at providing a satisfactory margin between production cost and selling price. If BPDB's planning continues to provide for a coal-fired plant in the West, it would be based on a coal cost of no more than the import equivalent. The incentives, therefore, have to focus on the supply cost elements. Given a guaranteed long-term purchase price formula agreed by BPDB, the mine operation would benefit from:

- (i) participation of the public sector in the provision of infrastructure;
- (ii) a development contract with attractive taxation and duty-rebate provisions, perhaps patterned in some elements on the model petroleum exploration contract;
- (iii) the opportunity to export, if reserves of appropriate quality are discovered, any quantities beyond the guaranteed offtake by BPDB;
- (iv) a Government guarantee ensuring timely payment for coal supplies by BPDB, the probable single large consumer of Barapukuria coal;
- (v) support for the investor in minimizing manpower and training costs, such as flexible wage guidelines, and discouragement of labor disputes.

3.44 Outlook and Lessons. The coal reserves of the Northwest (either in Barapukuria or in adjacent areas) could prove to be interesting ventures for foreign investors, if the following conditions are satisfied:

- (i) a production cost that is not significantly higher than in comparable coal mines, or higher than the cost of imported coal;

(ii) a guaranteed offtake by a mine-mouth BPDB generating plant;
and

(iii) the possibility to export if adequate coal quality is
identified.

3.45 Given the need for lengthy investigations during the second phase of consultancy work, an active promotion campaign cannot start before late 1990. Accurate hydrogeological and coal quality analysis will be necessary to judge whether the cost of coal extraction can compete with imports, and whether the quality is tradeable. If, as expected, the commercial attractiveness of the project is marginal, but economically sound, the Government and BOGMC should aim for maximum flexibility in the discussions with potential investors. The modes of cooperation with a foreign group could include (i) a development contract based on royalty or production-sharing principles, (ii) a joint venture, either from the beginning or with an option for the Government to buy into the operation later, and (iii) a combined mining-cum-power-generating private or joint venture, which would sell power to the grid, rather than coal to a power plant. It is likely that international mining and exploration groups would opt for the mining-only alternative to stay with their comparative advantage. However, if the Government decides to open the power sector to private investment, the combined option may become attractive to consortia which also contain industrial interests.

Power Sector Investment

3.46 Background. The power sector remains officially reserved for public investment, with the exception of standby generating sets, and selected continuous-process generation for industries such as jute mills, paper mills, and fertilizer. While the rural areas, with their concept of consumer cooperatives, form a unique part of the power sector, the bulk of generation, transmission and urban distribution is handled directly by BPDB, a publicly owned utility. BPDB's investments in FY88 amounted to about Tk 6.9 billion, of which Tk 4.9 billion had to be mobilized in foreign exchange. Investment requirements in the coming years are projected to rise rapidly after an initial constrained period, when only projects with absolute priority are to be implemented. By 1990, the annual investment expenditure is estimated to rise to only Tk 7.6 billion, but thereafter increases steeply in current terms to about Tk 22 billion in 1994/95 (Annex 3.11). The bulk of projected investment in 1989/90 is transmission and distribution, but generation investment activity picks up again from 1991 onwards. Apart from having to mobilize Tk 37 billion in local funds in the five years 1991-95, a foreign component of about Tk 50 billion (US\$1.5 billion) will have to be found during the same period. Total borrowings of BPDB for the period 1989-95 are estimated to be about US\$2.4 billion from both foreign and local sources.

3.47 The deteriorating financial position of BPDB in recent years, and the growing indebtedness of the institution, make it imperative to seek equity-based solutions for the massive investment program. Similarly, new institutional arrangements are necessary to enable the sector to be revitalized. Recent steps in this direction included:

- (i) an agreement under the recently approved Energy Sector Adjustment Credit to separate the Dhaka distribution operation from BPDB as an autonomous public sector entity;
- (ii) high-level initiatives in BPDB and Government to encourage private investors to participate in the financing and operation of major new generating plants; and
- (iii) continuing approvals of captive generating capacity, and tentative discussions concerning industrial own generation.

3.48 The current stock of standby and captive capacity is modest. Compared to the total generating capacity of BPDB of about 1,800 MW to serve a peak demand of 1,300 MW in 1988, the installed non-BPDB capacity amounts to about 200-250 MW, of which about 120-150 MW are continuous-process captive generation for fertilizer and cement plants, or paper mills, and the remainder are mostly small standby sets. An aggregate of about 5 MW of small standby capacity is approved per year, but standby capacity is not officially encouraged. In recent years, the average size of standby plant approved was in the range of 400-500 KW, with only selected chemical industries obtaining permission to install standby sets of up to 5 MW each. The new Chittagong fertilizer plant has a provision for a 16 MW captive generating plant.

3.49 The main functions of private investment in the sector would be to introduce profit-oriented efficiency and cost control. BPDB, acknowledging its increasingly difficult financial situation due to a buildup of debt servicing, is keen to share the responsibility of financing new generating capacity with the private sector. This willingness to consider innovative approaches to power development should be supported actively by the supervising authorities such as MEMR, to establish confidence among potential investors. The possibilities for private investors to enter this market are threefold:

- (i) extension of the policy of standby and captive generation approval to include any industrial self-generating scheme that would be compatible with grid operations and could sell surplus to the grid;
- (ii) establishment of a financing and institutional mechanism to attract investors for major new generating plant; and
- (iii) opening of the urban power distribution sector to private investors, as partners or operators.

3.50 Industrial Generation. Considerable interest exists in the business community about the possibility of expanding the current standby policy to a more flexible approach that would allow a broad spectrum of generating plant investments, ranging from straight standby to full own generation with BPDB fulfilling the standby role. The options could include (i) maintaining a diesel or gas-fired standby-only set with BPDB providing the regular supply, (ii) generating all own requirements with a captive set and relying on BPDB for standby only, (iii) a combination of the two, (iv) generating a surplus with the captive set and selling this

surplus to the grid, (v) obtaining a local industrial supply franchise and supplying all requirements in, say, an industrial estate with own generation. The latter option would involve a distribution function for the private investor, but could be well defined in an industrial environment. The key points here will be the arrangements to link private generation with the BPDB system, and in particular the prices at which generation fuel will be purchased, and power will be sold to and bought from the grid. If BPDB will be called upon to maintain a reserve for possible claims on standby power from the grid, the contract prices for such standby power should reflect the cost incurred by BPDB. Conversely, the selling price to the grid would be determined by the predictability of such excess supply, and on the savings accruing to BPDB.

3.51 The financial viability of industrial self-generation looks quite attractive, if gas supply would be available to the operation. A preliminary estimate of a proposed captive power supply for a textile mill (Annex 3.12), covering the full requirement of about 2.5 MW, indicates that the option providing for full own gas-fired generation is by far superior to the other options of BPDB supply with own standby, or own diesel generation. This is the case even if gas supply is priced at the current industrial price of Tk 60/MCF: at the lower price available to BPDB of Tk 29/MCF, the case for industrial self-generation becomes even more compelling. It can, of course, be argued that the removal of industrial baseload consumption from the grid naturally would yield good returns at the expense of the remainder of the system which needs to provide residential and other high-cost supply. The urgent need for innovative financing of new generating capacity, however, may override such considerations, if care is taken that the grid retains adequate baseload. Given the current small size of non-BPDB capacity, there is ample room for an expansion of industrial self-generation.

3.52 There are several features of the industrial approach that make it attractive as a first step to open the sector to private investment. First, it requires only a gradual relaxation of the current approvals policy for captive plant. A relatively low-profile liberalization of approvals could include a gradual move away from the standby-only policy, and define the possible combinations of standby, own generation, and continuous process more broadly. Second, the cost and scope of such ventures fits neatly with the fund-raising and implementation capacity of the private sector and the domestic capital market. The typical cost of a 2-3 MW facility of about US\$1-2 million would be easy to finance locally. The foreign exchange component of the financing could be mobilized as part of the total funding for the industrial project. Third, it appears that no major policy decisions have to be taken concerning the price of natural gas: even at the industrial price, self-generation may yield adequate returns to investors. Fourth, the BPDB tariff structure offers the possibility to design an appropriate standby tariff for self-generating consumers (at present, temporary supply costs double regular supply), and the BPDB cost structure is known well enough to allow the establishment of an appropriate purchase price from private suppliers of surplus power. Finally, the approach offers a way to open up the distribution market by first concentrating on self-contained industrial estates where only small numbers of consumers are involved, and private distributors would be de facto members of a local industrial "cooperative".

3.53 Major Private Generation. The planned additions to the BPDB grid during the next 10-20 years are of a different order of magnitude. The proposed generating plants range from 100 MW gas turbine units to gas and coal-fired steam thermal stations consisting of several units of 300 MW each. The investment costs for such projects start at about US\$30 million for the gas turbine plant, and rise to US\$500 million and beyond for the first two units of major steam plants such as Meghnaghat (gas) or Mongla (coal). These sizes and funding requirements call for a different approach, as they are well beyond what the domestic capital market and private expertise can provide.

3.54 The policy decisions required for the encouragement of private foreign investors can be illustrated in the case of the Meghnaghat steam plant, with an ultimate proposed capacity of 4x300 MW. At about US\$ 700/KW, the total cost of the project amounts to some US\$840 million. For BPDB, the options are either to finance, construct and operate the plant themselves, or invite a private group to do so and sell power to BPDB. A rough estimate, based on a recent system planning study by Electrowatt, indicates that the approximate annual debt servicing, fuel, and operating cost of about Tk 5,500 million incurred by BPDB at full operation would be equivalent to a maximum purchase price from a private facility of about Tk 0.80/kWh. At that price, BPDB would be indifferent whether they generate themselves or purchase. At the same bulk sales price, however, (and assuming that relevant costs would be the same as BPDB's) the project would yield a financial rate of return to the investor of only 7% in real terms, a rate which is unlikely to attract foreign investors for a major project with Taka revenues from one consumer, even though it is assumed that the gas price of the venture is the same one as that available to BPDB. A rate of return of 12% in real terms would require a bulk sales price to the grid of about Tk 1.00/kWh. Alternatively, a high-efficiency private venture may be able to reduce capital and recurrent costs sufficiently to make the project attractive at the lower sales price.

3.55 The question, therefore, becomes whether the initial incentives that would have to be offered to potential investors are a desirable "premium" to encourage private investment for the purpose of raising sector efficiency in the long run. At the minimum, the terms of operation should be equal for BPDB and private investors. The necessary encouragement would have to include:

- (i) a Government guarantee of payment of power purchases by BPDB to the generating venture, and other risk-reducing measures;
- (ii) a gas supply price of no more than the cost to BPDB;
- (iii) a bulk power sales price adequate to ensure an attractive rate of return for the investor, while giving BPDB enough incentive to purchase from the private venture;
- (iv) an agreement to repatriate profits in foreign exchange, although the venture's income would be accruing in Taka;

- (v) a load dispatch agreement that would guarantee a minimum load factor for the private venture, without decreasing the efficiency of PDB's merit order operations;
- (vi) an objective regulatory framework that would apply equal criteria to all participants in the power sector;
- (vii) a clear communication from the highest levels of Government that the power sector is open for private investment.

3.56 The institutional, regulatory, and financing mechanisms for an international approach need to be prepared carefully. Agreements for private power generation can cover options such as build-own-operate (BOO), build-own-operate-transfer (BOOT), joint ventures, consortia, or construction and management contracts. The financing can be mobilized on a case-by-case basis for individual projects with separate agreements, or through a "private power development fund" that would provide partial financing and a standard contractual format for a series of private ventures. Recent experience with the operation of such a fund in Pakistan would indicate that a clear ex-ante definition of the purchase agreements, the respective functions of all participants, the procurement procedures, and the responsibility for project evaluation and for fund syndication, is a must in order to achieve smooth operation. The Pakistan fund provides for the financing of a part of private BOOT ventures, organized by private consortia of investors, and based on standard "power purchase agreements" between the utility and the investors. Identification of potential projects would normally be done by the public utility, to ensure the consistency with a least-cost expansion program. Project sponsors could then bid for the project. To ensure financial expertise, the fund is operated by a development bank on behalf of the Government.

3.57 In the case of Bangladesh, the Government would have to give a clear signal to international and domestic investors that private investment in power is accepted and supported. International power equipment manufacturers and expatriate Bangladeshi financiers are likely to react positively to such an opportunity. Similarly, it would address the concerns of local investors that Government policy in the energy sector is still ambiguous with respect to private participation. If the policy would focus on the financing of new power plants rather than any ownership transfers of existing assets, the concerns of the power sector's labor movement may not be as strong as could be expected. In any event, the preparatory work to lay the institutional groundwork would have to begin immediately in order to be able to proceed with promotion and implementation of the program. Apart from Meghnaghat, future Chittagong gas-fired plant expansions, the Fenchuganj, Mymensingh, and Baghabari gas turbine projects, or the Chittagong and Mongla coal-fired plants would lend themselves to private participation. As BPDB appears to be reluctant to embark on a higher-efficiency combined cycle operation, this would be an opportunity to let the private sector shoulder the technical and institutional risk in a self-contained operation. As these projects are to be commissioned from 1993 onwards, time is of the essence. In late 1989, PDB received several proposals from international groups to build and operate major gas-fired generating plant. Similarly, a Bangladeshi group intends to put forward a proposal for a 40-MW gas-fired plant. MEMR and

PDB would benefit from early technical assistance to review these proposals, and help in making policy decisions.

3.58 Nuclear Generation. The Atomic Energy Commission has been studying a proposed nuclear generating plant of about 300-500 MW capacity for some time. Although a detailed study is still under preparation, preliminary estimates indicate a total cost of about US\$600-800 million, and a unit cost of generation of about US\$0.05/kWh. At first sight, the cost does not appear to be competitive with the alternatives including coal from Barapukuria, or coal imported for a coastal power plant. If further refinement of the cost estimates yields a competitive generating cost, the attractiveness of this venture would have to be tested against the other generating possibilities that would be open to foreign private investors. However, the relatively small size of the plant makes it unlikely that unit costs can be decreased significantly, as international experience has demonstrated. Similarly, appropriate training, safety and environmental costs may add to the total expenditures. In general, the proposed plant would have to be demonstrated to be part of a consistent least-cost power system expansion program to be able to be offered for foreign participation and operation.

3.59 Power Distribution. During the early 1990s, investment in the urban distribution systems will represent about 25-45% of total planned BPDB investment expenditures. While this is a substantial amount, growing from Tk 2.5 billion in 1989 to more than Tk 8 billion in 1995, it differs in several important respects from major generation investment. Distribution investment essentially uses well-established and simple technology which places less of a premium on sophisticated staff skills. Furthermore, investments can be formulated as manageable implementation packages requiring less capital per project, as compared to large integrated power plant investment. Finally, the market for equipment such as transformers, conductor and other line materials, and meters is large and competitive, and allows straightforward procurement procedures. In addition, distribution equipment manufacture lends itself to the development of smaller indigenous production capacity which could compete with international suppliers. These features make distribution investment attractive to local investors with limited capital and sector knowledge.

3.60 Consequently, lively interest exists in the local business community in the possibility of investing in and operating urban power distribution systems. The forthcoming separation of the Dhaka distribution system as independent entity is giving rise to expectations that this step may serve to prepare the new entity for eventual share offerings to investors. Although not much thorough analysis has been conducted in this respect yet, potential investors expect that they would be able to revitalize the ailing distribution systems by improving the metering, billing, and collection performance, and reduce both technical and non-technical losses. Prerequisites for successful operation of these systems would be (i) an intensive preparation period to improve financial and institutional performance prior to issuing shares, and (ii) a clear picture of the margins available for operators of the distribution systems, including the bulk sales price of electricity at the substation, and the degree of freedom to set retail tariffs according to financial needs. The latter concept could be patterned on the REB approach to rural tariffs,

backed by the establishment of an efficient regulatory mechanism. A regulatory body would have to be able to conduct rate case analysis and hearings swiftly and impartially, and have the necessary expertise to balance financial, legal, technical, and equity considerations.

3.61 The obstacles facing private operation of distribution systems are formidable. First, the high level of system losses has become chronic and very difficult to reduce. Without a major improvement in this key component of institutional performance, profitability for private operators will prove elusive. Secondly, a clear concept of franchise area integrity would have to be maintained, to avoid that major industrial consumers would remain direct BPDB consumers and thus remove needed baseload from the distribution operator's consumer mix. Finally, labor union resistance is likely to be high, as the transfer of assets of a labor-intensive operation from the public to the private sector would be involved: concerns about employment security and about the sale of a key public utility would loom large. On the favorable side, discrete parts of planned distribution investment could easily be handled by local private investors who would have the local knowledge to contribute to the improvement of operations. In general, therefore, private participation in power distribution is a worthwhile long-term goal, if significant progress can be made first in improving the subsector's efficiency.

Other Investment Potential

3.62 Petrochemicals. In view of the strong worldwide investment in petrochemical production, and the generally delicate demand/supply balance in the international trade of such products, investments can only be attractive if the feedstock and the capital investment are low-cost. Although the Bangladesh gas reserves offer a reasonably economical source of raw material, there are other locations of gas with larger reserves and lower production cost that would be a priority choice for new international investors. In the case of Bangladesh, local investors in partnership with foreign groups would have to identify appropriate market niches where domestic production cost can be internationally competitive, and where markets abroad can be secured.

3.63 One example of this is the proposed production of methanol, an intermediate chemical, primarily for export. A proposal to establish the production of methanol from natural gas has been prepared by the Beximco group in collaboration with the Lucky Engineering Co. of Korea. The proposal calls for the transfer of an existing methanol plant from Korea to Bangladesh, to produce about 300,000 tpa (about 2% of current world demand) for use in Korea, Japan and other East Asian countries. At this level of production, the project would use about 11,000 MMCF of gas per year, representing about 8% of total FY88 gas sales, or about 20% of current fertilizer use of gas. As partner in the joint venture, the Lucky Goldstar group would guarantee purchases of about 100,000 tpa - the remainder would have to be marketed primarily in Japan. No firm offtake prospects in Japan have been identified yet.

3.64 In economic terms, the project appears marginal. Assuming a total investment cost of about US\$100 million, and an achievable output price of US\$120/t, a gas input cost of about Tk 45/MCF (the economic cost to the

fertilizer industry including depletion premium) yields a rate of return of about 10%. If gas is costed at the current fertilizer-use price of Tk 29/MCF, the IRR rises to 16%. At the gas price to industry of Tk 60/MCF, the IRR falls to 5%. It appears that the project is economically feasible if the gas price is not higher than its current level to power and fertilizer users. In financial terms, the project yields a rate of return to shareholders of about 17% after tax, if the gas input price is about US\$ 0.50/mmBtu or Tk 16/MCF (Annex 3.13). This gas price is about equal to the long-run marginal cost of gas delivered to fertilizer users. If raised to the current minimum of Tk 29, the gas price may make the the methanol project financially unattractive to prospective investors, unless methanol prices rise sharply or further investment cost reductions can be achieved.

3.65 The proposal illustrates that financing, even for amounts of the order of US\$100 million, could be mobilized if the prospects are favorable. Based on a debt/equity ratio of 70:30, the joint-venture partners Lucky and Beximco would bring in about US\$10 million in equity, complemented by Government equity of about the same amount, and a public offering of US\$5 million. This is consistent with the estimated capacity of the domestic capital market. Debt financing would be obtained primarily through the Korean Eximbank. As in the case of other gas-based production of new products (LPG, CNG), the private sector would bear the risk of market development.

3.66 Petroleum Product Distribution. Private participation in the distribution of refined petroleum products is limited to transport services and the retail end of the distribution chain. From the refinery and import point in Chittagong, products are shipped in bulk to regional depots owned by BPC and its subsidiaries. About 75-80% of this bulk transport is by water to the major depots in Dhaka and Khulna, where transshipment to smaller barges takes place for transport to smaller up-country depots. The owners/operators of the tankers and barges enter into one- or two-year contracts with BPC, and are paid by ton-mile shipped. From the depots, the products are sold to filling station operators who are paying a fee for the use of filling equipment originally installed at the stations by the BPC subsidiaries. In recent years, the bulk of filling station investment has been carried out by the operators themselves. In the case of kerosene, the private tanker trucks or boats deliver drums to kerosene dealers close to points of consumption.

3.67 As the present system appears to work well, there are no initiatives to encourage private investors to get more involved. However, the opening of the household and automotive sectors to competition from LPG and CNG will require a degree of deregulation which could affect the market in refined products. Deregulation would involve access of private companies to import and wholesale distribution of products, and the building up of an own dealer network in competition with BPC. Eventually, an opening up of the fuels market as a whole will be necessary to avoid a situation where the retailers of new products will be dependent on the goodwill of a dominant public monopoly in fuel distribution. In parallel, a deregulation of retail pricing would introduce the necessary flexibility for competition between fuels, and retailers of the same fuel. To encourage private investment at all stages of the energy sector, the

Government would limit its intervention to a consistent and revenue-generating taxation of petroleum products.

3.68 Equipment manufacture. The growing energy sector is capital-intensive, and requires a wide range of equipment sophistication. While the major components of power plants, gas separation plants, refineries, and compression facilities will still have to be imported, a number of smaller equipment items could conceivably be produced competitively in Bangladesh. A start has already been made with initiatives to manufacture electricity meters and LPG cylinders locally. Both ventures are led by local investors, and have experienced foreign partners who provide the production technology. This pattern is likely to remain optimal for some time, as indigenous capability to develop energy sector technology is still limited. The recent establishment of the BOI facilitates such ventures, and may lead to more interest from the private sector. However, potential investors will have to guard against excessive expectations that they will enter a protected and guaranteed market, selling to the public sector agencies as captive customers. International competition for standard equipment items is keen, and public sector procurement will remain to be guided by competitive bidding procedures.

IV. SCENARIO FOR PRIVATE PARTICIPATION

4.1 Given the early stage and small present scale of private investment activity in the energy sector, there is much flexibility in the path to be charted for a more substantial involvement of private investors, both local and foreign. The direction, however, is clear: all interested parties, both in Government and in the business community, agree that a more intensive private participation in the sector will contribute to the improvement of efficiency. Opinions differ on the pace and nature of this process, but a reasonable consensus exists that the progress achieved in the deregulation of the industrial sector could be extended into the energy sector. The scenario for the next few years will involve two major components: (i) a consistent set of policy measures that would set the scene for increased private investment, and would build confidence among investors, and (ii) the vigorous pursuit of several key investment prospects that would serve as pioneering ventures and demonstrate the clear intention to move ahead.

Policy Measures

4.2 Some of the necessary policy measures involve merely a change in practice or application, while others would require a more formal consultation process, high-level decisions, or legislative change. Nevertheless, they form a coherent set of policies that should be implemented together to create the needed momentum, and provide a clear signal to investors. The main actions would be as follows.

- (i) One of the early measures, whether gradual or in large increments, has to be the move towards economically sound energy prices, and the removal of distortions. With slowly rising international crude prices, an economic case for an increase in the domestic retail price of kerosene and diesel may develop, particularly as a price rise would diminish the remaining price gap between these two fuels and gasoline. Similarly, natural gas prices should be maintained as close to full economic cost as possible. If the realignment of energy prices results in attractive margins for the production of gas-based fuels such as LPG and CNG, private investment in these new subsectors should be encouraged actively. An economically sound, but relatively low bulk gas price, combined with a cost-covering bulk power sales price to BPDB, would also have the effect of making power generation investment interesting for private investors.
- (ii) The formulation of a clear policy defining the terms and rules for the involvement of foreign investors in major energy projects is a necessary precondition for any large-scale promotion. A promising start has been made with the preparation of the model petroleum exploration contract, which will serve as the basis for discussion with prospective investor groups. Similar clear principles have to be

formulated for other subsectors such as coal development, LPG and condensate separation at the gas fields, and major power generation. For all these potential investment opportunities, the rules of the game need to be known before serious negotiations begin. As soon as the economic viability of coal extraction or LPG stripping is established in the ongoing studies, a framework for promotion and discussion, covering similar areas as the petroleum model, should be put into place. Similarly, a contractual and financing framework should be established for independent power generation. The terms should include principles of gas purchase and output pricing, fiscal and other incentives, foreign exchange availability and remittance, ownership options, etc. An early start is essential, as the formulation and approval of such policy principles is likely to have a long gestation period.

- (iii) An acceleration of Government deliberations and a streamlining of the approvals and negotiations process is a vital component of the policy package. The aim should be to make the process of dealing with public enterprises in the energy sector more transparent, as such contacts and agreements will continue to be necessary for potential private investors. In particular, local investors seeking to establish a foothold in the newly emerging subsectors such as LPG or power, generation, will appreciate a removal of the uncertainty at an early stage. Improved flexibility in the public/private contacts should extend to more detailed and active negotiations at the working level before approvals are sought at a high level. This would cut short the process of achieving consensus, as private investors are able to indicate quickly where the limits of compromise lie.

- (iv) One of the early moves to gain momentum should be the establishment of a close working relationship between MEMR and other energy sector agencies on the one hand, and the new BOI on the other hand. If the promotional principles embodied in the BOI can be extended to the energy sector, potential private investors will be reassured that the streamlining of approvals, utility provision, and contract negotiations is a serious aim of the Government. The fact that public enterprises and Government authorities will be involved more closely in private energy ventures than would be typical for the industrial sector, will require the development of new cooperation mechanisms in BOI, and the establishment of a counterpart unit in MEMR specializing in the rapid formulation of a sector response to specific private investment proposals. This "private sector unit" would also serve as the repository of staff charged with the preparation of recommendations for relevant high-level policy decisions. In parallel with the approach taken at BOI, the unit should be staffed with a combination of private sector professionals and experienced civil servants, creating a

quick-response team that can conduct a constant dialogue with BOI and private investors.

- (v) Before any serious interest of local and foreign investors can be stimulated, there is a need for a clear policy statement at the highest levels that the power sector is open for private investment. Without such a clearly announced policy, mobilization of private funds for this fund-constrained sector will be difficult because of the perceived uncertainty. It may be prudent to take a first step of making new investments in generating plant available for private ventures, and only later proceed to other parts of the power system, or to the sales of existing public assets. Investment in new facilities that complement ongoing public sector construction is likely to encounter less resistance than an explicit privatization program. The growing power sector can accommodate both public and private funds with ease, and would benefit from private involvement.
- (vi) Finally, every effort should be made to interpret existing rules and regulations as liberally as possible, and make this known to potential investors. A broad interpretation and relaxed application of the regulations governing own power generation by industrial power consumers could stimulate a number of economically and financially attractive investments that cover the spectrum from standby sets to full own generation. Similarly, there may be viable cases for generation investment by RIB (permitted under the ordinance). In the new subsectors such as gas-based fuels, the attempt should be made to refrain from the drafting of new regulations, and rely on a liberal interpretation of existing laws and guidelines.

Key Investment Prospects

4.3 While there is a large number of potential areas where private investment could be attractive, immediate progress can be expected in only relatively few opportunities. Starting with the most promising ones, which are about to be launched or are in an advanced stage of preparation, the major prospects are the following:

- (i) Petroleum Exploration and Development. The Government is conducting a vigorous promotion campaign to attract international exploration companies to Bangladesh. This effort is supported by the new draft model contract, and by the reorganization of BOGMC that provides a more efficient internal counterpart for discussions with potential investors. As a number of foreign investors have already expressed their interest, the key element in this effort is to maintain momentum, and to ensure that negotiations with prospective investors are conducted speedily, flexibly, and transparently. In the course of petroleum exploration, the potential participation of the private sector in natural gas

development is an important innovation which will bring needed additional capital and technology.

- (ii) **LPG Bottling and Distribution.** The forthcoming joint venture in Khulna is a promising beginning, which, however, needs to be supported by a deregulation of LPG pricing, and to be expanded to larger scale and wider geographical spread. This kind of investment is eminently suitable for local investors with access to appropriate technology, and is within the capacity of domestic capital mobilization. It should be considered to open other locations to private investment, and to permit fully private ventures in addition to joint ventures. If domestic LPG production from natural gas proves to be economically feasible, the complete range of wholesale, transport, bottling, and retail activities should be available for private investment. A possible accompanying measure would be the acceptance of the transport sector as a major market for LPG in areas remote from the gas grid, if sector priority issues of optimal fuel strategy are resolved first.
- (iii) **LPG Separation.** The case for extending private sector involvement in the LPG chain further upstream hinges on the results of ongoing studies. If it can be determined that separation plants at the gas fields, using the yield of natural gas liquids, are viable, it would be logical to invite the private sector to share the risk. As these investments are large-scale, foreign investors will have to be attracted by a clear policy on the principles of participation, and by appropriate demonstrations of market potential, including the possibility to export condensate.
- (iv) **Industrial Power Generation.** A relaxation of the standby and captive generation rules can be accomplished relatively easily, and can provide an early start for the involvement of local investors in the power sector. A broad spectrum of investment possibilities can be made available, ranging from traditional standby and self-generation, to more complex arrangements of selling surplus power to the grid, and of supplying groups of industries in a defined area. Clear provisions for the input price of gas, for the purchase price of surplus power, and for BPDB standby rates will form the necessary framework for investors' decisions. Early moves in this respect will increase power sector knowledge among local investors, and make later participation in larger generation ventures easier.
- (v) **Major Generating Plant.** Following a clear policy message that private participation in major power sector expansions will be desirable, a mechanism for investment and operation of private groups in the sector will need to be established. This could take the form of a development fund or a case-by-case approach to BOOT contracts, provided that the input price of gas as generating fuel, and the BPDB purchase price

of bulk electricity are clearly established ex ante. As in other large-scale investments, the promotion will have to be directed primarily towards foreign investors such as equipment manufacturers or specialized financing groups. A significant time lag and complex discussions can be expected before the framework is completed, and preparations should start early if power plants such as Meghnaghat are envisaged to be included. Several projects should be included in the considerations, to avoid risking the failure of negotiations of one project alone.

- (vi) Coal Development. Detailed considerations of the Barapukuria project will have to await the results of further studies examining the viability of the proposal. However, steps should be taken early to establish a consensus on the principles of private participation in this major venture, or similar ones in the Northwest. These principles, covering the nature of private investment, ownership arrangements, incentives, export potential, and the price of coal delivered to BPDB, will form the basis for discussions with international mining groups when more information on technical, economic, and financial viability is available by mid-1990. A promotion strategy should be planned early to avoid losing time when the picture becomes clearer.
- (vii) CNG Compression and Retail. Following the sharp reduction of the gasoline retail price in January 1990, investment in CNG projects has become much less attractive to private investors. If petroleum product prices were to rise again, CNG ventures to replace both gasoline and diesel fuel would become interesting again in that case, the Government should exercise restraint in its own CNG plans, and accelerate the approvals process, to enable private investors to enter the new subsector with a minimum of public sector involvement. Similar to LPG distribution in areas not covered by piped gas, CNG projects in areas close to gas grids are ideal for Bangladeshi investors with foreign technological backing.

4.4 The proposed combination of realistic policy actions and a vigorous encouragement of the main private investment possibilities should give the mobilization of private funds an impetus which would create enough momentum for a sustained development of private participation. The productive cooperation of private and public sectors in energy will provide a much-needed boost to efficiency and will contribute to the progress of deregulation and liberalization evident in recent years.

BANGLADESHPrivate Sector Participation in Energy

**PRIORITY INVESTMENT PROGRAMME
FINANCING PLAN
(Taka Millions)**

	<u>1988-89</u>		<u>1989-90</u>		<u>1990-91</u>		<u>TOTAL</u>	
	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Foreign Exchange</u>
<u>BPDB</u>								
ADP/Internal Cash Generation	1821.40		3450.68		3903.79		9175.85	
Foreign Loan		4673.15		5269.94		6864.03		16827.12
<u>REB</u>								
ADP/Internal Cash Generation	401.00		550.00		700.00		1651.00	
Foreign Loan		1244.90		1498.00		1807.50		4550.40
<u>BPC</u>								
ADP/Internal Cash Generation	90.20		138.10		190.00		418.30	
Foreign Loan		160.00		185.60		380.00		725.60
<u>BOGMC</u>								
ADP/Internal Cash Generation	524.40		627.20		759.00		1910.80	
Foreign Loan		1450.00		1457.00		2088.00		4995.00
<u>TOTAL</u>	2837.00	7528.05	4765.96	8410.54	5552.79	11159.53	13155.75	27098.12

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BANGLADESH**Private Sector Participation in Energy****1. Bangladesh Petroleum Corporation Ordinance****Date Enacted: November 11, 1976****Main Purpose of Document:**

To provide for the establishment of the Bangladesh Petroleum Corporation (BPC) for the purposes of import, refining and processing of crude petroleum, blending of lubricants, import, export and marketing of petroleum products and by-products.

Summary Assessment of Effectiveness of Document:

This regulation served to establish the effective monopoly of the government, through BPC, on all activities connected to the refining and marketing of petroleum and petroleum products, including related import and export functions.

Main Features of Document:

This regulation gives BPC the authority to acquire import and refine crude petroleum, and manufacture refined petroleum products. BPC is also responsible for determining the allocation of petroleum products among the marketing companies, establishing and expanding petroleum marketing facilities, and exporting petroleum and petroleum products. BPC is also given the authority to supervise, coordinate and control the affairs of the nationalized enterprises.

In regards to private sector, BPC is authorised to enter into any agreement or contract with any firm or company for the purpose of discharging its functions. BPC may also form companies for carrying out any of its functions, hold shares in such companies, and permit foreign or domestic private individuals or companies to hold shares.

In practice, BPC has not as yet entered any agreements or formed joint venture companies with the private sector. Currently, however, a proposal is under consideration for forming a joint venture public limited company for bottling and separation of LPG.

Aside from the above provision, the document does not include any other mention or scope for a private sector role in the petroleum market. Although not explicitly stated, the document has provided the effective basis for the exclusion of the private sector from all petroleum refining and marketing operations in practice.

The regulation can be improved from private investors view point with the inclusion of legislation or outlining the specific operations where BPC agreements with private investors are desirable, as well as provisions for

transforming the subsidiaries into public limited holding companies with at least 49% of shares offered to the private sector.

2. The Petroleum Act

Date Enacted: August 22, 1974

Main Purpose of Document:

An Act to provide for the exploration, development, exploitation, production, processing, refining and marketing of petroleum.

Summary Assessment of Effectiveness of Document:

Remains the authoritative legislation on all petroleum operations. The basis for production sharing agreements with private investors.

Main Features of Document:

Establishes the exclusive rights of the Government over all petroleum operations. With respect to private sector, the Act permits the Government and its sector corporation (BOGMC) to enter into production sharing agreements and joint ventures with private investors. However, also includes provisions for strong Government control and monitoring of private activities.

3. Bangladesh Petroleum Corporation Rules

Date Enacted: June 6, 1977

Main Purpose of Document:

To prepare a set of established rules to guide the activities of the Bangladesh Petroleum Corporation.

Main Features of Document:

This document lays down the rules governing the operations of BPC with respect to (i) procedures for forming companies; (ii) management of existing or new companies; (iii) preparation and reporting of work plan and annual budgets; (iv) preparation of programme and budget of subsidiaries; (v) determination of transfer prices and prices of refined petroleum and petroleum products; and (vi) sources of finance of the corporation.

Regarding private involvement in petroleum operations, the rules only state that BPC may act as managing agent of companies sponsored by it, or relinquish such management responsibility in favor of any private person.

The document is unclear in terms of the rules guiding BPC's relationship with the private sector. Earlier, the Bangladesh Petroleum Corporation Ordinance of 1976 contained provisions for the Corporation to enter into agreements or joint ventures with private companies, for any petroleum operation. Yet, the rules do not lay down any guidelines on the type of possible ventures with the private sector, or the procedures for correlating

such agreements. From the view point of the private sector, the BPC rules need to be amended in order to incorporate specific guidelines defining BPC's relationship with existing or potential private agents.

4. The Electricity Act (Act IX of 1910)

Date Enacted: March 18, 1910

Main Purpose of Document:

An Act to amend the law relating to the supply and use of electrical energy.

Summary Assessment of Effectiveness of Document:

To date, this regulation remains the most comprehensive and significant legislation covering all aspects relevant to the supply, transmission and use of energy.

Main Features of Document:

This Act empowers the Government to undertake operations in connection with: (i) laying of electric supply lines or other works; (ii) granting and revocation of licenses; (iii) control of transmission and use of energy; and (iv) establishment of charges for use of energy. The Act also contains administrative rules and procedures, methods for recovering payments, outline of penalties for misuse of energy and other provisions which remain in force today.

No mention is made of any private role in the supply and transmission of electricity except as a license to supply energy in a specific area.

5. The Bangladesh Water and Power Development Boards Order

Date Enacted: May 31, 1982

Main Purpose of Document:

To provide for the constitution of a Water Development Board and a Power Development Board to replace the East Pakistan Water and Power Development Authority.

Summary Assessment of Effectiveness of Document:

On the commencement of this order, two separate boards were created from the erstwhile EPWAPDA to undertake activities in the power and water sub-sectors. This Order provides BPDB with effective control over all activities related to production and supply of electrical power in Bangladesh.

Main Features of Document:

This Order gives BPDB the power and responsibility to prepare a comprehensive plan for the development and utilisation of power resources of

Bangladesh. The Board will prepare schemes for (i) generation, transmission and distribution of power; (ii) construction, maintenance and operation of power houses and grids; and (iii) undertake all other physical works for the transmission of electricity. BPDB will also fix the rate at which power is sold such as all operating costs, interest and tax payments, and depreciation charges.

Along with other regulations, this Order imposes the effective control of the public sector over all operations related to production and supply of power in Bangladesh. No provision is included for private participation in this sector.

6. The Electricity Ordinance (Ordinance No. XLII of 1983)

Date Enacted: August 25, 1983

Main Purpose of Document:

To amend Electricity Act of 1910 in order to give the electricity authorities (BPDB and REB) the power to take action against theft of energy, and for the recovery of outstanding claims against consumers.

Summary Assessment of Effectiveness of Document:

This amendment represents a recognition of the recurring systems loss arising from theft of energy through the tampering of meters and installation of artificial means for dishonest abstraction and consumption of energy. Despite the legislation, theft of energy and systems loss remains a significant problem in the power sector. Similarly, non-payment of outstanding bills for the use of energy by consumers also continues to be a major issue.

7. The Rural Electrification Board Ordinance

Date Enacted: October 31, 1977

Main Purpose of Document:

To provide for the establishment of a Board for rural electrification in Bangladesh.

Summary Assessment of Effectiveness of Document:

With the enactment of this Ordinance, the responsibility for supply of electricity in rural areas was transferred from BDPB to a separate organization.

Main Features of Document:

This regulation gives REB the right to (i) establish electricity generation, transmission, transformation and distribution systems in the rural areas of Bangladesh; (ii) take over from BPDB electrical systems in rural areas; (iii) organize prospective consumers of electricity into formal and informal groups for the purpose of execution and management of electrical schemes and providing related services; (iv) prescribe by-laws for such groups

for their registration with the Board and determine the manner of their functioning; (v) advance funds to the groups for execution of approved schemes; and (vi) hand over to any group completed schemes for operation.

With respect to the private sector, the Ordinance allows REB to discharge responsibility for operation of electrical systems to private consumer-owned cooperatives. REB will provide funds for the execution of the schemes, and provide loans to the members of the groups for the the purpose of obtaining electrical connections. REB will also approve the rate of electricity to be levied by these groups for sale of electric power to their members.

Aside from this provision for the organization of private groups for selling power to its members, the Ordinance does not envision any other role for the private sector in the generation or transmission of electricity in rural areas.

BANGLADESH

Private Sector Participation in Energy

Privatization in Industry

In pursuance of the privatization policy of the Government, so far (upto 20-3-89) 563 industrial units under the following sectors having total investment of Tk 207.07 crores have been privatized.

<u>Sl. No.</u>	<u>Sector</u>	<u>No. of Units</u>
(A)	<u>By sale of assets/transfer to Bangladesh former owners</u>	
1.	Tannery	31
2.	Rubber & Plastic	23
3.	Chemicals	34
4.	Engineering	140
5.	Food and Allied Products	151
6.	Tobacco	15
7.	Ice Factory and Cold Storage	25
8.	Specialized Jute	8
9.	Specialized Textile	29
10.	Pharmaceutical	10
11.	Printing Press	13
12.	Films and Cinema	6
13.	Hotel	4
14.	Textile Mill	30
15.	Jute Mill	35
(B)	<u>By off-loading of 49% Shares</u>	
16.	Chemicals	3
17.	Engineering	3
18.	Food and Allied Products	<u>3</u>
	Total	563

Mention may be made that the process of privatization is a continuous process.

BANGLADESH

Private Sector Participation in Energy

PUBLIC ISSUE OF HOLDING COMPANIES SHARES - EXCLUDING EMPLOYEES PORTION

Sl. No.	Name of the Issue	Subscription List		Size of Public Issue		Public Subscription		Percentage	Percentage
		Opening Date	Closing Date	Number of Shares	Amount in Taka	Number of Shares	Amount in Taka	% of Total	% of Total
1	Rupali Bank	17-01-87	16-04-87	580,000	58,000,000	1,248,454	124,845,400	193.60	19.60
2	Osmania Glass Sheet	10-06-87	30-06-87	119,000	11,900,000	435,830	43,583,000	366.24	366.24
3	Eastern Cables	16-07-87	07-09-87	580,000	58,000,000	740,570	74,057,000	128.31	128.31
4	Dhaka Vegetable Oil	25-11-87	05-01-88	289,000	28,900,000	553,695	66,369,500	229.65	229.65
5	Soninoor Chemicals	15-05-88	31-05-88	170,000	17,000,000	747,575	74,757,500	439.75	439.75
6	Atlas Bangladesh	11-06-88	20-06-88	340,000	3,400,000	5,175,050	51,750,500	1,522.07	1,522.07
7	Zeal Bangla Sugar Mills	20-06-88	14-07-88	2,040,000	20,400,000	2,583,700	26,837,000	131.55	131.55
8	Eagle Box & Carton Mfg. Co.	10-10-88	27-10-88	170,000	1,700,000	799,650	7,996,500	470.38	470.38
9	Renwick Jagneswar & Co.	15-10-88	10-11-88	58,000	5,800,000	132,875	13,287,500	235.40	235.40
10	Metalex Corporation	20-11-88	30-11-88	17,000	1,700,000	131,695	13,169,500	774.68	774.68
11	Kushtia sugar Mills	16-01-89	13-03-89	272,000	27,200,000	Subscription not yet closed		--	--
12	Ctg. Cement Clinker Grinding	09-03-89	30-03-89	292,400	29,240,000	Subscription not yet closed		--	--
				5,137,400	284,240,000	12,759,094	496,653,400	174.73	71.73

Source : Dhaka Stock Exchange Limited

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Private Sector Participation in Energy

Abolition of Departments/Agencies/Committee/
Boards consequent upon creation of Board of
Investment (BOI).

- a) Department of Industries
- b) Sub-Committee of the Investment Board
- c) Investment Board
- d) Discussion Committee of the Standing Committee of the National Committee for Industrial Development (NCID)
- e) Standing Committee of the National Committee for Industrial Development (NCID)
- f) Executive Committee of the National Committee for Industrial Development (NCID)
- g) Standing Committee for Employment of Foreign Personnel.
- h) Hard Term Loan Committee
- i) High Power Facility Board
- j) Bangladesh Licencing Board.

Private Sector Participation in Energy

The Investment Board Ordinance, 1988
Ordinance No. 32 of 1988

AN
ORDINANCE

to establish a Board for the purpose of encouraging investment in industry in the private sector and providing necessary facilities and assistance in the establishment of industries.

WHEREAS, it is expedient to make provision for establishing a Board for the purpose of encouraging investment in industry in the private sector and providing necessary facilities and assistance in the establishment of industries and for matters connected therewith;

AND WHEREAS Parliament is not in session and the President is satisfied that circumstances exist which render immediate action necessary;

NOW, THEREFORE, in exercise of the powers conferred by clause (1) of article 93 of the Constitution of the People's Republic of Bangladesh, the President is pleased to make and promulgate the following Ordinance :-

1. Short title:— This Ordinance may be called the Investment Board Ordinance, 1988.
2. Definitions:— In this Ordinance, unless there is anything repugnant in the subject or context :—
 - (a) "Board" means the Board established under section 4;
 - (b) "Chairman" means the Chairman of the Board;
 - (c) "Executive Council" means the Executive Council constituted under section 8(1);
 - (d) "letter of approval", in relation to the establishment of an industry, means a letter of approval issued under section 11(4);
 - (e) "person" includes a group of individuals, a company or a commercial establishment;
 - (f) "private sector" means an industrial sector not declared by the Government as an industrial sector reserved for the Government;
 - (g) "rules" means the rules made under this Ordinance.
3. Ordinance to override other laws:— The provisions of this Ordinance and the rules made thereunder shall have effect notwithstanding anything to the contrary contained in any other law for the time being in force.

4. Establishment of the Investment Board :- As soon as may be after the commencement of this Ordinance, the Government shall, by notification in the official Gazette, establish a Board to be called Investment Board.
5. Head Office :— The head office of the Board shall be at Dhaka, and the Board may establish its branch offices at such place or places as it considers necessary.
6. Composition of the Board :—
 - (1) The Board shall consist of the following members, namely :—
 - (a) Chairman;
 - (b) Minister in charge of the Ministry or Division dealing with industries who shall also be its Vice-Chairman, ex-officio;
 - (c) Minister in charge of the Ministry or Division dealing with finance, ex-officio;
 - (d) Minister in charge of the Ministry or Division dealing with power, fuel and mineral resources, ex-officio;
 - (e) Minister in charge of the Ministry or Division dealing with commerce, ex-officio;
 - (f) Minister in charge of the Ministry or Division dealing with textiles, ex-officio;
 - (g) Minister in charge of the Ministry or Division dealing with jute, ex-officio;
 - (h) Minister in charge of the Ministry or Division dealing with planning, ex-officio;
 - (i) Governor of the Bangladesh Bank, ex-officio;
 - (j) Secretary of the Ministry or Division dealing with industries, ex-officio;
 - (k) Secretary of the Ministry or Division dealing with finance, ex-officio;
 - (l) Secretary of the Ministry or Division dealing with internal resources, ex-officio;
 - (m) President of the Federation of the Bangladesh Chambers of Commerce and Industry, ex-officio;
 - (n) President of the Bangladesh Chamber of Industry, ex-officio;
 - (o) Chairman of the Executive Council, who shall also be its Secretary, ex-officio;
 - (2) The Chairman of the Board shall be the President or a person nominated by him from amongst the Minister-members of the Board.
 - (3) The Board may co-opt not exceeding four additional members.

(4) No act or proceeding of the Board shall be invalid or called in question merely on the ground of existence of any vacancy in, or any defect in the constitution of the Board.

7. Functions :— The functions of the Board shall be—

- (a) ~~providing of all kinds of facilities~~ in the matter of investment of local and foreign capital for the purpose of rapid industrialisation in the private sector;
- (b) implementation of the Government policy relating to the investment of capital in industries in the private sector;
- (c) preparation of investment schedule in relation to industries in the private sector and its implementation;
- (d) preparation of area-schedule for establishment of industries in the private sector and determination of special facilities for such areas;
- (e) approval and registration of all industrial projects in the private sector involving local and foreign capital;
- (f) identification of investment sectors and facilities for investment in industries in the private sector and giving wide publicity thereof abroad;
- (g) invention of specific devices for the purpose of promotion of investment in industries in the private sector and their implementation;
- (h) creation of infrastructural facilities for industries in the private sector;
- (i) determination of terms and conditions for employment of foreign officers, experts and other employees necessary for industries in the private sector;
- (j) preparation of policies relating to transfer of technology and phase-wise local production in the private sector and their implementation;
- (k) providing of necessary assistance for rehabilitation of sickly industries in the private sector;
- (l) financing and providing of assistance in the financing of important new industries in the private sector;
- (m) adoption of necessary measures for creation of capital for investment in industries in the private sector;
- (n) collection, compilation, analysis and dissemination of all kinds of industrial data and establishment of data-bank for that purpose;
- (o) doing such other acts and things as may be necessary for the performance of the above functions.

8. Executive Council :—

- (1) There shall be an Executive Council of the Board which shall consist of a Chairman and other members not exceeding six in number.
- (2) The Chairman and other members of the Executive Council shall be appointed by the Government, and the tenure of their office and terms and conditions of their service shall be determined by the Government.
- (3) The Chairman of the Executive Council shall be called the Executive Chairman and shall act as the chief executive of the Board.
- (4) The Executive Council shall advise and assist the Board in the efficient performance of its functions, be responsible for implementation of the decisions of the Board shall exercise all powers and perform all functions delegated to it by the Board.
- (5) Where the office of the Executive Chairman becomes vacant or he is unable to discharge his duties due to absence, illness or any other reason, a member of the Executive Council nominated by the Government in this behalf shall act as the Executive Chairman until the new Executive Chairman appointed to the vacant office enters upon that office or, as the case may be, the Executive Chairman becomes able to resume the duties of his office.

9. Meetings :—

- (1) Subject to the other provisions of this section, the Board shall determine the procedure for its own meetings and for the meetings of the Executive Council.
- (2) All meetings of the Board shall, with the approval of the Chairman, be convened by its Secretary and shall be held at least once in every three months at such times and places as may be determined by the Chairman.
- (3) All meetings of the Board shall be presided over by its Chairman or, in his absence, by its Vice-Chairman, and in the absence of both of them, by such member as may be nominated by the members present in the meeting from amongst themselves.
- (4) All meetings of the Executive Council shall be convened under the direction of the Executive Chairman and shall be held at such times and places as may be determined by him.
- (5) All meetings of the Executive Council shall be presided over by the Executive Chairman and, in his absence, by a member thereof as may be specified by the Executive Chairman.

10. Registration:—

- (1) All industries set up in the private sector, other than those falling within the jurisdiction of the Export Processing Zones Authority or of the Bangladesh Small and Cottage Industries Corporation and textile industries set up by own finance and the industrial projects approved by the Board, shall be registered in the prescribed manner.
- (2) An industry registered under this section shall be deemed to be an industry approved by the Board under this Ordinance, and such industry may, on its request, be provided with all such facilities as may be provided to an industrial project approved by the Board.

11. Approval etc. of an industrial project :—

- (1) Every person intending to set up an industry in the private sector, other than an industry falling within the jurisdiction of the Export Processing Zones Authority or of the Bangladesh Small and Cottage Industries Corporation, shall apply to the Board in the form and manner prescribed by it for obtaining the Board's approval on the proposed industrial project.
- (2) Notwithstanding the provisions of sub-section (i), upon recommendation of the Board, the Government may, by notification in the official Gazette, exempt any industry or any industrial project from the operation of the provisions of this section.
- (3) The Board may, for the convenience of considering an application received under sub-section (i), direct the applicant to furnish any information which it considers necessary for such purpose, and may also consult any relevant authority on any matter relating to the proposed industrial project.
- (4) If, after considering the application, the Board is satisfied that the project should be approved, it shall, subject to such conditions and limitations as it deems fit to impose, approve the same and shall issue a letter of approval to the applicant and shall specify in such letter the time-limit for the implementation of the project and also the time-limit for commencement of production thereat.
- (5) At the time of approving an industrial project under sub-section (4), the Board shall give its decisions on all facilities that may be required for implementation of the project in due time and, in particular, on all or any of the following matters, subject to their relevancy, and shall send such decisions to the concerned persons or authorities, namely :—

- (a) the extent and the terms and conditions of foreign loan and of suppliers' credit;
 - (b) allotment of land in the industrial areas under the control of, or belonging to, the Government or a local authority other than the Export Processing Zones Authority and the Bangladesh Small and Cottage Industries Corporation;
 - (c) time-limit for giving connections of electricity, gas and water-supply;
 - (d) time-limit for giving sewerage connections;
 - (e) time-limit for giving connections of all kinds of tele-communications;
 - (f) time-limit for clearing by the customs- authorities of imported machineries, spares of such machineries and raw materials;
 - (g) time-limit for issuing clearance regarding environment pollution;
 - (h) other facilities and services that may be required for speedy setting up of an industry.
- (6) A decision given by the Board under sub-section (5) shall be deemed to be a decision given by the Government or by such other person or authority as is authorized by, or entitled to give such decision under, the provisions of the relevant law on the relevant subject, and such decision shall be implemented accordingly.
- (7) No person shall, except with the prior permission of the Board, use any service or facility availed of by him pursuant to a decision under sub-section (5) for any purpose other than for the industrial project for which it was so availed.
- (8) Where an industrial project is a company registered under the provisions of the Companies Act, 1913 (VII of 1913), the Board may, in respect of all matters relating to the issue of capital and sale of shares of that company, exercise all powers and perform all functions of the Government under the provisions of the Capital Issues (Continuance of Control) Act, 1947 (XXI of 1947).
- (9) Where an industrial project faces any difficulty in the completion of the project within the time-limit specified in the letter of approval or if, after such completion, it faces any difficulty in commencing, within such time-limit, production thereat, the entrepreneur of the project may apply to the Board for removing such difficulty, and upon such application, the Board shall endeavour to extend to the entrepreneur necessary assistance.

- (10) The Board may, from time to time, require the entrepreneur of an industrial project approved under sub-section(4) to furnish such information relating to the implementation of the project as the Board may consider necessary.
12. Determination of import entitlement :—
- (1) If, an industry set up in the private sector, other than a textile industry or an industry falling within the jurisdiction of the Bangladesh Export Processing Zones Authority or of the Bangladesh Small and Cottage Industries Corporation, is in need of import entitlement for importing machineries, spares of machineries, raw-materials and packing materials for its own use, it may, in the form and manner prescribed by rules, apply to the Board for such entitlement.
- (2) The Board shall, issue to the applicant a clearance so that such machineries, spares of machineries, raw materials and packing materials may be imported in accordance with the import entitlement determined by the Board after considering the application.
13. Royalty and fees :— If an industry set up in the private sector, other than an industry falling within the jurisdiction of Export Processing Zones Authority, is required to pay to a foreign national or a foreign organisation any royalty or any fees in respect of technical know-how or technical assistance, that industry shall, in the manner prescribed by the Board, apply to the Board for determination of such royalty or fees; and the royalty or fees determined by the Board shall be payable by the industry.
14. Duties of other concerned authorities regarding an approved industrial project :—
- (1) If, at the time of approving an industrial project, the Board sends to any person or authority any decision under section 11, that person or authority shall take necessary steps so that the decision is implemented within the time-limit specified by the Board.
- (2) If such person or authority fails or is unable to take, within the time-limit specified by the Board, proper steps pursuant to such decision, the Board may, after considering the circumstances of the case, issue direction for taking proper step pursuant to the decision, and upon such direction the concerned person or authority shall be bound to take necessary step accordingly.
15. Cancellation of approval :— If an industrial project approved under section 11 contravenes any of the provisions of this Ordinance or of any rules made

- thereunder or violates any condition or limitation specified in the letter of approval, the Board may, in the manner prescribed by rules, cancel the approval of the project.
16. **Inspection, etc.:**— The Executive Council or a person or authority appointed by it may inspect the progress of the implementation of an industrial project approved under section 11 and shall, after such inspection, submit to the Board a report of the inspection.
 17. **Declaration of industrial area:**— For carrying out the purposes of this Ordinance, the Government may, by notification in the official Gazette, declare one or more areas specified therein to be an industrial area or areas.
 18. **Acquisition of land for industrial areas:**— If any land situated in an area declared under section 17 to be an industrial area is required for any industrial project approved under section 11, such land shall be deemed to be required for public purpose and it may be requisitioned or acquired for such purpose under the provisions of the Acquisition and Requisition of Immovable Property Ordinance, 1982 (11 of 1982).
 19. **Committee:**— The Board may appoint one or more committees to assist it in the performance of its functions.
 20. **Appointment of officers and other employees:**— For the proper performance of its functions, the Board may appoint such number of officers and other employees and consultants or advisers as it may deem fit.
 21. **Delegation of powers:**— The Board may, by order, delegate to the Executive Council or the Executive Chairman or a member of the Executive Council any of its powers or functions under this Ordinance or the rules made thereunder.
 22. **Power to make rules:**— The Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Ordinance.

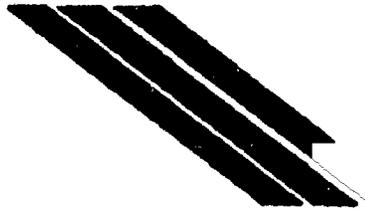
BANGLADESH

Private Sector Participation in Energy



**FOREIGN
INVESTMENT
IN BANGLADESH**

**Board of
Investment**



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In addition, the following services are rendered to the enterprises by the BOI by giving a time-limit to the concerned agencies.

- a. Electricity, gas and water supply
- b. Sewerage connection
- c. All kinds of telecommunication
- d. Customs clearance for imported machinery, spares and raw materials
- e. Clearance regarding environment pollution
- f. All other facilities and services that may be required for speedy setting up of an industry.

PROCEDURE FOR ESTABLISHING AN INDUSTRIAL PROJECT

No prior approval for establishing an industry with foreign investment is required if:

- The total project cost does not exceed Tk. 100 million (US \$ 3.3 million approx.),
- The foreign equity does not exceed 49%, and
- The proposed industry does not fall within the purview of discouraged list.

Joint venture projects not falling under the aforesaid conditions require approval of the Board of Investment.

There is no fixed ratio of equity between local and foreign investors.

Foreign equity to the extent of 100% is also allowed.

Applications in prescribed forms may be forwarded to the BOI directly or through any Bangladesh Mission abroad for consideration. Decisions on fully documented proposals are given expeditiously. BOI's approval of a project includes approval of all required facilities to implement the project.

Post investment services and facilities during the life of the project are also provided by the BOI.

INVESTMENT GUARANTEE

Foreign Private Investment (Promotion & Protection) Act, 1980 ensures legal protection to foreign investment in Bangladesh. Further, bilateral investment protection agreements have been signed by the government with several countries.

REPATRIATION FACILITIES

- Repatriation of capital invested including capital gains
- Remittance of all post-tax dividend on foreign capital
- Remittance of Royalty and Technical Fees

FISCAL INCENTIVES

Tax-holiday for 5 years for Developed Areas, 7 years for Less Developed Areas, 9 years for Least developed Areas and 12 Years for the Special Economic Zone:

20% import duty on capital machinery for industries in Developed Areas, 7.5% duty for less Developed Areas and 2.5% for Least Developed Areas.

2.5% import duty on capital machinery for selective industries using 70% or more of indigenous raw materials irrespective of their location.

2.5% import duty on capital machinery for export oriented industries irrespective of their location.

Accelerated depreciation at the rate of 80% of actual cost of machinery or plant from the year the unit starts commercial production and 20% for the following year is allowed if the industry is located in a Developed Area. If the unit is set up in a Less Developed Area the depreciation shall be 100%. Depreciation allowance can be carried forward if the unit sustains loss.

Exemption of tax on interest on foreign loans.

Exemption of tax on Royalty, Technical Know-how and Technical Assistance fees.

Liberal investment allowance for tax assessment.

Relief from Double Taxation for foreign investors.

OTHER INCENTIVES

- Tariff protection up to 4 years to the deserving industries.
- Liberal debt equity ratio.
- Suppliers' Credit under approved terms.
- Availability of long term credit facilities from industrial financing institutions.
- Income tax exemption to foreign technicians employed in approved industries for a period of 3 years.
- Remittance of 50% of the salary of foreign nationals.
- Remittance of saving from earnings, retirement benefits and personal assets of individuals on retirement/termination of service.
- Joint venture companies with capital up to Tk. 10 million need not issue public shares. For those above this amount, it is also not required at the initial stage.

ADDITIONAL INCENTIVES TO EXPORTERS

- Loan upto 90% value of Letter of Credit from commercial banks for export-oriented industries.
- Lower interest rate (presently 9%) on pre-shipment and packing credit.
- Income tax rebate upto 60% on export of non-traditional items.
- Export Credit Guarantee Scheme.
- For export-oriented industries and those located in a Least Developed Area the rate of interest will be one percent less than that charged for Development Areas.
- Rebate of 25% on excise duty on additional production if such unit produces more than 100% of sanctioned capacity.

MANPOWER CONDITIONS

Bangladesh offers a substantial manpower reserve - skilled, semi-skilled, unskilled, educated and otherwise. The availability of an inexpensive, trained and easily trainable labour force permit industrial production at a comparatively low cost.

EXPORT PROCESSING ZONE

The Export Processing Zone in Chittagong provides the necessary fiscal and infrastructural facilities for export-oriented enterprises. Foreign investment to the extent of 100% of ownership is allowed in the Export Processing Zone. An air-based Export Processing Zone will soon be set up near the capital, Dhaka.

STOCK EXCHANGE

The Stock Exchange Market provides services of purchase and sale of shares, securities, debentures and underwriting of public limited companies to enable industries to augment capital requirements.

SCOPE OF JOINT VENTURE

BOI welcomes joint venture projects involving Bangladeshi and foreign entrepreneurs on mutually beneficial terms and conditions, particularly in the following areas:

- Export-oriented industries
- Hi-tech products which will either be efficient import substitute or export-oriented
- Undertakings in which more diversified use of indigenous natural resources are made, and
- Existing public and private enterprises for increasing productivity and/or improving quality of products.

COURTESY SERVICE

The BOI extends services for reception, hotel booking, transport and drawing up itinerary in accordance with the needs of the entrepreneurs visiting Bangladesh.

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The Board of Investment,
Shilpa Bhaban,
91 Motijheel C.A.,
Dhaka-1000, Bangladesh.
Telex: 642212 BOI BJ.

Private Sector Participation in Energy

HIGHLIGHTS OF STOCK MARKET AS ON 31ST DECEMBER, 1988

GROWTH PATTERN OF LISTED ISSUES	1988	1987	1986	1985
Total Number of Listed Securities	111	92	82	72
Total Number of Listed Shares, Debentures and M.F. Certificates	123,063,478	105,280,078	99,591,958	86,451,148
Total Issued Capital of All Listed Securities in Taka	3,663,693,270	3,149,698,270	2,653,049,270	2,059,677,270
Percentage of Increase of Issued Capital	18.39	18.72	28.81	33.18
Average Issued Capital	33,006,246	34,235,851	32,354,259	28,606,629
Total Market Capitalisation of All Listed Securities in Taka	13,556,871,544	12,670,977,316	5,730,616,996	3,492,637,059
Percentage of Increase of Market Capitalisation	7.30	121.21	64.08	54.78
Average Market Capitalisation	122,133,978	137,728,014	69,885,573	48,508,848

TURNOVER OF SHARES AND DEBENTURES	1988	1987	1986	1985
Total Turnover - Volume in Shares and Debentures	1,023,936	1,876,326	849,144	591,838
- Value in Taka	130,033,941	177,656,656	47,851,645	32,269,641
Percentage of Increase - Volume	-45.43	120.97	43.48	5375.93
- Value	-26.81	271.27	48.29	2229.14
Daily Average Transaction - Value in Taka	490,694	662,898	170,291	116,078
Weekly Average Transaction - Value in Taka	2,500,653	3,416,474	920,224	620,570
Monthly Average Transaction - Value in Taka	10,836,162	14,804,721	3,987,637	2,689,137
Annual Transaction - Value in Taka	130,033,941	177,656,656	47,851,645	32,269,641

PUBLIC ISSUES OF LISTED SECURITIES (SHARES AND DEBENTURES)	1988	1987	1986	1985
Number of Public Issue	21	9	9	19
Size of Public Issue - Volume in Shares	7,401,550	3,487,500	987,000	5,536,700
- Value in Taka	302,955,000	265,050,000	81,150,000	194,120,000
Public Subscription - Volume in Shares	17,666,115	6,201,489	1,797,775	9,602,567
- Value in Taka	721,543,600	458,049,900	122,614,000	331,577,000
Percentage of Subscription - Volume	238.68	177.82	182.15	173.43
- Value	238.17	172.82	151.10	170.81
Percentage of Subscription - Volume	138.68	77.82	82.15	73.43
- Value	138.17	72.82	51.10	70.81

BANGLADESH

Private Sector Participation in Energy

PETROLEUM PRODUCT PRICES (NOMINAL) 1980-1988
 (Last Effective Price Change in 1986)
 Tk/liter (except LPG, which = Tk/12.5 kg cylinder)
 Ex Depot Chittagong

PRODUCT	EFFECTIVE DATE						
	July 1980*	May 1981*	Sept. 1981*	July 1982*	March 1983*	July 1984*	June 27 1986***
LPG	54.36	54.31	54.36	54.36	105.00	105.00	113.50
Premium Gasoline (with HBOC)	10.73	11.58	12.09	15.28	18.66	18.78	13.58 <u>1/</u>
Gasoline (ms)	10.20	10.64	11.11	14.03	14.67	14.67	12.88 <u>1/</u>
Jet Fuel (JP-1)	6.23	6.87	7.20	9.24	9.25	9.25	8.44
Kerosene (SKO)	3.88	4.95	5.20	7.22	7.22	7.22	6.71
Diesel Oil (HSD)	4.95	4.95	5.20	7.22	7.22	7.22	6.71
Jute Batching Oil (JBO)	na	na	na	na	na	8.18	7.52
Hi-Sulph Fuel Oil (HS)	2.86	3.87	3.85	5.40	5.00	5.40	4.70

 na = not available

* Bangladesh Petroleum Corporation (BPC)

*** GOB Min. of Energy & Mineral Resources, Petroleum and Mineral Resources Division

1/ January 1990: reduction to Tk 7.51/L (regular) and Tk 7.89/L (premium).

BANGLADESH

Private Sector Participation in EnergyRETAIL NATURAL GAS PRICES 1980-1988
Tk/mcf
(Except Domestic Unmetered in Tk per month)

	June 7 1980	June 7 1981	July 1 1982	June 30 1983	June 27 1984	June 30 1985	June 27 1986	June 18 1987	July 1988
RETAIL CONSUMER CATEGORIES									
Bulk Power	7.75	9.30	10.50	11.50	13.05	15.66	19.09	24.82	28.54
Bulk Fertilizer	7.75	9.30	10.50	11.50	13.05	15.66	19.09	24.82	28.54
Industry	18.00	27.75	31.00	36.00	36.00	43.20	52.14	52.14	59.96
Commercial	19.00	28.00	31.00	36.00	45.20	54.24	65.39	65.00	97.75
Tea Estates						60.00	72.30	na	83.15
Seasonal (Brick)					51.00	65.00	78.30	na	90.05
Domestic Metered	18.00	20.00	27.00	34.00	34.00	40.80	44.88	56.10	56.10
Domestic Unmetered									
- 1 burner	22.00	25.00	35.00	45.00	45.00	60.00	66.00	80.00	92.00
- 2 burner	40.00	45.00	65.00	80.00	80.00	100.00	110.00	130.00	150.00
additional burner						41.00	45.00	56.00	64.00
oven (each)						89.00	97.00	121.00	139.00
additional oven (each)						45.00	49.00	61.00	70.00
grill (each)						89.00	97.00	121.00	139.00
additional grill						45.00	49.00	61.00	70.00
water heater <20 gal						177.00	194.00	242.00	278.00
water heater >20 gal						221.00	242.00	303.00	348.00
dryer (each)						265.00	291.00	364.00	419.00
refrigerator (each)						177.00	194.00	242.00	278.00

Sources: BOGMC, Titas

* Category introduced at this point

BANGLADESH

Private Sector Participation in EnergyBPDB FY89 Tariff Summary

Class of Consumer	Category	Tariff		
		1/ TK/kWh	2/ TK/kW	3/ TK/Month
<u>Domestic</u> (up to 50 kW)	A			
1st slab (0-70 kWh)		1.30	0.00	5.00 (Single Phase)
2nd slab (71-200 kWh)		1.45	10.00	25.00 (Three Phase)
3rd slab (beyond 201 kWh)		2.90	10.00	
<u>Agricultural</u> (up to 50 kW)	B			
Flat Rate		1.75	35.00	25.00
Off-peak Rate (exceeding 20 kW)		1.40		
Peak Rate (exceeding 20 kW)		4.05		
<u>Small Industrial</u> (up to 50 kW)	C			
Flat Rate		2.35	35.00	60.00
Off-Peak Rate (exceeding 20 kW)		2.05		
Peak Rate (exceeding 20 kW)		4.30		
<u>Education, Hospitals, Religions and Charitable Institutions</u> (up to 60 kW)	D			
		1.70	15.00	5.00 (Single Phase) 25.00 (Three Phase)
<u>Commercial</u> including offices, commercial establishments (up to 2.5 MW)	E			
Flat Rate		2.85	40.00	5.00 (Single Phase)
Off-peak Rate (exceeding 50 kW)		2.05		25.00 (Three Phase)
Peak Rate (exceeding 50 kW)		5.48		350.00 (8.35/11kV)
<u>Large General Purpose</u> (up to 2.5 MW, beyond 50 kW supply at 11kV)	F			
Flat Rate		2.15	40.00	350.00
Off-Peak Rate		1.75		
Peak Rate		4.05		
<u>Extra High Voltage</u> (up to 150 MW and at 132-kV)	G			
Off-Peak Rate		0.80	35.00	To be determined on individual basis
<u>High Voltage General Purpose</u> (up to 10 MW and at 33-kV)	H			
Flat Rate		2.05	35.00	400.00
Off-Peak Rate		1.70		
Peak Rate		3.80		
<u>REB/PBS</u> (up to 10 MW and at 33-kV)	I			
Flat Rate		1.19	-	400.00
Off-Peak Rate		0.80		
Peak Rate		2.90		
<u>Street Light & Water Supply</u> (up to 50 kW)	J			
		2.20	35.00	200.00
<u>Temporary Power Service</u>	Category E or F or H whichever is applicable, multiplied by 2.			

1/ There is an additional charge of Tk 0.05/kWh levied as electricity duty on all categories of consumer except Category I.

BANGLADESH

Private Sector Participation in EnergyNominal and Economic Energy Prices late 1988
(Taka)

Product	Unit	Domestic Retail Price	Estimated Economic Price	Type
Premium Gasoline	liter	13.56 ^{1/}	4.29 ^{1/}	CIF
Diesel	liter	6.71	3.78	CIF
Kerosene	liter	6.71	4.18	CIF
Fuel Oil	liter	4.70	2.67	CIF
LPG	12.5 kg cylinder	113.50	86-135	CIF plus transport
Natural Gas	MCF	29-98	12-54 45-98	LRMC LRMC plus deple- tion premium
Power (average)	kWh	1.96	3.3	Average LRMC

^{1/} January 1990: domestic retail price Tk 7.89/L, estimated economic price about Tk 5.15 (L).

BANGLADESH

Private Sector Participation in Energy

Relative Retail[1] Energy Prices 1989

Products	Energy Content[2] BTU X 1000/Unit	Price (per mm BTU)[4]	
		Tk	\$
Petroleum Products			
LPG	45.2/kg	212.39	6.46
Gasoline (MS)	32.5/ltr	406.15 <u>6/</u>	12.35 <u>6/</u>
Kerosene (SKO)	34.9/ltr	196.85	5.98
Diesel Oil (HSD)	35.7/ltr	192.44	5.85
Fuel Oil. (FOHS) [5]	37.0/ltr	127.03	3.86
Natural Gas			
Power	.941/scf	30.33	0.92
Fertilizer	.941/scf	30.33	0.92
Industry	.941/scf	63.72	1.94
Commercial	.941/scf	103.88	3.16
Tea Estates	.941/scf	88.36	2.69
Seasonal (Brick)	.941/scf	95.70	2.91
Domestic (metered)	.941/scf	97.77	2.97
Firewood[3]			
Urban - Dhaka	6.5/lb	129.97	3.95
Urban - Rangpur	6.5/lb	93.50	2.84

-
- [1] For oil products, except fuel oil, retail prices are official ex-filling station or retail outlet prices for locations within 40 km of oil company depots. These prices are equal to the ex-depot prices plus allowable equalized transport costs and dealer's margins.
- [2] Lower heating values
- [3] Based on Jan 1988 prices of 69.5 Tk/maund Dhaka and 50 Tk/maund Rangpur (1 maund = 82.27 lbs).
- [4] 32.9 Tk = 1 \$
- [5] Ex-depot price
- [6] January 1990: Tk 237 or \$7.15 per mmBtu.

BANGLADESH

Private Sector Participation in EnergyComparative Financial Cost of Household Energy

Energy Form	Costs[1]	Conversion[3,4]	Costs/Unit[6]
	Tk/mm BTU	Efficiency	Energy Delivered Tk/mm BTU
Fuelwood Dhaka	129.97	12 - 15 (12)	1083
Fuelwood Rangpur	93.50	12 - 15 (12) [2]	779
Natural Gas metered	97.77	30 - 60 (35)	279
Kerosene	196.85	20 - 50 (30)	656 [7]
LPG	212.39	35 - 60 (35) [5]	607 [7]

-
- [1] From previous page
- [2] Depends on type of stove and pot, assumption here is mud/clay stove (formed open fire) and aluminum pot.
- [3] Depends on stove type. Figures used are meant to be for illustrative purposes only.
- [4] Figures in parentheses used in calculation of costs/unit energy delivered.
- [5] LPG efficiency often slightly higher than natural gas but for illustrative purposes here set at same efficiency.
- [6] Energy costs stoves or other equipment costs excluded.
- [7] Higher combustion efficiency makes 1t LPG = 1.5t kerosene, thus widening the price gap per energy delivered for cooking.

BANGLADESH

Private Sector Participation in EnergyField ViabilityBasic Economics - No Government Take

1. OIL FIELDS ONLY

Field Sizes (MM barrels)	10	30	100
Number of development wells	3	6	12
Average maximum well productivity (bopd)	1300	1300	2500
Exploration costs (MM 1987 \$)	15	15	15
Total development costs (MM 1987 \$/yr)	50	100	200
Fixed Operating costs per year (MM 1987 \$/yr)	4	7	12

ROR on Total Capital (%)

(Current \$)

- Based on \$15 by the year 2000	9%	27%	38%
- Based on \$25 by the year 2000	26%	44%	56%

2. GAS FIELDS ONLY

Field Sizes (Bcf)	800	2000	5000
Number of development wells	8	12	18
Average maximum well productivity (MMcft/d)	24	27	46
Exploration costs (MM 1987 \$)	25	15	15
Total development costs (MM 1987 \$)	130	200	300
Fixed Operating costs per year (MM 1987 \$/yr)	9	12	18

RESULTS

ROR on Total Capital (%)

(Current \$)

-Based on \$15 by the year 2000			
- No Export by pipeline	25%	26%	N/A
- Export by pipeline	31%	44%	53%
-Based on \$25 by the year 2000			
- No exports by pipeline	40%	40%	N/A
- Exports by pipeline	50%	62%	70%

BANGLADESH

Private Sector Participation in EnergyPetroleum Product Consumption in Bangladesh
(Metric Tons)

Product	1985/86	1986/87	1987/88
HOBC High Octane Blending Compound for Premium Gasoline	7,573	9,538	11,294
MS Motor Spirit (Gasoline)	53,323	58,628	76,844
SKO Kerosene	384,485	394,090	497,088
HSD High Speed Diesel	648,435	674,184	800,117
LDO Light Diesel Oil	16,189	11,508	13,552
FO (HS) High Sulphur Fuel Oil	385,072	283,234	327,964
JBO Jute Batching Oil	26,252	28,384	31,822
LPG Liquid Petroleum Gas	8,951	8,800	9,000
Bitumen	32,564	N.A.	N.A.
JP-1 Jet Fuel	76,171	71,897	100,063
Lubes and Others	23,001	25,266	30,145
TOTAL	1,662,404	1,565,529	1,897,889

BANGLADESH
Private Sector Participation in Energy

Baghabari and Marleshchira LPG Bottling and Transport

ITEMS	Physical Quantity of Work	Total Provision Financial			1986-1987			Year-wise Expenditure 1987-1988			1986-1987			1989-1990		
		Total	Local	F E	Total	Local	F E	Total	Local	F E	Total	Local	F E	Total	Local	F E
I Pre-Construction Expenditure																
a Land (Baghabari)	4 acres	16 00	16 00	-	4 00	4 00	-	12 00	12 00	-	-	-	-	-	-	-
b Land Development	4 acres	4 00	4 00	-	-	-	-	4 00	4 00	-	-	-	-	-	-	-
II Construction Works																
a Office Building (1 No.)	125 M2	3 80	3 80	-	-	-	-	1 30	1 30	-	2 50	2 50	-	-	-	-
b Residential Bldg (1 No.)	135 M2	5 00	5 00	-	-	-	-	1 50	1 50	-	3 50	3 50	-	-	-	-
c Other Construction Works																
1 Maintenance Shop 1 No.	140 M2	3 00	3 00	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Product Pump House 1 No.	29 M2	0 65	0 65	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Fire Pump House 1 No.	15 M2	0 35	0 35	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Fill loading & Tanklorry shed	425 M2	9 00	9 00	-	-	-	-	5 00	5 00	-	9 00	9 00	-	2 50	2 50	-
5 Boundary wall, Internal drain, concrete pavement, etc		3 50	3 00	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Foundation of storage spheres & tanks		15 00	15 00	-	-	-	-	2 50	2 50	-	10 00	10 00	-	2 50	2 50	-
7 Pipelines laying & construction of oil mooring		40 00	40 00	-	-	-	-	6 00	6 00	-	26 00	26 00	-	8 00	8 00	-
III Machinery & Equipment (incl spares)																
LPG Bulk Carrier																
a Bay crossing type (800 MT capacity) duty @50%	1 No	405.00	135 00	270 00	-	-	-	-	-	-	40 00	-	40 00	365 00	135 00	230 00
b LPG Tank Lorry (MT capacity) @50%	3 Nos	84 00	28 00	56 00	-	-	-	-	-	-	8 00	-	8 00	76 00	28 00	48 00
c Spherical Tanks (500 m3/250 Mton)	1 No	137.50	12 50	125 00	-	-	-	18 50	-	18 50	119 00	12 50	106 50	-	-	-
d Horizontal Tank (50 M3/250 ton) duty @10%	2 Nos															
e Pipeline facilities, 2 pumps meter arms, couplings, valves, etc at Ctg & Baghabari w/ duty @15% Filling M/C's for bottling plant (2000 bottles of 12.5 KG capacity per shift), 1 product pump, 1 air compressor, evacuating unit w/ gas compressor, 1 surge tank, pipe, fitting & other auxiliary equip, duty @10%		69 00	9 00	60 00	-	-	-	10 00	-	10 00	59 00	9 00	50 00	-	-	-
f Fire fighting equip, duty @100%		40 00	20 00	20 00	-	-	-	3 00	-	3 00	37 00	20 00	17 00	-	-	-
g Cylinders, duty @ 100%	35,000 Nos	385.00	192 50	192 50	-	-	-	-	-	-	29 00	-	29 00	356 00	192 50	163 50
h Transportation to site (w/o LPG Vessel & Tank Lorry)		7 00	7 00	-	-	-	-	-	-	-	3 00	3 00	-	4 00	4 00	-
IV Transport																
Microbus (12 seater) & car	1 No & 1 No	11.00	11 00	-	-	-	-	5 50	5 50	-	5 50	5 50	-	-	-	-
V Others																
a Cost of supervision, erection		23 00	5 00	18 00	-	-	-	-	-	-	10 00	2 00	8 00	13 00	3 00	10 00
b Commissioning & Installation		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
c Manpower (details at pp 18)	14 persons	57 70	12 70	45 00	-	-	-	28 06	5 56	22 50	28 06	5 56	22 50	1 58	1 58	-
d Training (details at Az V)	4 persons	15 00	2 50	12 50	-	-	-	-	-	-	11 00	1 50	9 50	4 00	1 00	3 00
e Overhead		5 00	5 00	-	-	-	-	0 50	0 50	-	1 00	1 00	-	3 50	3 50	-
f Unforeseen/physa contingency		14 00	5 00	9 00	-	-	-	1 50	0 50	1 00	5 00	1 00	4 00	7 50	3 50	4 00
g Interest		167 00	167 00	-	-	-	-	6 50	6 50	-	42 00	42 00	-	118 50	118 50	-
Total		1,619 50	721 00	898 00	4 00	4 00	0 00	68 36	44 86	42 00	500 06	163 06	371 00	962 08	503 58	428 50
Total Cost Escalation		245 83	117 03	128 80	-	-	-	-	-	-	53 41	16 31	37 10	192 42	100 72	91 70
Total Investment		1,865 33	838 03	1,026 80	4 00	4 00	0 00	68 36	44 86	42 00	553 47	179 37	408 10	1,154 50	604 30	520 20

BANAJI ARI SHI
Year-wise Physical and Financial

Schedule of Work

ITEMS	Physical Quantity of Work	Total Provision Financial			Year-wise Expenditure (Taka in Lakh)													
		Total	Local	F E	1986-1987			1987-1988			1988-1989			1989-1990				
					Total	Local	F E	Total	Local	F E	Total	Local	F E	Total	Local	F E		
I Pre-construction Expenditure																		
a Land (Kailashtila)	4 acres	4 00	4 00	-	1 00	1 00	-	3 00	3 00	-	-	-	-	-	-	-	-	-
b Land Development	4 acres	2 00	2 00	-	-	-	-	2 00	2 00	-	-	-	-	-	-	-	-	-
II Construction Works																		
a Office Building (1 No.)	125 M2	3 70	3 70	-	-	-	-	1 20	1 20	-	2 50	2 50	-	-	-	-	-	-
b Residential Building (1 No.)	135 M2	7 00	5 00	-	-	-	-	1 50	1 50	-	3 50	3 50	-	-	-	-	-	-
c Other Construction Works																		
1 Maintenance Shop (1 No.)	140 M2	3 00	3 00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Product Pump House (1 No.)	29 M2	0.65	0 65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Fire Pump House 1 No	15 M2	0 35	0 35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Filling & Lending Shed	300 M2	6 50	6 50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 Boundary Wall, Internal road, dike drain, concrete pavement, etc		3 50	3 50	-	-	-	-	4 00	4 00	-	8 00	8 00	-	-	-	2 00	-	-
6 Foundation of storage	3 Nos	15.00	15 00	-	-	-	-	2 50	2 50	-	10 00	10 00	-	-	-	2 50	-	-
III Machinery & Equipment (incl. spares)																		
a Spherical Tanks (500 M3/250 M Ton)	1 No	8 00	8 00	8 00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b Horizontal Tank (50 M3/25 M Ton) duty @10%	2 Nos	49 50	4 50	45 00	-	-	-	18 50	-	18 50	119 00	12 50	106 50	-	-	-	-	-
c Filling M/C's for Bottling Plant (2000 bottles of 12.5 Kg capacity per shift) 1 product pump, 1 air compressor, evacuating unit w/ 1 gas compressors 1 surge tank, pipe & fittings & other auxiliary equipment; duty @10%		99 00	9 00	90 00	-	-	-	13 50	-	13 50	85 50	9 00	76 50	-	-	-	-	-
d Fire fighting equip., duty @100%		40 00	20 00	20 00	-	-	-	3 00	-	3 00	37 00	20 00	17 00	-	-	-	-	-
e Cylinders	25,000 Nos	275 00	137 50	137 50	-	-	-	-	-	-	21 00	-	21 00	254 00	137 50	116 50	-	-
f Transportation to site		5 00	5 00	-	-	-	-	-	-	-	2 00	2 00	-	3 00	3 00	-	-	-
IV Transport																		
Microbus (12 seaters)	1 No	6 00	6 00	-	-	-	-	6 00	6 00	-	-	-	-	-	-	-	-	-
V Others																		
a Cost of Supervision, erection		18 00	5 00	13 00	-	-	-	-	-	-	8 00	2 00	6 00	10 00	3 00	7 00	-	-
b Commissioning & Installation																		
c Manpower	12 persons	56.80	11 80	45 00	-	-	-	27 70	5 20	22 50	27 70	5 20	22 50	1 40	1 40	-	-	-
d Training	4 person	15 00	2 50	12 50	-	-	-	-	-	-	11 00	1 50	9 50	4 00	1 00	3 00	-	-
e Overhead		3 00	3 00	-	-	-	-	0 50	0 50	-	1 00	1 00	-	1 50	1 50	-	-	-
f Unforeseen/physical contingency		7 00	3 00	4 00	-	-	-	1 50	0 50	1 00	3 00	1 00	2 00	2 50	1 50	1 00	-	-
g Interest		99 50	99 50	-	-	-	-	5 00	5 00	-	29 50	29 50	-	65 00	65 00	-	-	-
Total		731 00	361 50	375.00	1 00	1.00	0 00	89 90	31 40	58 50	368 70	107 70	261 00	345 90	213 90	127 50		
Total Cost Escalation		106 05	54 37	51 60	-	-	-	-	-	-	36 87	10 77	26 10	69 18	43 68	25 50		
Total Investment Cost		837 05	415 87	426 60	1 00	1 00	0 00	89 90	31 40	58 50	405 57	118 47	287 10	415 08	257 58	153 00		

BANGLADESH

Private Sector Participation in Energy

LPG Bottling Plant Viability: 5,000 and 10,000 tpa
(Tk million)

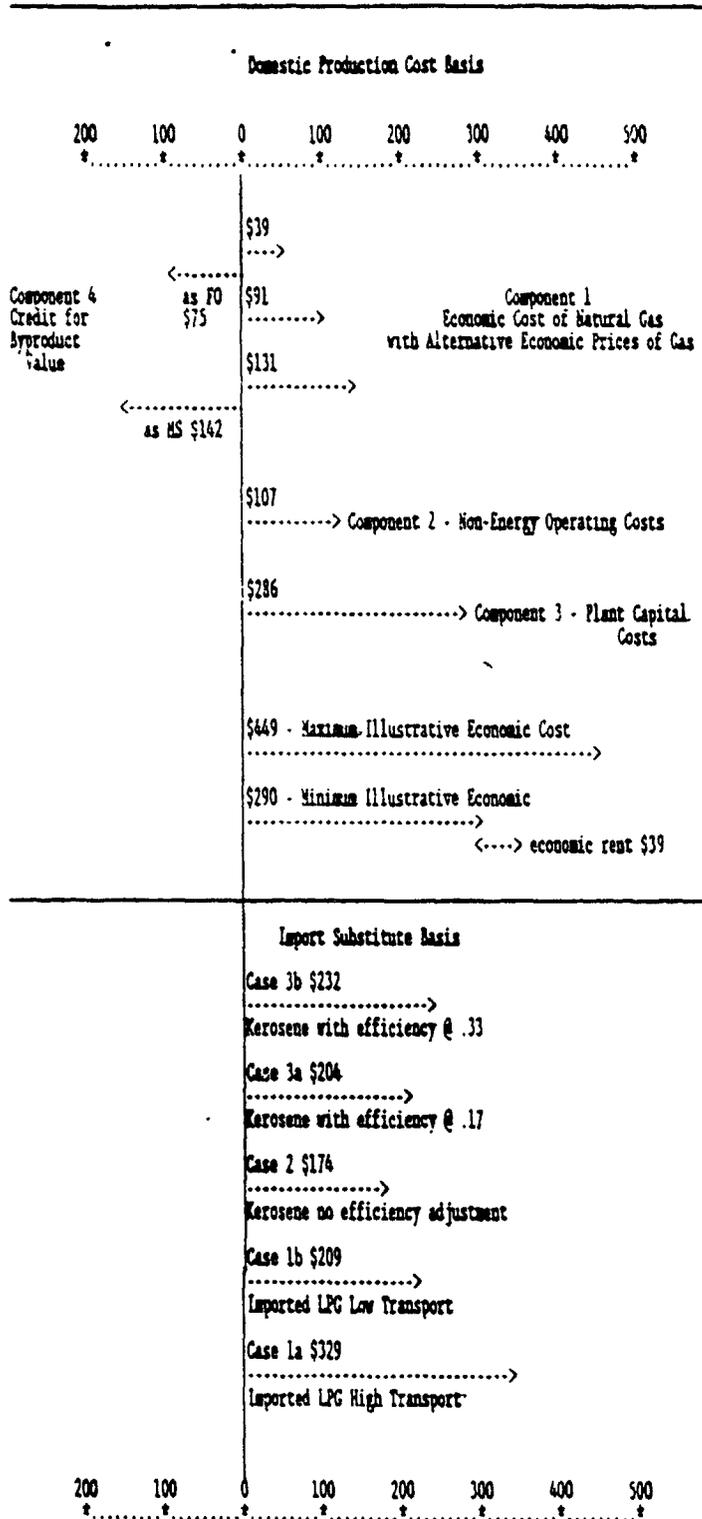
Cost	Year 1	Year 2	Year 3	Year 4-20
5,000 tpa				
Capital Investment	60	60	-	-
O & M 2% of Assets	-	-	2.4	2.4
Cost of bulk LPG ex ref. (T 3,980/f)	-	-	11.9 (3000t)	19.8 (5000t)
Transport (T 1,600/f)	-	-	4.8	8.0
Total Cost	60	60	19.1	30.2
Benefit				
Sales ex plant at T 120/cylinder = T 9,600/t	-	-	28.8	48.0 [IRR=11%]

Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7-20
10,000 tpa							
Capital Investment	60	60	-	60	60	-	-
O & M at 2% of Assets	-	-	2.4	2.4	2.4	4.8	4.8
Cost of Bulk LPG (T 5,680/t delivered)	-	-	16.7 (3000t)	22.2 (5000t)	22.2 (5000t)	38.9 (7000t)	44.4 (10,000t)
Total Cost	60	60	19.1	84.6	84.6	43.7	49.2
Sales at T 120/cylinder (T 9,600t)	-	-	28.8	48.0	48.0	67.2	96.0 [IRR=14%]

BANGLADESH

Private Sector Participation in Energy

TWO PERSPECTIVES ON ECONOMIC PRICE OF LPG



BANGLADESH

Private Sector Participation in Energy

Full Substitution: Gasoline/Diesel vs. CNG

1. <u>Comparative Retail Price</u>	<u>Tk (mm Btu)</u>
Gasoline at Tk 12.88/l	406
Gasoline at Tk 7.51/l	237
Diesel at Tk 12.88/l	400
CNG at Tk 180/MCF	191
CNG at Tk 130/MCF	122
LPG at Tk 120/cylinder	212
LPG at Tk 170/cylinder	301
2. <u>Conversion</u>	
(i) Gasoline to CNG: Conversion cost	Tk 20,000
Annual use about 1,900 l gasoline or 54 MCF of CNG	
Annual gasoline cost at Tk 12.88/l:	Tk 24,500
Annual CNG cost at Tk 180/MCF :	Tk 9,700
Annual Saving :	<u>Tk 14,800</u>
Annual gasoline cost at Tk 7.51/l :	Tk 14,300
Annual Saving :	<u>Tk 4,600</u>
(ii) Diesel to CNG: Conversion cost Tk 30,000-40,000	
Annual use about 3,800 l diesel	
or 108 MCF of CNG	
Annual diesel cost at Tk 6.71/l :	Tk 25,500
Annual CNG cost at Tk 180/MCF :	Tk 19,400
Annual Saving :	<u>Tk 6,100</u>
Annual diesel cost at Tk 10/l :	Tk 37,900
Annual Saving :	<u>Tk 18,500</u>
Annual diesel cost at Tk 12.88/l :	Tk 48,800
Annual Saving :	<u>Tk 29,400</u>

BANGLADESH

Private Sector Participation in Energy

CNG Project Costs and Benefits (Tk million)

<u>Year</u>	<u>Capital Invest.</u>	<u>Conver. Kits</u>	<u>D&M and Electricity</u>	<u>Cost of Gas at T 29/MCF</u>	<u>Total Cost</u>	<u>Sales of Conver.Kits</u>	<u>CNG Sales at T 180/MCF</u>	<u>CNG Sales at T 100/MCF</u>	<u>Cost of Gas at T 80/MCF</u>	<u>CNG Sales at T 130/MCF</u>
1	17.4	-	3.8	-	21.0	-	-	-	-	-
2	17.1	22.0	10.7	2.0	51.8	25.1	12.2	6.8	4.1	8.8
3	18.2	35.2	21.3	5.1	79.8	40.2	31.6	17.5	10.5	22.8
4	9.2	39.2	21.0	8.8	78.4	45.2	53.5	29.7	17.8	38.6
5	-	35.2	25.0	11.8	72.0	40.2	72.9	40.5	24.3	52.7
6	-	-	25.0	11.8	36.8	-	72.9	40.5	24.3	52.7
7	-	-	25.0	11.8	36.8	-	72.9	40.5	24.3	52.7
8	-	-	25.0	11.8	36.8	-	72.9	40.5	24.3	52.7
9	-	-	25.0	11.8	36.8	-	72.9	40.5	24.3	52.7
10	8.8	-	25.0	11.8	45.6	-	72.9	40.5	24.3	52.7
11	8.8	-	25.0	11.8	45.6	-	72.9	40.5	24.3	52.7
12	10.0	-	25.0	11.8	45.6	-	72.9	40.5	24.3	52.7
13	4.9	-	25.0	11.8	41.7	-	72.9	40.5	24.3	52.7
14-25	-	-	25.0	11.8	36.8	-	72.9	40.5	24.3	52.7

BANGLADESH

Private Sector Participation in Energy

CNG Project - Internal Rate of Return

<u>CNG BULK Purchase Cost</u> (Tk/MCF)	<u>CNG Retail Price</u> (Tk/MCF)	<u>IRR</u> %
29	180	44
29	130	19
29	100	-3
60	180	29

BANGLADESH

Private Sector Participation in Energy

ECONOMIC VALUES OF INITIAL CAPITAL WITH CONTINGENCIES

COST BASIS : Q4 1988, £1 = TK55

TK 10⁶

ITEM	UK SUPPLY			LOCAL SUPPLY			TOTALS	
	Financial* Cost	Conversion Factor	Economic Value	Financial Cost	Conversion Factor	Economic Value	Financial Cost	Economic Value
Site Development	1,784	1.0	1,784	110	0.8	88	1,894	1,872
U/G Equipment	1,156	1.0	1,156	-	-	-	1,156	1,156
Surface Equipment	986	1.0	986	-	-	-	986	986
Surface Infrastructure	-	-	-	658	0.8	526	658	526
Total - Initial Capital with Contingencies	3,925	1.0	3,925	768	0.8	614	4,694	4,540

Note: Economic Value of Replacement Capital is Financial Cost of Replacement Capital/1.025 (to exclude Import Duties).

Working Capital is excluded from the economic analysis.

* Excluding import duties.

BANGLADESH

Private Sector Participation in Energy

ECONOMIC VALUES OF CASH OPERATING COSTS AT FULL PRODUCTION, WITH CONTINGENCIES

COST BASIS : Q4 1988, £1 = TK55

TK 10⁶

ITEM	UK SUPPLY			LOCAL SUPPLY			TOTALS	
	Financial* Cost	Conversion Factor	Economic Value	Financial Cost	Conversion Factor	Economic Value	Financial Cost	Economic Value
U/G	222.23	1.0	222.23	4.25	0.8	3.40	337.59	336.74
Surface	49.35	1.0	49.35	6.80	0.8	5.44	56.15	54.79
Townsite	-	-	-	4.37	0.8	3.50	4.37	3.50
Power	-	-	-	58.54	0.8	46.83	58.54	46.83
Manpower (Year 10 onwards)	-	-	-	131.98	0.8	105.58	131.98	105.58
Subtotal - Direct	271.58	1.0	271.58	205.94	0.8	164.75	477.52	436.33
Indirect	-	-	-	55.61	0.8	44.49	55.61	44.49
Total - Cash Operating Costs with Contingencies	271.58	1.0	271.58	261.55	0.8	209.24	533.13	480.82

* Excluding import duties

BANGLADESHPrivate Sector Participation in Energy

**ECONOMIC BORDER PRICES OF
BARAPUKURIA COAL FOR THE
ECONOMIC ANALYSIS**

	Ex-Mine Border Prices for the Mine-mouth Power Station		
	Financial Price	Conversion Factor	Economic Price
COST STRUCTURE			
C & F - USD/tonne	48.00		
		TK/tonne (4th Qtr 1988)	
C & F - TK/tonne	1,584	1.00	1,584
Import taxes (10.25%)	162	0.00	-
Ship unloading (USD 1.05/t)	35	1.00	35
Misc. Handling/Depot charges	81	0.8	65
Total - TK/tonne	1,862	-	1,884
Total - USD/tonne	56.42	-	51.03

Price Basis: 4th Qtr 1988 USD 1.00 = TK 33

BANGLADESH

Private Sector Participation in Energy

ECONOMIC COST COMPARISONS FOR A 260 MWe POWER STATION

4th QTR 1988

	Steam Electric							Combined	
	Coal	Fuel Oil \$10/bbl	Fuel Oil \$15/bbl	Fuel Oil \$20/bbl*	H.S. Diesel Oil \$10/bbl	H.S. Diesel Oil \$15/bbl	H.S. Diesel Oil 20/bbl	N. Gas	N. Gas
Total Capital and O & M Costs - USD 10 ⁶ /yr	32.5	22.7	22.7	22.7	22.7	22.7	22.7	21.8	22.5
- Mills/kWh	19.1	13.4	13.4	13.4	13.4	13.4	13.4	12.5	13.3
FUEL COSTS									
Net Heat Rate (HHV) - Btu/kWh	10,210	9,490	9,490	9,490	9,490	9,490	9,490	9,750	8,170
Heat Requirement - 10 ¹² Btu/yr	17.357	16.133	16.133	16.133	16.133	16.133	16.133	16.575	13.559
Fuel Purchase Cost - USD/10 ⁶ Btu	224	1.67	2.36	2.86	2.45	3.49	4.24	1.78	1.73
Materials Handling - USD 10 ⁶ /yr	3.2	0.7	0.7	0.7	0.7	0.7	0.7	-	-
Fuel Cost - USD 10 ⁶ /yr	38.9	26.9	38.1	46.1	39.5	56.3	64.4	29.5	24.7
Total Fuel Cost - USD 10 ⁶ /yr	42.1	27.6	38.8	46.8	40.2	57.0	69.1	29.5	24.7
- Mills/kWh	24.8	16.2	22.8	27.5	23.6	33.5	40.6	17.4	14.5
TOTAL COSTS									
- USD/yr	74.6	50.3	61.5	69.5	62.9	79.7	91.3	51.3	47.3
- Mills/kWh	43.9	29.6	36.2	40.9	37.0	46.9	54.0	30.2	27.8
- TK/kWh	1.45	0.98	1.19	1.35	1.22	1.55	1.78	1.00	0.92

Price Basis: Q4, 1988 1USD = TK13

* Ex-Singapore crude oil price. 1 tonne crude oil = 7.33 barrels

Fuel Oil prices include USD 10/t for ocean freight (Singapore to Chittagong), USD 3.66/t for inland freight (Chittagong to Kulna) with a fuel oil price of 75% of ex-refinery crude oil price. Fuel oil has 18,000 Btu/lb heating value.

High Speed Diesel oil prices include USD 10/t for ocean freight (Singapore to Chittagong), USD 3.66/t for inland freight (Chittagong to Kulna) with a high speed Diesel oil price of 120% of ex-refinery crude oil price. High speed Diesel oil price of 120% of ex-refinery crude oil price. High speed Diesel oil has 19,200 Btu/lb heating value).

Economic price of Natural Gas is from the Bangladesh Power Tariff Study 1986). The quoted mid-1988 price (assuming 12% discount factor for the depletion premium) is inflated by 9% to give an estimate of the Q4, 1988 economic price. Natural gas has 941 Btu/scf heating value.

BANGLADESHPrivate Sector Participation in EnergyBPDB Investment Program Summary(YEAR ENDING JUNE 30)

(Current Prices in Tk. Million)

INVESTMENT SUMMARY

	1988	1989	1990	1991	1992	1993	1994	1995

	ACTUAL	-----ESTIMATED-----						
Generation - Foreign	3657.5	719.7	997.9	2584.7	3822.5	6763.8	7078.9	5270.2
- Local	947.0	490.2	598.3	1008.0	2384.2	5157.6	4612.6	4009.5
Sub - Total	4604.5	1209.9	1596.2	3592.7	6206.7	11921.4	11691.5	9279.7
Transmission - Foreign	214.8	1849.5	1535.1	1465.5	1677.8	1094.6	2025.0	2025.0
- Local	258.1	203.7	912.1	743.0	1058.2	998.8	1830.0	1350.0
Sub - Total	472.9	2053.15	2447.21	2208.45	2736.01	2093.42	3855	3375
Distribution - Foreign	881.8	1909.4	2138.7	2311.6	1940.5	2692.2	4055.1	4564.7
- Local	740.0	621.7	1253.5	1844.2	2373.7	1890.5	3128.9	4071.4
Sub - Total	1621.8	2531.0	3392.1	4155.8	4314.2	4582.7	7184.0	8636.1
Miscellaneous - Foreign	134.2	232.9	130.0	653.4	322.0	0.0	0.0	0.0
- Local	69.3	80.5	78.6	192.9	209.4	0.0	0.0	0.0
Sub - Total	203.5	313.43	208.57	846.28	531.35	0	0	0
Total - Foreign	4888.3	4711.4	4801.7	7015.1	7762.8	10550.6	13159.1	11859.3
- Local	2014.4	1396.1	2842.5	3788.1	6023.5	8046.9	9571.5	9431.0
TOTAL	6902.7	6107.5	7644.1	10803.2	13788.3	18597.5	22730.5	21290.3

BANGLADESH

Private Sector Participation in Energy

COST ANALYSIS FOR ALTERNATIVE
PLANS FOR PADMA TEXTILE

Period of study - 20 years
 Rate of interest - 15%
 Minimum ROR - 10%
 Factory run : 3 shifts, 6 day/week
 No peak load restriction

ITEMS	PLAN 1 Runs: PDB power Standby: Diesel 2x1250KVA	PLAN 2 Runs: PDB Power Standby : Gas 4x630KVA	PLAN 3 Run: Gas 4 x 630 KVA Standby : PDB Power	PLAN 4 Run : Diesel 2 x 1250 KVA Standby: PDB Power.													
INVESTMENTS	S/S TK 4,867,000 Diesel Tk.7,800,000 engine	S/S TK. 4,867,000 Gas Tk. 14,400,000 engine	Gas Tk. 14,400,000 engine S/S TK. 4,867,000	Diesel Tk. 7,800,000 engine S/S Tk. 4,867,000													
MONTHLY OPERATION COSTS	<table border="0"> <tr> <td rowspan="3">PDB Bill Gen.Set Operation Gen.Set Maint.</td> <td>TK 1,378,791</td> </tr> <tr> <td>Tk. 81,407</td> </tr> <tr> <td>Tk. 13,000</td> </tr> </table>	PDB Bill Gen.Set Operation Gen.Set Maint.	TK 1,378,791	Tk. 81,407	Tk. 13,000	<table border="0"> <tr> <td rowspan="3">TK. 1,378,791</td> <td>TK. 25,702</td> </tr> <tr> <td>TK. 24,000</td> </tr> </table>	TK. 1,378,791	TK. 25,702	TK. 24,000	<table border="0"> <tr> <td rowspan="3">TK. 164,073</td> <td>TK. 458,243</td> </tr> <tr> <td>TK. 130,000</td> </tr> </table>	TK. 164,073	TK. 458,243	TK. 130,000	<table border="0"> <tr> <td rowspan="3">TK. 164,073</td> <td>TK. 1,212,648</td> </tr> <tr> <td>TK. 97,500</td> </tr> </table>	TK. 164,073	TK. 1,212,648	TK. 97,500
PDB Bill Gen.Set Operation Gen.Set Maint.	TK 1,378,791																
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TK. 164,073		TK. 1,212,648															
	TK. 97,500																
	YEARLY OPERATION COSTS.	Tk. 17,678,376	Tk. 17,141,916	Tk. 9,627,952	Tk. 17,690,652												
PRESENT WORTH OF NET DISBURSEMENTS FOR 20 YEARS.	Tk.123,263,297	Tk. 126,470,268	TK 83,643,378	TK.125,030,476													
ANNUAL COSTS i = 10%, n = 20 years.	Tk. 14,479,094	Tk. 14,855,197	TK 9,707,291	Tk. 14,691,952													

BANGLADESHPrivate Sector Participation in EnergyMethanol Project

(Basis: Product Price - US\$120/MT and Natural Gas Price - US\$0.5/MMBTU)

	Operation Year			
	(Unit: US\$1000)			
	1st	5th	10th	15th
1. Total Investment	109,000			
Fixed Capital Investment	97,000			
(includ. contingency)				
Working Capital Investment	5,000			
Interest during const.	7,000			
2. Production Cost				
Natural Gas	3821.2	5458.8	5458.8	5458.8
Utilities	1363.9	1948.4	1948.4	1948.4
Selling Expenses	231.0	360.0	360.0	360.0
Labor Cost	531.0	531.0	531.0	531.0
Administrative Cost	159.3	159.3	159.3	159.3
Plant Overhead	212.4	212.4	212.4	212.4
Maintenance Cost	1940.0	1940.0	1940.0	1940.0
Insurance	970.0	970.0	970.0	970.0
Depreciation	9700.0	9700.0	9700.0	0
Financial Charge	7266.1	4206.7	382.4	0
3. Sales Revenue	23100.0	36000.0	36000.0	39000.0
4. Total Profit B/Tax	-2345.1	10513.4	14337.7	26455.1
5. Corporate Tax	0	0	0	4232.8
6. Net Profit A/Tax	-2345.1	10513.4	14337.7	22222.3
7. Financial Ratios				
- Debt/Equity Ratio	2.3	0.6	0	0
- Current Ratio	0.2	3.8	144.3	236.7
- Liquidity Ratio	0.2	0.2	1.3	1.3
- Cash Ratio	0.1	0.0	0.3	0.3
- Debt Service Coverage Ratio	1.0	2.1	3.0	3.0
8. IRR (%)				
On Total Project (B/Tax)	19.10			
On Total Project (A/Tax)	18.71			
Stockholders (A/Tax)	16.65			
9. Payback Period for Equity	4.0 Year			
(exclud. Construction Period)				