DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations For the Review of the Bilateral Assistance Subcommittee

BANGLADESH - KARNAPHULI THIRD UNIT

AID/BAS-037

UNCLASSIFIED

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KARNAPHULI THIRD UNIT
(Supplementary)

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: C (A = ADD, C = CHANGE, D = DELETE) — PP

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10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	7,000		7,000	14,800		14,800
(GRANT)	( )	( )	( )	( )	( )	( )
(LOAN)	(7,000)	( )	(7,000)	(7,000)	( )	(7,000)
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY	-	1,600	1,600		5,800	5,800
OTHER DONOR(S)						
TOTALS	7,000	1,600	8,600	14,800	5,800	20,600

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. Prior F. GRANT	E. Prior G. LOAN	H. 2ND FY 76 I. GRANT	H. 2ND FY 76 J. LOAN	K. 3RD FY 77 L. GRANT	K. 3RD FY 77 M. LOAN
(1) SD					5,300		2,500		-
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 78 O. GRANT	N. 4TH FY 78 P. LOAN	Q. 5TH FY ___ R. GRANT	Q. 5TH FY ___ S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1)		7,000				14,800
(2)						
(3)						
(4)						
TOTALS						14,800

12. IN-DEPTH EVALUATION SCHEDULED: MM 12 YY 79

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Joseph S. Toner

TITLE: Mission Director

DATE SIGNED: MM 07 DD 14 YY 78

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 07 DD 14 YY 78

AID 1330-4 (3-78)

PREFACE

The assistance proposed in this project paper is a supplementary financing contribution to an ongoing A.I.D. project: The installation of a 50 MW generating unit at the Karnaphuli Multipurpose Dam and Power Plant at Kaptai, Chittagong District in Bangladesh. The Dam and Power House were originally financed by the U.S. Government and were completed in 1963. The Power House structure made provisions for the future installation of the third of three turbo-generators when the incountry demand for power so dictated. Power consumption within Bangladesh expanded rapidly and work on the third unit was begun in 1969. Construction was interrupted by the War of National Liberation in 1970, and the Power Development Board attempted to complete the unit since resuming work at the site. Due to the unavailability of adequately skilled labor and technical resources, work did not progress satisfactorily and A.I.D. and the BDG have since agreed to change the implementation approach whereby an expatriate contractor will complete the work on a turnkey basis. This change in the implementation plan will require additional foreign exchange resources. This project paper provides the rationale for approving the request for supplementary financing needed to achieve the original project purpose.

B. Recommendations

The following actions are being submitted for approval within this Project Paper:

Grant	-
Loan (Terms: 40 years, 10 years grace period. 2% during grace--3% thereafter)	$7,000,000
	$7,000,000

The Borrower will be the Government of the Peoples Republic of Bangladesh (BDG). The proceeds of this loan will be provided by the BDG to the Bangladesh Power Development Board for the procurement of goods and services on a direct basis. This loan, as with prior financing for the project, will not be a two step loan. All procurement of goods and services will be in accordance with A.I.D. guidelines from Geographic Code 941 countries.

C. Description of the Project

1. Goal and Purpose

The overall goal of this activity is to improve the quality of life of the Bangladeshi peoples. The immediate sub-goal of the project is to contribute towards the improvement of electric power availability for both industrial and

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residential consumers in the Eastern Transmission Grid. Improving generating capacities, stabilizing power deliveries and, indirectly, strengthening and improving the productivity of the industrial sector are all high priority considerations in the current Bangladesh National Economic Development Plan.

The timely installation of the third Karnaphuli generating unit as proposed herein is essential to the orderly development of PDB generating capacity and is badly needed to increase Karnaphuli's contribution as a more economic electric power "peaking" generation source. The third unit will represent a reliable hydrogeneration reserve for power delivery to the Chittagong port and inustrial area and support the ADB's Chittagong Area Distribution project and the new A.I.D. Rural Electrification program. Water is now wasted over the spillway at Kaptai for a substantial portion of the year and this energy can be directly converted to electric energy and save both gross expenditures and foreign exchange now expended on oil imports for thermo-electric generating plants. Completion of the installation of this turbogenerator has a projected benefit/cost ratio of 2.82 at a discount rate of 10 percent. The economic internal rate of return is 25.3 percent. The unit is also projected to increase the PDB's net power sales revenues by Taka 54.6 million per year and could save as much as 335,900 barrels of imported fuel oil each year. The reinforcement of reliable power supplies in the Chittagong region will not only increase the productivity of the port and industrial complex, but will save foreign exchange resources. At present, there are some 15 in-house generating units in the various industries in Chittagong, with an aggregate capacity of 47 MW. These units are fueled with expensive imported fuel oil, and most have been installed for the purpose of safeguarding industrial production against the unreliable public utility power supplies. Operation of these units represents a considerable expenditure in foreign exchange by the inudstrial sector and also incurs higher economic costs by the use of small-sized plants.

With the completion of the 50 MW hydroelectric unit at the Karnaphuli powerhouse and other improvements in the distribution systems, the Bangladesh Power Development Board (PDB) will be able to keep its gas fired thermoelectric plants on base loads with reliable deliveries to consumers and use the Kaptai installation for more economic peaking and reserve purposes as was originally intended. As power deliveries improve, the Chittagong industrial consumer will be able to shift their expensive diesel sets to standby status and the currently unsatisfied 5 MW of individual consumer demand in the area will be satisfied. This will occur following completion and commissioning of the third unit and, as a result, the project purpose will be fulfilled: to increase power generation in the Eastern Grid in Bangladesh.

2. Project Description

Investigations of the hydroelectric potential of the Karnaphuli River date as far back as 1906. In 1952, clearing and foundation explorations for the main dam were begun, based on the recommendation of a U.N. technical assistance mission. In March 1954 the International Engineering Company (IECO) of New York, entered into a contract with the U.S. Government for engineering assistance to the Government of Pakistan for the overall design of the project.

The Karnaphuli Multipurpose Project was located on the Karnaphuli River at Kaptai, Chittagong Hill Tracts, in what is now Bangladesh. It has as it primary objective the production of electric power and as secondary objectives the improvement of flood control, navigation, fishing and recreation. The 256 square mile reservoir is ideally situated to absorb huge volumes of monsoon runoffs and prevent serious and costly downstream flooding of the Chittagong port and city. The lake is sufficiently large to support commercial fishing and a cableway elevator transfers boats and barges for continuous travels above or below the dam. The regulated and silt free discharge of water from the dam improves downstream navigation and keeps the port city of Chittagong free from river siltation.

The main dam is an earthen structure approximately 200 feet high and 2000 feet long at its crest. The power house facilities include penstocks and draft tubes for three turbo-generators, although only two 40 MW units were installed during the initital phase. Each turbine is a 55,000 horsepower vertical Kaplan wheel with a direct drive 40 MW generator. The cost of the original project in 1963 was about $75 million. The procurement and installation of a single turbine, generator and switch gear would cost approximately $20 million at 1978 prices. The project was highly successful and the PDB has an excellent operating and maintenance record on the two existing turbo-generators. Production output on the two units has run in excess of 108 percent of rated capacity in the past six months.

The current project involves the installation of the third turbogenerator, necessary control of equipment, transformers and switchgear. The project was initiated in 1967 and construction work began in 1969. Sverdrup and Parcel and Associates, Inc. was the engineering firm and with Allis-Chalmers and Fishback and Moore the equipment and erection contractors respectively. Construction work was unfortunately suspended at the outbreak of the Civil War and the consultants and constructors evacuated from the site in March 1971. Much of the A-C equipment was enroute on the high seas at the time and had to be diverted to port in Rangoon, Karachi, etc. In 1972 the

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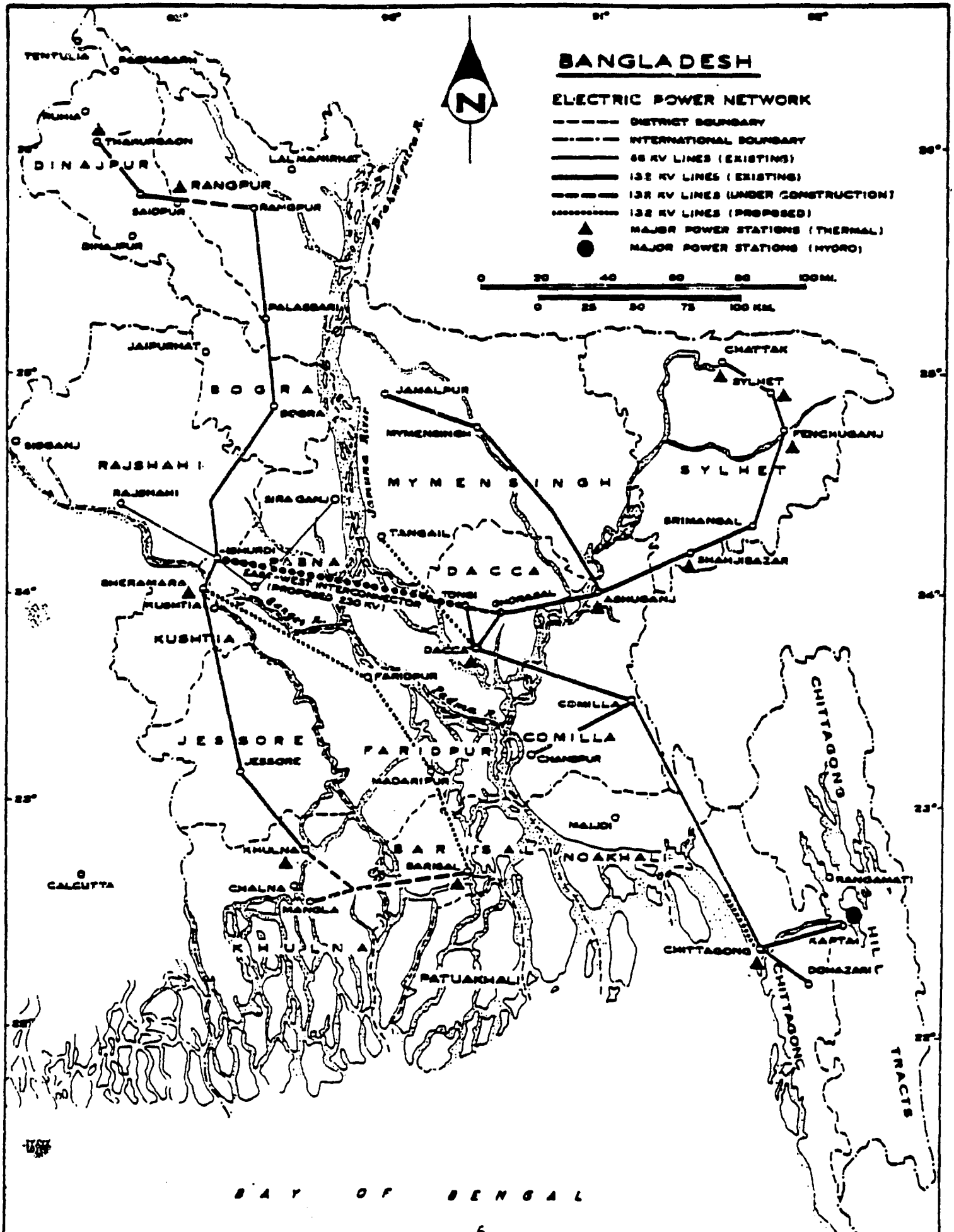
special Relief and Rehabilitation Grant provided funds to recover the equipment and move it all to site at Kaptai. The Bangaldesh Government then requested a loan of $2.5 million to finance the delivery of missing or damaged items and technical services to help the Power Development Board install the unit and complete the project using Bangladeshi resources. The project did not go well due to a lack of manpower and properly trained skilled labor. An evaluation of the project was made in November 1977 and discussions entered into with the PDB as to the alternatives for completing the work. A map of Bangladesh, indicating the locations of the project and the main PDP generating and transmission facilities is attached for information.

D. Project Status

1. Revision of Implementation Approach

In 1975 when the dollars 2.5 million A.I.D. financing was being programmed, it was the USAID Mission's judgment that there existed within Bangladesh local construction capability with the experience and know-how to enable the Bangladesh Power Development Board (PDB) to carry out the tasks remaining to install the third Karnaphuli unit. Local craftsmen were at that time available in all of the needed trades. However, since 1975 a major drain of trained personnel to other countries has taken place with most laborers going to work in the Middle Eastern countries where pay scales are several times those of Bangldesh. The impact of this on the Karnaphuli project has been to make it virtually impossible for the PDB to recruit qualified engineers and the numbers of welders, electricians and pipefitters needed for the highly technical work. The implementation approach was changed in late 1977 when it became apparent that resources and capabilities of the PDB and Bangladesh contractors were not adequate tc complete the project as planned. To overcome the skilled labor recruitment problem, the plan was revised to complete the project by employing a single expatriate contractor. This approach was approved by the Asia Bureau, provided that: (1) BDG agrees to the revised implementation approach and provides local currency support (in a set aside account) for construction costs estimated to total approximately 20 percent of the remaining expenditures; (2) firm lump sum construction cost proposals are in hand prior to approval of the project revision by AID; and (3) AID funds are available to finance this revision.

With respect to (1) above, the BDG letter of January 9, 1978, approves the revised installation contracting plan and agrees to provide necessary additional local currency. (See Annex A). The total local currency to be provided by the PDB is estimated at $1.6 million and the schedule for making local currency available is for construction activities: TK 10. million


BANGLADESH
ELECTRIC POWER NETWORK
DISTRICT BOUNDARY
INTERNATIONAL BOUNDARY
66 KV LINES (EXISTING)
132 KV LINES (EXISTING)
132 KV LINES (UNDER CONSTRUCTION)
132 KV LINES (PROPOSED)
MAJOR POWER STATIONS (THERMAL)
MAJOR POWER STATIONS (HYDRO)
0 20 40 60 80 100 MI.
0 25 50 75 100 KM.
N
TENTULIA
PANCHAGARH
THAKURGAON
DINAJPUR
LAL MANIRHAT
RANGPUR
SAIDPUR
SIRAJGANJ
PALASBARI
JAIPURHAT
BOGRA
SHIBGANJ
RAJSHAHI
NAOGAON
RAJSHAHI
SIRAJGANJ
JAMALPUR
MYMENSINGH
TANGAIL
PABNA
ISHURDI
SHERAMARA
KUSHTIA
DACCA
TONGI
GOALANDO
ASHUGANJ
FARIDPUR
COMILLA
JESSORE
CHANDPUR
MADARIPUR
MAIJDI
KHULNA
BARISAL
NOAKHALI
CALCUTTA
CHALNA
MONGLA
PATUAKHALI
CHATTAK
SYLHET
FENCHUGANJ
SRIMANGAL
SHAMJIBAZAR
CHITTAGONG
RANGAMATI
KAPTAI
HILL TRACTS
BAY OF BENGAL

representing the first twelve months requirements to be made by the time the C.P.s for the dollar loan are met and TK 7. million at the end of the first six months followed by six months later by an equal final installment. All estimat taka would thus be deposited in the account by the end of on year or six months earlier than project completion. These funds will be disbursed to the construction contractor by the consulting engineer, SPA, or the PDB, as appropriate. Firm construction prices were obtained in proposals submitted June 30 by prequalified construction contractors to satisfy (2) above and this PP supports the request for LC [illegible] meet (3).

2. Technical Aspects

The Karnaphuli hydroelectric power plant was built initially to accommodate three generating units. The initial construction of the Karnaphuli Power House made provisions for later installation of the third generating unit and therefore the intake tunnel, draft tube discharge and trailrace are already in place. As part of the current project, major equipment consisting of a 69,000 hp Kaplan vertical turbine and 50 MW umbrella type generator, control equipment, transformers and circuit breakers were procured from Allis-Chalmers when construction of the third unit was started in 1969. This equipment is now at the site. Additional equipment and parts needed to replace damaged or missing items were ordered from Allis-Chalmers in July 1977. Delivery of this replacement equipment has been slow but all items ordered are expected at site before start of construction. Due to time lapse from project start in 1969 and the various storage arrangements and handling, some additional replacement and repair requirements are anticipated but the major elements of work and equipment needed to complete the installation are covered.

Work remaining to be done at the site includes most of the civil, mechanical and electrical work identified when completion of the unit was initiated in 1976. (See Project Paper 388-0004, dated November 17, 1975).

Additionally, however, the generator stator must be disassembled and restacked with new laminations and possibly some new coils will be required. Materials for this work and the rehabilitation of other generator elements have been ordered from Allis-Chalmers. Technically, the project has changed only with respect to the method of performing the work and the costs associated with that change. Lost time under the previous implementation plan, higher foreign exchange costs of the expatriate contractor and the extension of construction management and services of the engineering firm account for the increased foreign exchange costs. The Government will finance local currency elements of the engineering and construction contracts and the extension of PDB administrative and training expenses. (See Project Financing Plan, PART II.C).

E. Summary Findings

The activity for which this supplementary financing is being requested is technically feasible and, even with the increased foreign exchange costs of expatriate construction services, both economically and financially sound. The Project will make a significant contribution to foreign exchange savings for the country and provide the PDB with increased peaking capacity and revenues. It will also benefit industrial and private consumers because its capacity is more reliable and can be applied as lower cost peaking generation. The industrial community in Chittagong and other parts of the Eastern Grid are continuously disrupted by unreliable and erratic power supplies, as is the main port facility itself. This means lost production (which the BDG estimates as seven percent of gross output) and a decrease in direct and secondary employment potential. The operation of this new generator will reduce these deficiencies The Project is also expected to enable higher standards of living by providing more reliable power to a larger section of the populace.

The Mission is satisfied that the PDB has tried within its means to carry out the project, but shortages of skilled technicians and labor within Bangladesh have created conditions that threaten project completion. To overcome these difficulties and get the unit completed on time, it is strongly recommended that prompt approval be given to the proposal contained in this project paper. The USAID Director has certified that the Bangladesh Government has the capacity to operate and maintain this unit once it is successfully installed. The PDB has already clearly demonstrated its capacity to do so by successfully operating the two existing units at or above rated capacity for a number of years. There are no issues regarding this financing request.

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PART II. PROJECT BACKGROUND AND ANALYSES

A. Review of Economic Conditions *

Bangladesh is one of the poorest countries in the region with a GNP per capita income of $110 in 1976 Economic performance and development are closely tied to agricultural production, which contributes about half of the GNP. The three year period after 1971 was one of rehabilitation and reconstruction and from 1975 onwards the emphasis has changed more to one of development. The recent improved economic performance of Bangladesh has been principally characterized by favorable weather and a series of economic stabilization measures. In 1975/76, foodgrain production rose by 14 per cent to a record level of 12.8 million tons. Coinciding with the favorable weather the Government introduced a number of economic reforms including devaluation of the Taka, credit restraints and import liberalization. Consequently, the growth rate of GDP in 1975/76 was 12.2 per cent.

The growth rate for 1976/77 has been markedly less at 3.2 per cent which in part reflects adverse weather conditions. Early floods and drought in 1976 inflicted damage to the food crops and foodgrain production is estimated to be around 12 million tons. Manufacturing output which contributes only about 7 per cent to total GDP was 11.9 per cent higher than in the previous year due to increased production of sugar, fertilizer, cement, paper and steel.

Inflationary pressures have been brought under control by the government stabilization measures in addition to the substantially increased food supplies, improvement of the distribution system and decline in import prices. Deficit financing has been reduced to a minimum while economic and development activities expanded substantially. Prices, after falling sharply in 1975/76, appear to have stablized and rose only moderately during 1976/77. The cost-of-living index in Dacca rose by 3.4 per cent from July 1976 to March 1977. An accelerated price trend is expected to develop, however, as a result of the setback in agricultural output and reduced inflow of aid-financed foodgrains.

* ADB Appraisal Report, November 1977

Government current revenue in 1976/77 has been estimated at Tk 9,961 million or slightly higher than the original budgeted amount of Tk 9,824 million. This represents an increase of 13 per cent compared to the Tk 8,826 million received in 1975/76. The increase was achieved through improved tax collection which compensated for lower receipts from customs duties due to decreased imports. Since development expenditures fell short of targets, the 1976/77 Annual Development Program (ADP) had been reduced from the original Tk 11,400 million to Tk 10,060 million. The ADP for 1977/78 has been budgeted on the basis of an expected economic growth of 7 per cent. Out of Tk 11,900 million in total expenditures 29 per cent is allocated to the development of agriculture, rural institutions and flood control and water resources. The power, transport and industries sectors are allocated 10.9, 15.7 and 12.8 per cent respectively, and the social sector 16.9 per cent. Within each area, priority is given to programs and projects for which foreign assistance has already been committed. Foreign aid has been projected to finance Tk 8,580 million of the ADP in 1977/78 or 70 per cent of ADP allocations.

The balance of payments position improved significantly in 1976/77. Total exports increased by 8 per cent to $412 million; on the other hand, imports were reduced by 25 per cent resulting in a drop in the trade deficit to $548 million from $894 million a year earlier. Higher earnings from the exports of tea, shrimp, frozen fish, leather and other non-traditional items, more than offset the decrease in exports of raw jute and jute goods. Lower payments for imports were on account of reduced import volumes of foodgrains, edible oil and industrial raw materials as well as the decline in international prices of some major import commodities. As a result of these favorable developments, foreign exchange reserves improved by $43 million and stood at $292.9 million in June 1977 or equivalent to about 3.5 months of imports. The terms of trade, however, continued to be adverse in 1976/77 which has eroded the purchasing power of exports. External public debt disbursed and outstanding at the end of June 1976 was $1,809 million. Debt service payments amounted to $86.8 million and the debt service ratio was 22.8 per cent.

Bangladesh continues to depend heavily on foreign aid. At the Fourth Bangladesh Aid Group Meeting in July 1977, the World Bank recommended new aid commitments of $967 million for 1977/78; initial aid commitments from the Aid Group, while encouraging, fell, however, short of the target and amounted to $860 million. The Government will continue to seek assistance also from donors who are not members of the Aid Group. Aid from the Middle East has recently become increasingly important for Bangladesh.

In the context of Bangladesh with its high population density and pressure, the Government's development strategy is to give priority to the modernization of agriculture, diversification of production and exports, self-sufficiency in foodgrains and control of population growth. Simultaneously, basic infrastructure through labor intensive methods in both urban and rural areas is being provided or strengthened to increase agricultural and industrial productive capacities which it is expected will subsequently bring about a better employment situation and improvement in the quality of life.

B. The Bangladesh Electric Power Sector

In the power sector, Bangladesh government policy gives continued emphasis on the attainment of an appropriate balance between generation and distribution. The power development program for the immediate future includes: (a) completion of a national grid system; (b) improvement of the distribution system in urban and industrial areas; and (c) supply of power to rural areas for electrification of tubewells and irrigation pumps, and the development of cottage and small-scale industries.

The recently completed Bangladesh Energy Study, in formulating an overall energy policy for Bangladesh, has proposed a substantial investment program for the energy sector. An inter-ministerial committee under the Planning Commission has been set up to coordinate matters relating to energy sector policies and investments. The recommended investment program for 1976-85 recommended by the Bangladesh Energy Study for the power sector includes rehabilitation of existing generating plants, an electric inter-connector across the Jamuna River, installation of a small (20 MW) gas turbine in the West Zone and a large gas turbine

(63 MW) in the East Zone and transmission and distribution system improvements throughout the period.

The major issue for the Government in the energy sector is how best to utilize the gas reserves. It is a government priority to generate as much power as possible from gas reserves and save foreign exchange on imported oil as gas is the major natural resource of the country. At present about 56.5 per cent of the total primary energy for generating electricity comes from natural gas. In this context, the possibility of providing gas to the Western Zone across the Jamuna River as a new power source to replace oil is an alternative approach to the East-West Electric Interconnector across the Jamuna River.

Bangladesh is divided by the Jamuna River flowing from north to south, and the electric power system is therefore divided into two zones, east and west. The East Zone contains the two primary centers of commerce and industry in Bangladesh, namely, Dacca, the capital city and Chittagong, the country's major port.

The rate of power growth in Bangladesh during 1960-70 had been about 10-15 per cent per annum and the pre-1971 peak demand of 225 MW was not achieved again until September 1973. The mid-1977 peak demand of the country was about 324 MW. Of this, some 253 MW or 78 per cent of peak demand was in the East Zone and the balance was in the West Zone. The total available capacity for bulk generation in mid-1977 was 648 MW of which 492 MW was installed in the East Zone. Balancing generation and utilization between East and West Zones is a priority objective. By mid-1977, the power system included some 928 miles of transmission line and 8,744 miles of sub-transmission and distribution lines.

The largest load concentrations in the country are in Dacca which accounted for about 45 per cent of the sales of electrical energy and in Chittagong which accounted for some 30 per cent. Of these sales, the industrial portion was about 60 per cent in Dacca and 80 per cent in Chittagong.

The Bangladesh Government has adopted a policy to support rural electrification. At the end of 1976 about

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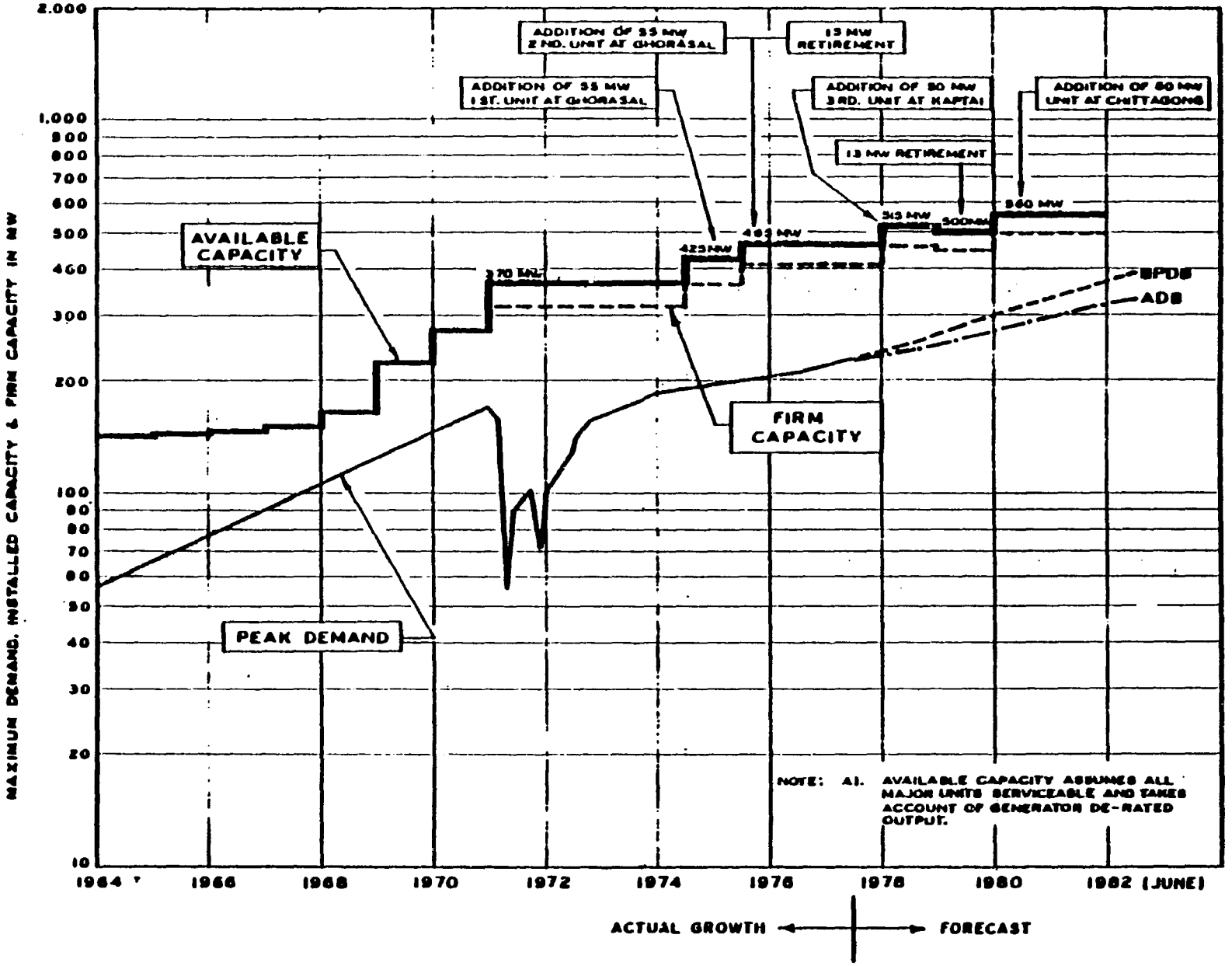
three-fourths of 422 Thana 1/ headquarters and about 2.0 percent of the 64,493 villages were electrified. The agricultural sector uses only about 5 percent of the total electricity consumption. The Government has determined to accelerate the rural electrification program and has established a new semi-autonomous Rural Electrification Board for this purpose.

The major drawback of the existing power system in Bangladesh is the imbalance between generation and distribution capacities. In addition, inadequate maintenance of these facilities has added to deterioration of the power system throughout Bangladesh. The consequence has been: low utilization of existing capacity, frequent power failures, high cost of electricity and a restrained level of load growth by comparison with demand in the country. A PDB chart showing the overall projected demand and near term generating capacity for the Eastern grid is shown on the following page.

1/ Administrative unit in Bangladesh

BANGLADESH EAST ZONE
PEAK DEMAND AND GENERATING CAPACITY



SOURCE: BPDB PLANNING DEPARTMENT

PART II.

C. Economic Analysis

1. Load Growth Projections of Electric Power *

The average annual growth rate for electric energy consumption over the period 1973/74 to 1993/94 amounts to 7.6 per cent under the mid-demand scenario and to 8.7 per cent under the high demand scenario. The same rates on a "plant send-out" basis are 6.7 per cent and 7.6 per cent. The fact that the rates of growth on the basis of plant send-out are lower than those referring to consumption is largely explained by the assumed decrease in losses from about 30 per cent in 1973/74 to 15 per cent in 1993/94.

The projected growth rates are lower than those experienced in some periods in the past, particularly during the 1960's. The average annual rate of growth of electricity sales over the period 1959-69 was 18.4 per cent, for example. A comparison of such rates during particular periods in the past with the projected rates requires a careful consideration of changing circumstances. In 1959 electric energy sales amounted to 138 GWH and maximum peak demand was less than 40 MW. The system grew, over the period 1959-69, from a very small base. Growth rates are very high when a system is in its first phase of development from a very small base. The annual rates of growth were, in fact, already decreasing during the 1960's, as is evident from the following average annual rates of growth of electric energy sales:

1959-1963	25.8 per cent
1963-1967	16.7 per cent
1967-1970	9.7 per cent

* Extracts from ADB Appraisal Report, November 1977

A rapid decline in average rates of growth is evident. Lower growth rates may be expected in the future, since the base is much larger presently.

It must be emphasized that the projections presented in the Report are not based on the extrapolation of past trends but on a step-by-step estimation of energy requirements in different sectors, given certain rates of over-all economic growth. This step-by-step approach resulted in the identification of very inefficient use of energy by a number of major industries that operated far below capacity in recent years. When these industries reach much higher levels of capacity utilization in the future, their use of energy will become more efficient. This is an important factor that is reflected in the projections of energy consumption. Increased efficiency of use of energy implies that the same levels of output can be obtained with a relatively smaller input of energy.

It should be noted that these are the base line scenarios; they do not include special considerations such as a program in rural electrification or other activities, which could affect the overall consumption of power within the planning horizon. In an effort to investigate the likely impact of rural electrification a simple variation on the mid-scenario was developed, in which domestic per capita demand in the rural areas rises from its present level of .12 kWh per capita per year at a rate of 1 per cent per year to .1325 in 1983-84, to .1464 in 1993-94 and to .1554 by the turn of the century. Given this assumption, the demand for electric power would increase from 3690 x 10^6 kWh to 4060 x 10^6 kWh in the mid-scenario, a 10 per cent difference in 1993. This represents roughly half the 1993-94 difference between the mid and the high scenarios.

Demand for Electric Power, 1974-2000
(in million kWh)

Three Growth Scenarios

	1973/74		1983/84		1993/84		1999/2000
Low Scenario							
Agriculture	6.70		44.02		100.32		
Industry (incl. fertilizer)	632.21		982.47		1825.24		
Transport, Trade & Services	47.20		97.56		243.59		
Domestic	166.00		358.16		829.91		
Total	852.11		1482.21		2999.06		4558.00
Growth Rate		5.7%		7.3%		6.8%	
Mid-Scenario							
Agriculture	6.70		128.00		370.50		
Industry (incl. fertilizer)	632.21		1110.38		2010.42		
Transport, Trade & Services	47.20		107.67		285.61		
Domestic	166.00		369.89		1023.18		
Total	852.11		1715.94		3689.71		5603.00
Growth Rate		7.3%		8.0%		7.2%	
High Scenario							
Agriculture	6.70		160.68		479.70		
Industry (incl. fertilizer)	632.21		1144.78		2490.12		
Transport, Trade & Services	47.20		110.28		359.07		
Domestic	166.00		400.93		1170.34		
Total	852.11		1816.67		4499.23		6871.00
Growth Rate		7.9%		9.5%		7.3%	

Note: Fertilizer demand assumes that maximum effort is placed on producing sufficient urea to meet local demand.

* Energy demand for the year 2000 was determined from peak demand growth pattern.

Historical Sales and Generation of Energy and Maximum Demand
(1964 - 1976)

Ending 30 June	Sales (Million KWh)						Annual Sales Growth (%)	Generation (Million KWh)	Systems Losses (%)	Maximum Demand (MW)		
	Industrial	Domestic	Commercial	Agricultural	Others	Total				East Zone	West Zone	Total System
1964/65	300	42	78	14	-	434	23.3	567	23	91	20	111
1965/66	351	51	90	15	-	507	16.8	659	23	105	29	134
1966/67	425	61	109	19	-	614	21.1	800	23	124	40	164
1967/68	489	69	125	24	-	707	15.1	911	22	134	40	174
1968/69	518	72	135	26	-	751	6.2	981	23	150	43	193
1969/70	586	84	151	28	-	849	13.0	1099	23	170	53	223
1970/71	472	118	75	3	15	683	-19.6	929	26	172	53	225
1971/72	292	102	57	4	13	468	-31.5	717	35	141	42	183
1972/73	428	123	59	1	13	624	33.3	1086	42	175	47	222
1973/74	571	165	70	6	17	829	32.9	1265	34	185	65	250
1974/75	594	160	51	5	21	831	0.2	1322	37	199	67	266
1975/76	658	151	87	24	27	947	14.0	1460	36	220	81	301

Forecast of Generation and Sales of Energy and Maximum Demand (1976/77 - 1984/85)

Ending 30 June	Total Generation (Mn kWh)	Total Sales	Annual Sales Growth (%)	Systems Losses (%)	Maximum Demand					
					East Zone		West Zone		Total	
					Annual (MW)	Increase (%)	Annual (MW)	Increase (%)	Annual (MW)	Increase (%)
1976/77	1,572	1,025	8.2	35	233	5.9	77	-4.9	310	3.0
1977/78	1,628	1,107	8.0	32	252	8.0	83	8.0	335	8.0
1978/79	1,661	1,196	8.0	28	272	8.0	90	8.0	362	8.0
1979/80	1,699	1,291	8.0	24	294	8.0	97	8.0	391	8.0
1980/81	1,731	1,385	7.3	20	315	7.3	104	7.3	419	7.3
1981/82	1,859	1,487	7.3	20	338	7.3	112	7.3	450	7.3
1982/83	1,994	1,595	7.3	20	363	7.3	120	7.3	483	7.3
1983/84	2,139	1,711	7.3	20	389	7.3	129	7.3	518	7.3
1984/85	2,295	1,836	7.3	20	418	7.3	138	7.3	556	7.3

Energy Sales (in Million kWh) and Maximum Demand (in MW)
(Chittagong Area)

Ending 30 June	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82
Consumer Category												
Domestic	15.33	7.83	10.03	13.16	16.08	16.76	19.27	21.39	23.74	26.35	29.26	32.48
Commercial	9.26	4.73	6.05	7.93	9.70	10.13	11.65	12.93	14.35	15.93	17.68	19.64
Industrial	191.91	97.98	125.44	164.64	201.17	209.95	241.44	267.99	297.49	330.22	366.52	406.82
Agricultural	6.55	3.34	4.27	5.62	6.86	7.17	8.25	9.16	10.16	11.27	12.52	13.90
Total Sales	223.05	113.88	145.79	191.35	233.81	244.01	280.61	311.47	345.74	383.77	425.98	472.84
Sales Growth (%)	19.0	-48.9	28.0	31.3	22.2	4.4	15.0	11.0	11.0	11.0	11.0	11.0
Maximum Demand (MW)	48.0	49.5	41.4	46.7	50.3	53.8	67.2	74.6	82.8	91.9	102.0	113.2
Demand Growth(%)	9.8	3.1	-16.4	12.8	7.7	7.0	24.9	11.0	11.0	11.0	11.0	11.0

PART II. C

2. Power Utilization in Chittagong Area *

Chittagong is the major port of Bangladesh and second only to Dacca in population and industrial concentration. Although the port facilities were badly damaged during 1971, these have now been restored to their former capacity. Chittagong is linked with all the major commercial and industrial centers of Bangladesh by a transport network of railways, roads and inland waterways, and is an attractive location for future industrial development. At present, there are over 400 manufacturing plants in the Chittagong area, of which many are dependent on the port facilities. Predominant industries in Chittagong are the steel mills, oil refinery, jute industries and textile industries; many subsidiary industries are directly dependent of the output products of these four undertakings. The remainder of the industrial sector is widely diversified, and includes cement manufacture, pharmaceutical industries, tobacco products, leather goods, chemicals (including fertilizers and pesticides), paper products, electrical equipment and the assembly of trucks/buses and other vehicles.

At present, industrial capacity in Chittagong, as throughout Bangladesh, is not fully utilized; the events of 1971 followed by the loss of old markets in West Pakistan hit the Bangladesh industrial sector adversely. Over the past three years, however, substantial recovery has been achieved, particularly in the jute, tea, fish, leather and textile industries, and this improvement has been reflected in power sales. Some 52,463 consumers are presently served by the Chittagong distribution network, of which in 1976/77, Chittagong's 5,780 industrial consumers accounted for approximately 86 per cent of Chittagong's total energy sales of 280.6 GWh. Commercial consumers and domestic consumers account for 4 per cent and 7 per cent of these sales respectively, and agricultural consumers for about 3 per cent. Only about 35 per cent of domestic premises in Chittagong are electrified, although additional domestic consumers are still being connected at the rate of about 600 per month in the greater Chittagong area.

* ADB Appraisal Report, November 1977

Notwithstanding the serious shortcomings of the distribution network and the poor reliability of power system, energy sales in Chittagong have recorded an average growth rate of 14 percent per annum over the past three years, and some 5 MW of suppressed demand is reported to be awaiting connection to the system. Load suppression in Chittagong has been resorted to both because of insufficient distribution and service connection equipment (meters, etc.) for the connection of new consumers. With the installation of third Karnaphuli generator, generation capacity in the East Zone will be sufficient to meet Chittagong's load demand over the next several years.

Projected growth of maximum demand and energy sales in Chittagong area is shown in Appendix 4 and graphically on the following page. These projections have been derived by the ADB from PBDB s projections which include analysis of ongoing and scheduled development projects in Chittagong's industrial and agricultural sectors; from data on presently suppressed demand, and from the Energy Consultants' estimates for load growth in southeast Bangladesh. It is anticipated that with reinforcement of Chittagong's distribution network by the proposed Project, annual load growth will be sustained at not less than 11 percent per annum, and will maintain this level beyond 1982. Energy sales for this period are expected to increase in approximate proportion to maximum demand, with a load factor in the order of 57 percent. These estimates, although lower than those prepared by BPDB, are considered to be realistic in the context of Chittagong's present development.

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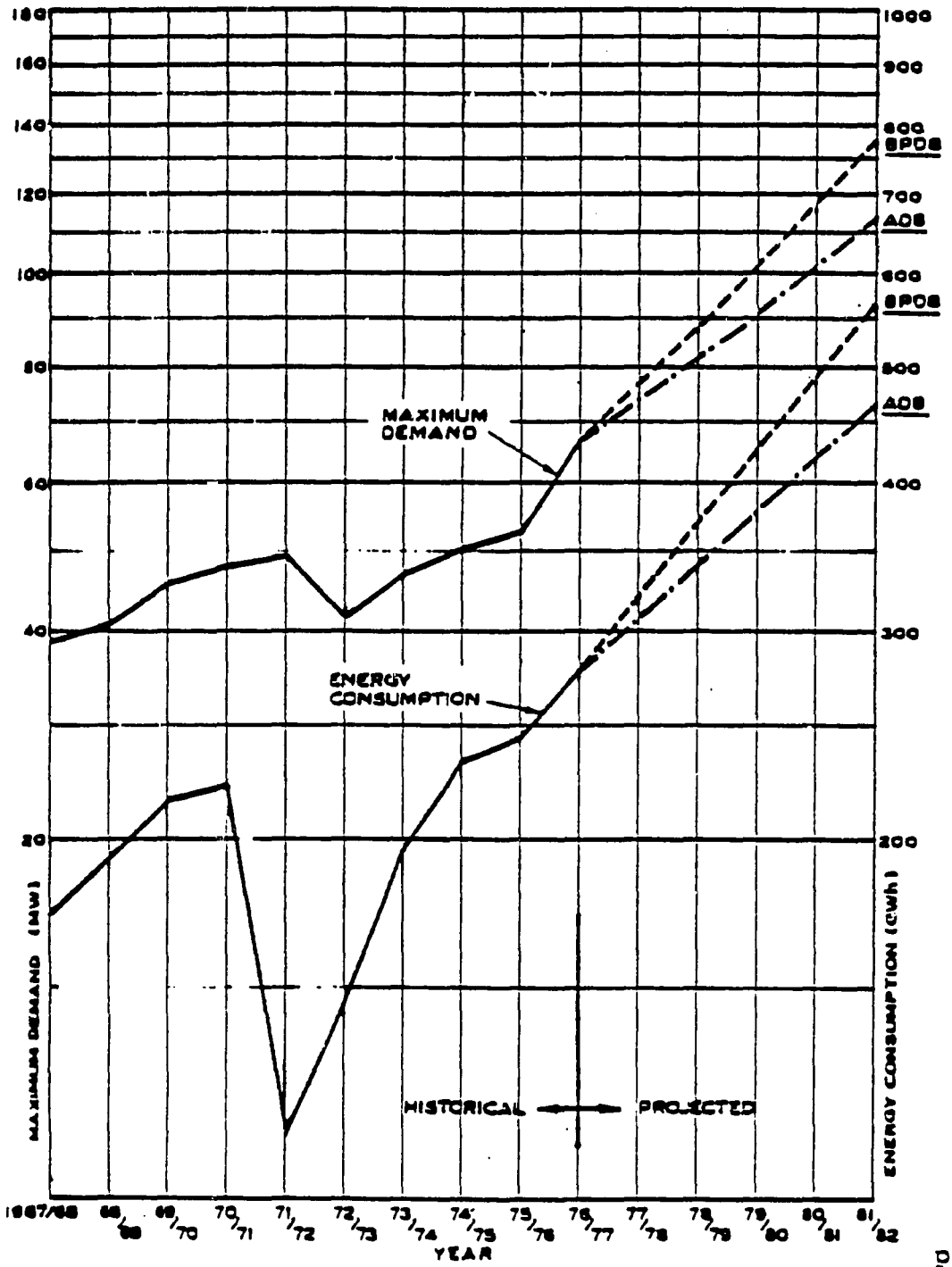
CHITTAGONG POWER DISTRIBUTION PROJECT

MAXIMUM DEMAND AND POWER CONSUMPTION IN CHITTAGONG



PART II. C.

3. Project Economics

The Karnaphuli Dam and Power House were designed and constructed to serve as a multi-purpose project, principally for generation of electric power, but also for secondary benefits in flood control, navigation, fisheries, recreation, etc. Reservoir operating levels (Rule Curves) were established to meet this combination of needs, but are primarily governed by the need to generate peaking power and emergency standby for the Eastern Grid (which includes deliveries to the two largest consumer centers - Dacca and Chittagong). Only two 40 MW units were installed initially because this was judged adequate for early Grid conditions of demand and thermo-electric generation. It was recognized that the third unit would be needed in the late 1960's or early 1970's to take full advantage of Karnaphuli's hydro potential. By the time of the earlier Capital Assistance Paper (1967-1969), it had been established that the Grid loading and thermo-electric generation developments were such that full peaking capacity of 130 MW was needed from the station and thus work was initiated on the third unit.

The rule curve requires the third unit to operate as base load during the periods of high water - the monsoon months of July through October during an average water year and for peaking purposes during the remainder of the year to the extent water is available. The IECO water study showed that the third unit could be base-loaded 112 months during the 25 year period covered in the study, or an average of 4-1/2 months per year. The study also indicated sufficient water would be available during the remaining months to operate all three Karnaphuli units for peaking purposes eight or more hours a day. It is estimated by the BPDB and BVI that 153.3 million KWH can be generated as an average annual amount over the life of the project This amount of energy can be absorbed by the system by cutting back a like amount of thermal generation.

To the extent that the Karnaphuli third unit represents firm peaking capability throughout the year which could not be provided by units one and two alone, it has peaking benefits which should be measured against alternative sources of generation. The third unit will provide additional flexibility in permitting the entire Karnaphuli project to operate as a peaking plant in a manner for which it was originally designed. A hydro plant is particularly valuable to meet peaks since starting and stopping can be accomplished quickly and with less deleterious effects than a steam plant.

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In addition to substituting for more expensive fuel fired thermal plants as a peaking station, the Karnaphuli third unit can generate base load power during those periods when monsoon rains are wasted over the spillway. This will not only benefit consumers, but will give the PDB additional revenues to support the continued operation, maintenance and expansion of the entire power system. There will also be considerable primary but indirect economic benefits occuring to the industrial and private consumers as a result of having less expensive and more reliable power deliveries to support productive investments, generate employment and generally improve the quality of life through electrification. Notwithstanding, the primary and direct benefits accrue principally to the PDB in the form of increased sales, system reliability and the savings of fuel cost, especially on those thermal plants that use imported fuel oils such as at Chittagong. By conserving outlays of foreign exchange on fuel oil, the PDB will be better able to finance external purchases of spare parts, materials and services to keep the rest of the system in working order.

Since the benefits derived from fuel savings are alone sufficient to justify the costs of installing the third unit, only these elements will be calculated. The benefits to be derived from fuel cost savings by installing the third unit are calculated (separately for natural gas and furnace oil) by the PDB as follows:

(a) Analysis of Annual Fuel Savings in Different Natural Gas Fired Thermal Power Stations in the Eastern Zone.

(1) Karnaphuli Third Unit
Capacity of the Third Unit - 50 MW
Plant Factor - 70 percent
Power Generated Annually - 306,600,000 KWH (@ 70% factor)
Power Generated 6 months - 153,300,000 KWH (@ 70% factor)
Average Annual Output: Base = 114,750,000 KWH
Peaking= 63,110,000 KWH
177,860,000 KWH

(2) Ashuganj Power Station
Natural Gas required for generating 1 KWH = 11 cu. ft.
Gas rate: 5.0 Taka/1000 cu. ft.
Generation Cost/KWH = $\frac{5.0 \times 11}{1000}$ = 5.50 paisa/KWH

Total potential savings = 177.860 MKWH x .055 paisa
= Taka 9.78 million

(3) Shahiżibazar Power Station
Natural Gas required for generating 1 KWH - 25 cu.ft.
Gas rate: 3.6 Taka/1000 cu. ft.
Generation Cost/KWH = $\frac{3.6 \times 25}{1000}$ = 9.0 paisa/KWH
Total potential savings = 177.860 MKWH x 9.0 paisa
= Taka 16.01 million

(b) Analysis of Annual Fuel Savings in the Chittagong Thermal Plant Using Imported Fuel Oil

(1) Karnaphuli Third Unit
Generating Capacity of Third Unit = 177.860 MKWH

(2) Chittagong Thermal Power Station
Fuel oil required for generating 1 KWH = .75 lbs.
One Imperial gallon = 9.5 lbs. of furnace oil
Fuel Oil Rate: 5.22 Taka/Gal (Imp.)
Generation cost/KWH $\frac{.75 \text{ lbs} \times 5.22}{9.5}$ = 41.2 paisa/KWH
Total Fuel savings potential:
177.860 MKWH x 41.2 paisa
=Taka 74.7 million
= $5.34 million

Total fuel saved: $\frac{177.860 \text{ MKWH} \times .75 \text{ lbs/KWH}}{9.5 \text{ lbs/gal}}$
= 14,040,000 gallons (Imp.)
= 335,890 barrels/year

BENEFIT/COST CALCULATIONS

Assumptions:

Discount Rate: 10 percent
Commissioning: Year 1 = 65 percent
Year 2 = 85 percent
Year 3 = 95 percent
Line/Sales Losses: 28 percent
Plant Factor: 70 percent
Conversion rate: 1 Taka = $.0714
Prior investments are sunk costs

Summary Discounted Cash Flow:

	Year of Incidence							Cumulative
	1	2	3	4	5	6	7	8-25
Capital Outlays	3.0	4.5	1.6					
Gross Revenues				2.68	3.51	3.92	4.12	74.16
Operating Expenses				.65	.40	.35	.22	3.96
Net Revenues				2.03	3.11	3.57	3.90	70.20
Discounted Cash Flow @ 10 percent	3.0	4.05	1.30	1.48	2.04	2.11	2.07	15.88

Benefit/Cost Ratio: $\frac{23.58}{8.35} = 2.82$/
@ 10 percent/yr.

Internal Rate of Return = 25.3 %/

IRR (including all investments) = 12.51%/

INTERNAL RATE OF RETURN CALCULATION
(all costs in 1978 dollars)

	0	1	2	3	4	5	6	7	8	9	10-30
Capital Outlay (past)	13.03										
Capital Outlay (future)		3.0	4.5	1.6							
Gross Revenues					2.68	3.51	3.92	4.12	4.12	4.12	4.12
Operating Expenses					.65	.40	.35	.22	.22	.22	.22
Net Revenues					2.03	3.11	3.57	3.90	3.90	3.90	3.90
Adjusted Cash Flow (1978 dollars)	13.03	3.0	4.5	1.6							
					2.03	3.11	3.57	3.90	3.90	3.90	3.90/yr.

Internal Financial Rate of Return - 12.51%
(All investments included
at 1978 dollar equivalents)

PART II

D. Project Financing

1. Cost Estimate

Total dollar costs, in addition to the $2.5 million from loan 007, to complete installation and place the third unit in operation are estimated at $7.0 million. All of the added costs are required for foreign construction contractor services and materials and an additional two years of construction management and supervisory services provided by the engineering consultant, Sverdrup & Parcel and Associates, Inc.

The lower of the two contractor proposals is 37 percent higher in total amount and 95 percent higher in the dollar portion than the engineer's estimate. Differences between the engineer's estimate and proposals received are attributed to (1) high mobilization costs; (2) large expatriate supervisory staff relative to the amount of work to be done; (3) the probable necessity of importing skilled labor; (4) risks of unidentified costs in installing and placing in service equipment that has been subject to the multiple handling and storage of this equipment since 1971.

Mobilization is more than 30 percent of the dollar amount of the low proposal. Major items are imported portable housing for the contractor's and engineers' staffs and construction equipment.

Areas for negotiation have been identified and it may be possible to reduce costs or time for mobilization and to shift some items from dollar to taka costs.

Expatriate construction management and supervision is estimated at 20-22 U.S. and third country nationals during the construction period of 18 months. It is anticipated that 12-15 skilled laborers (welders, carpenters, millwrights, electricians) will be required also. The inability of the PDB and local contractors to produce qualified construction supervisors and skilled craftsmen is the principal reason that led to the decision to contract with a foreign construction contractor for the work. Higher wages for such personnel, associated costs for hosuing and logistic support plus the fact that these costs are shifted from taka to dollars has escalated the FX requirements dramatically.

Risks are high for all parties in this project. Major equipment furnished by Allis Chalmers in 1970 and 1971 is no longer covered by warranties. Although it has been inspected and known deficiencies and repairs have been identified, there is more than normal possibility of hidden

trouble that may be as added cost to the contractor, the owner or both. The contractor appears to have included a generous allowance for such contingencies in his price. Claims for extras in addition are probable if problems in obtaining acceptable performance develop. A contingency of about 10 percent is included in the Cost Estimate for these and other possible cost escalations. No provision has been included in the estimate specifically for escalation since that is presumed to be reflected in the contractor's fixed price proposal.

The estimated costs are considered acceptable considering factors discussed above. Costs are summarized below.

COST SUMMARY

	$(000)	Taka(000)	Total Equiv. $(000)
1. Construction Contract	5,256	14,159	6,200
2. Replacement Parts & Services			
(a) Allis Chalmers-Parts	1,262		1,262
(b) Allis Chalmers-Services	444	78	449
(c) Other Replacements	217		217
(d) Repairs	140		140
3. Engineering Services			
(a) SPA Contract thru 9/78	532	350	555
(b) Amendment - 27 months	700	1,983	832
4. Contingency	949	1,840	1,072
5. PDB Admin. Costs	-	5,590	373
TOTAL	9,500	24,000	11,100
Less funds available	2,500		
Net additional funds required	$7,000		

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REPLACEMENT PARTS AND SERVICES

1.	Allis Chalmers Contract 7/18/77 - Parts:		$ 1,123,160
	Additional parts known		3,000
	Estimated Shipping		135,800
		Subtotal	$ 1,261,960
2.	Allis Chalmers Field Services:		
	Short term through 7/78		$ 30,000
	General rep 24 mos. @ 14,000		336,000
	Specialists 6 mos. @ 13,000		78,000
		Subtotal	$ 444,000
3.	Other Procurement:		
	By SPA through 7/78		$ 91,300
	In process by SPA		8,000
	Switchyard Steel		20,000
	Additional Unidentified		50,000
	Tools and Equipment		23,000
	Estimated Shipping		25,000
		Subtotal	$ 217,000
4.	Repairs:		
	Refinish thrust bearing		$ 15,000
	Repair excitation cubicle		75,000
	Repair OCB's transformers		50,000
		Subtotal	$ 140,000
		TOTAL	$ 2,063,260

ENGINEERING SERVICES - TAKA COSTS

1. Local Salaries:

Engineers	- 2 x 27 mos. @ 8,000		432,000
Engineers	- 4 x 24 mos. @ 8,000		768,000
Administrator	- 1 x 27 mos. @ 5,000		135,000
Draftsmen	- 2 x 24 mos. @ 2,000		96,000
Typists	- 1 x 27 mos. @ 1,200		32,400
Drivers	- 3 x 25 mos. @ 1,000		75,000
Maintenance	- 1 x 24 mos. @ 800		19,200
		Subtotal	1,557,600

2. Reimbursable Direct Costs - SPA:

Travel & per diem within Bangladesh		119,000
Personnel Expense:		
SPA Living Allowances		180,000
Office Expenses		135,000
	Subtotal	425,000
	TOTAL	1,982,600
	(Equivalent	$132,200)

3. Reimbursable Direct Costs - A.C.:

Travel & per diem within Bangladesh		10,000
Personnel Expense:		
A.C. Living Allowances		67,500
Office Expenses		-
	TOTAL	77,500

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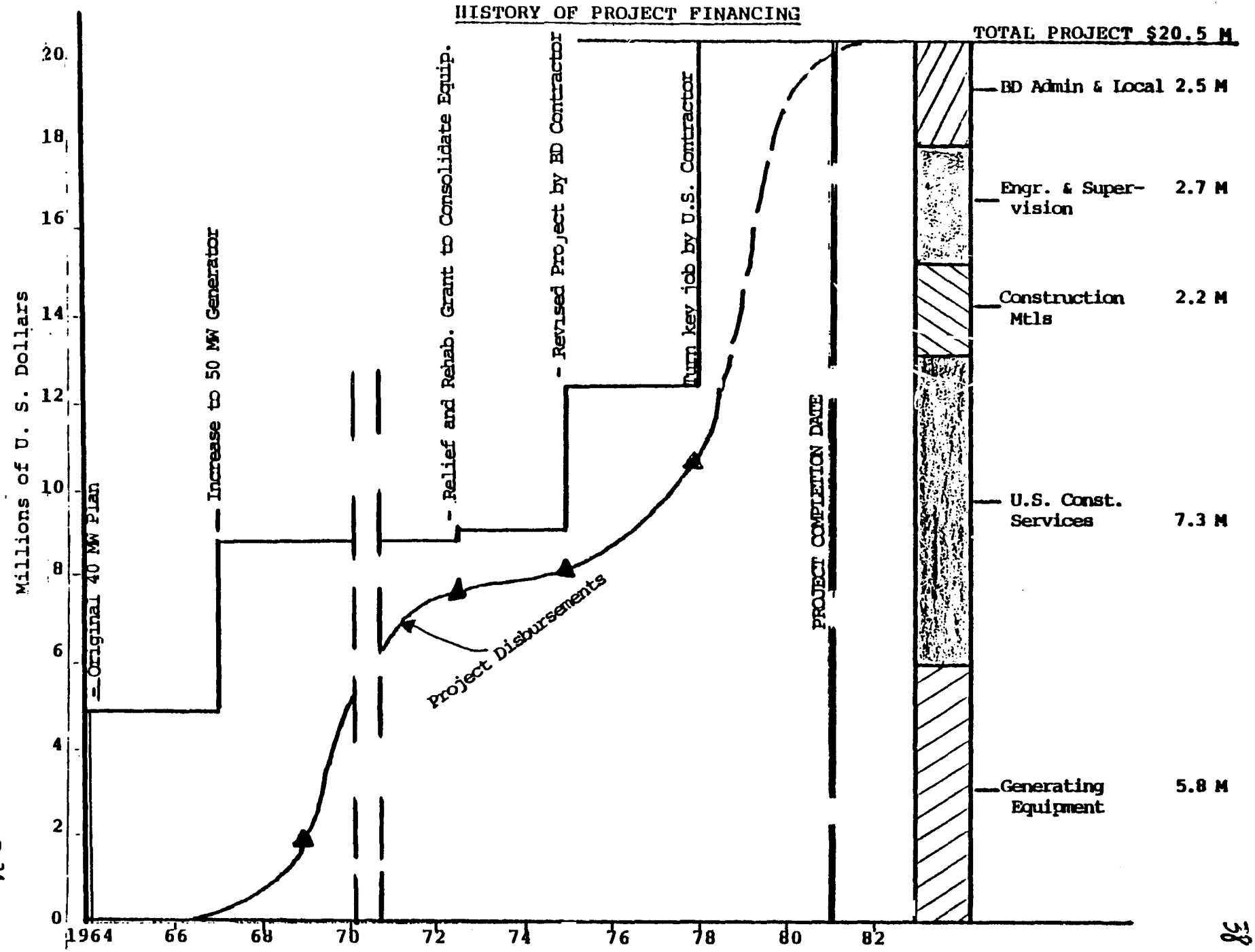
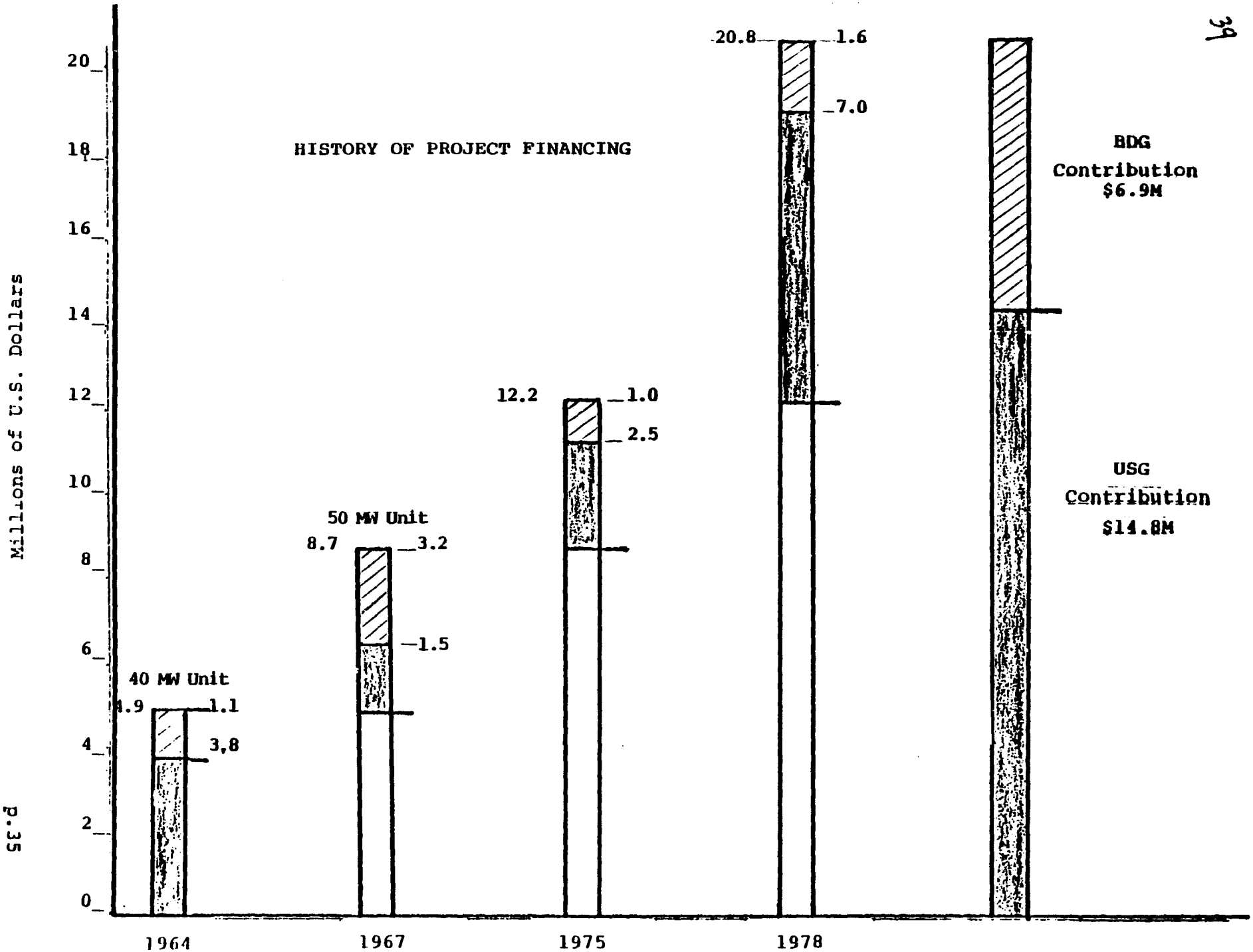
ENGINEERING SERVICES - AMENDMENT TO SPA CONTRACT - 27 MONTHS

1. **Salaries and Salary Related Costs:**		
Project Manager	- 27 mos. @ $4,000	$ 108,000
Civil Engineer	- 15 mos. @ $2,800	42,000
Electrical Engineer	- 21 mos. @ $2,800	58,800
H.O. Support	- 12 mos. @ $3,100	37,200
	Total Salaries	$ 246,000
	Salary Related Expenses @ 30%	73,800
	Overhead @ 70%	147,600
	Subtotal	$ 467,400
2. **Reimbursable Direct Costs:**		
Vice President time	- 50 days $400	$ 20,000
Travel & Per Diem	- International 13 trips	25,000
	- Within U.S.	2,000
Personnel Expenses:		
Move three men at $3,000		$ 9,000
Terminal Leaves - 3 @ $2,500		7,500
Medical		3,000
Office Expenses		26,000
Insurance and Miscellaneous		47,000
	Subtotal	$ 139,500
	Total Salaries and Costs	$ 606,900
	Fee and Contingency	$ 91,035
	TOTAL	$ 697,935
	Use	$ 700,000


HISTORY OF PROJECT FINANCING
TOTAL PROJECT $20.5 M
Millions of U. S. Dollars
20
18
16
14
12
10
8
6
4
2
0
1964
66
68
70
72
74
76
78
80
82
Original 40 MW Plan
Increase to 50 MW Generator
Relief and Rehab. Grant to Consolidate Equip.
Revised Project by BD Contractor
Turn key job by U.S. Contractor
PROJECT COMPLETION DATE
Project Disbursements
BD Admin & Local 2.5 M
Engr. & Super-vision 2.7 M
Construction Mtls 2.2 M
U.S. Const. Services 7.3 M
Generating Equipment 5.8 M


HISTORY OF PROJECT FINANCING
Millions of U.S. Dollars
20
18
16
14
12
10
8
6
4
2
0
40 MW Unit
4.9
1.1
3,8
50 MW Unit
8.7
3.2
1.5
12.2
1.0
2.5
20.8
1.6
7.0
BDG
Contribution
$6.9M
USG
Contribution
$14.8M
1964
1967
1975
1978

D. 2. Balance of Payments

Bangladesh's balance of payments situation has been characterized by generally stagnant exports, a large and generally widening trade deficit, and a consequent heavy dependence on foreign aid. While future aid requirements may be kept at approximately their current levels, the basic situation will continue to prevail for the foreseeable future.

Export growth has been stymied by sluggish world market for jute, which in both raw and finished form accounts for some 70 percent of export earnings. Thus, notwithstanding encouraging recent progress with respect to certain non-traditional exports - notably fish, leather, and tea - total export earnings in recent years have not reached pre-liberation (1971) levels. Imports, meanwhile, have risen in line with worldwide inflation, which has seen average import prices more than double since 1972/73. The country's terms of trade (export prices divided by import prices) stood at 53 (1972/73 = 100) in 1976/77.

The following Table summarizes recent trends in the country's foreign trade as compared with the last full pre-liberation year, 1969-70. Foodgrains and fertilizer are identified separately.

Table I

Foreign Trade, 1969-70 and 1972-73 - 1976-77

($ Millions)

	1969-70	1972-73	1973-74	1974-75	1975-76	1976-77
Exports	479	340	362	440	381	412
Imports	-594	-727	-925	-1236	-1290	960
Food	NA	321	308	544	358	158
Fert	NA	28	24	86	61	9
Other	NA	378	593	606	871	793
Balance	-115	-387	-563	-796	-909	-548

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As shown in the trade data, a $330 million (26 percent) reduction in imports in 1976/77 brought the trade deficit down sharply to its lowest level in four years. Apart from the reduced importation of foodgrains and fertilizer (lower by $200 million and $52 million, respectively), the decline could be attributed largely to the taka devaluation of May 1975 which occassioned increases in local prices of imported goods. The decline in non-food imports had an adverse effect on certain sectors of industry which operated at less than capacity for lack of imported materials and parts. A major expansion of imports is planned for 1977/78, as will be seen in the balance of payments data below.

As shown in the Balance of Payments Table, the country's trade deficits have been covered almost entirely by foreign assistance, divided more or less evenly among food, non-food commodity, and project aid. Foreign aid is less of a problem in Bangladesh than in many LDC's, given the fact that it is accorded top priority by the major donors, both as to the amount and terms of aid. As is often noted, aid commitments have been far in excess of the amounts annually disbursed. A sizeable proportion of the aid is on grant or soft loan terms, and annual repayment obligations are certainly low by current developing country standards.

Table II

Bangladesh: Balance of Payments, 1975/76 - 1977/78

(Millions of US $)

	1975/76	1976/77	1977/78 (proj.)
Current Account	-908	-538	-901
Exports (f.o.b.)	381	412	431
Imports (c.i.f.)	-1290	-960	-1329
Other	1	10	-3
Capital Account			
Foreign Aid	814	574	820
Food	307	135	275
Commodity	378	229	315
Project	129	160	230
Cash	-	50	-
Debt Repayment	-78	-42	-25
Private Transfers	122	46	50
IMF Position	-	3	-23
Reserves			
Change (-= increase)	50	-43	79
End of period 11/	213	294	215

11/ Available data to not explain the inconsistensies between reported changes in reserves and reported year-end reserve positions.

Source: World Bank and Planning Commission

If Bangladesh is relatively well off in these respects, nevertheless, the size of the aid commitment can be misleading. It should not be permitted to obscure the fact of a continuing extremely tight balance of payments situation. The bulk of the unused aid commitment (or aid pipeline, as it is often termed) - $1.2 billion of a total $1.6 billion as of Oct. 1, 1977 - consists of project aid. The government can perhaps be faulted for its inability to disburse project aid more quickly, but its failure to do so remains a fact of life.

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As experienced with the Karnaphuli project, the Government exerts little positive control over the skilled and technical resources of the private and public sectors. It is increasingly unable to marshall adequate local resources to implement its projectized annual foreign assistance (see Capital Account above) because suitable capital stocks, especially construction equipment, are very scarce in comparison with needs. Unfortunately, this condition is expected to continue for some time into the future -- certainly until BDG reserves improve to the point where the private sector obtains sufficient foreign exchange to maintain and expand its stocks of capital equipment. The Government's "wage earners scheme" is helping to alleviate foreign exchange constraints for imports in certain respects, however, the program will not materially assist the Karnaphuli project before its projected completion. In summary, the BDG Balance of Payments status is not expected to improve much during the next two years and there are no practical alternatives to completing the job, except to procure the expatriate services with A.I.D. funds as proposed herein. Fortunately, the project will enable the Government to save considerable foreign exchange each year by substituting for peaking generation now being supplied inefficiently by thermo-electric plants run on imported fuel oils. It will also improve power supplies in the Chittagong port and industrial complex and enable consumers there to operate more efficiently and reduce their foreign exchange outlays for maintaining and operating captive standby generator units.

E. Socio-Cultural Aspects

While this project will benefit both urban and rural consumers of all types by supplying the power needed for the Eastern Grid distribution system, it is primarily a support type activity to other projects (BDG-AID Rural Electrification Program, ADB Distribution System Project, etc.). In view of its critical but still supporting role, the primary but indirect beneficiaries of this project are the same direct target beneficiaries in the other two projects--i.e., the urban and rural consumers of all classes. All are directly or indirectly benefitted either by an improved quality of life that electrification brings to the households or through the general increase in employment and income generation. Since this project is closely tied to the A.I.D. supported Bangladesh Rural Electrification Program, information on the socio-cultural aspects of that activity are included in Annex C.

PART III. IMPLEMENTATION PLANNING

A. Project Administrative Arrangements

The previous project paper and the foregoing have given adequate details on implementation of the project. The following summary of roles is presented for clarity.

1. Host Country Responsibilities

The Bangladesh Government will be responsible for overseeing implementation of the project by the Power Development Board and Engineering Consultant acting as its agent. The PDB will be responsible for coordinating the work with other Government Agencies and A.I.D. The PDB and its agent SPA will be responsible for project planning, cost control, program expenditures, documentation, inspections, contract management and periodic evaluations of project progress. A.I.D. funds will be allocated for expenditures designated in Part II.D, with the BDG and PDB supplying all local currency as needed by the project schedule. Implementation and financing mechanisms used for the project to date will continue in effect. Special arrangements for the provision of local currency shall be initiated per A.I.D.-BDG discussions. Any departure therefrom shall be approved in writing beforehand by AID/W.

2. Role of A.I.D.

Primary implementation responsibility will continue to be vested in USAID/Dacca with AID/W backstopping the Mission on procurement and technical matters as necessary. The USAID Project Committee shall be responsible for ongoing monitoring of construction, logistics, payments to contractors and commissioning of the Generator Unit. The Engineering Office will be responsible for maintaining close contact with construction participants and field inspections of activities. The Project Committee shall make periodic evaluations and be responsible for mid-course corrections necessary to accomplish the purpose of the project. The USAID will keep AID/W advised of progress and notify it when backstopping actions or approvals are required. All Mission offices will perform their respective functions under the supervision of the USAID Director.

B. Implementation Plan

1. Engineering Services

The PDB contracted with Sverdrup and Parcel and Associates, Inc. (SPA) for consulting engineering services in August 1976. Design, procurement, construction supervision, inspection, operational testing and training services are included within the contract. It will be amended to extend time for performance by 27 months and to reflect staffing changes resulting from the altered construction/installation plan and to increase the contract amount accordingly. The contract scope will be modified in some respects to reflect the revised construction/implementation approach but coverage will still include the services outlined above.

2. Procurement

The consultant, SPA, as agent for the PDB is responsible for the procurement of all imported equipment, materials and parts. The largest requirement is for missing and replacement parts needed for the Allis-Chalmers generators. SPA contracted with Allis-Chalmers in July 1977 for requirements identified at that time, including field services of Allis-Chalmers technical representatives. SPA will continue procurement responsibility for imported equipment and parts for permanent installation in the plant. All other procurement including construction equipment, construction materials (cement, aggregate) housing and vehicles will be the responsibility of the construction contractor.

3. Construction and Installation

A U.S. contractor will be responsible for furnishing all labor, tools, construction equipment, vehicles, housing and office space and all construction materials required in addition to that identified as being at site, on order or to be procured by SPA. Field representative services furnished by Allis-Chalmers will be utilized by the construction contractor as required by its construction schedule.

Contracting guidelines set forth in HB-11 will apply for general procurement. However, variation in the normal contracting procedures was accepted in the interest of encouraging bidding participation by U.S. contractors having prior Bangladesh experience and to minimize the time required to get a contractor on the job. Competitive bidding procedures have been utilized but the final agreement will be a negotiated contract.

4. Project Schedule

The revised schedule for completing the project started with an approval by the Asia Bureau in February 1978 of the USAID plan to use an expatriate U.S. contractor in lieu of local Bangladeshi forces. Major actions accomplished since that time and dat[illegible]re as follows:

Contractor Prequalification: Synopsis published in the Commerce Business Daily March 9 with closing date for submission of prequalification data 30 days later. Three firms responded and all were declared qualified and invited to attend a site visit on May 8 and 9. All attended.

Request for Proposal (RFP): The RFP was issued on May 17, 1978. It established the date of June 30 for opening proposals in Dacca, defined the form of proposal to be fixed price in US dollars and Taka for each line item in the payment schedule and responded to questions raised by the contractors at the site visit. At various times prior to issuance of the RFP, the prequalified contractors were given reference material, including bidding documents prepared originally for local contractors, technical specifications drawings, draft general and special conditions proposed for this contract and draft material describing the scope of work and method of contract administration.

Contract Proposals: Two of the three prequalified contractors submitted proposed on June 30, 1978. Unevaluated results are as follows:

Vinnell Corporation:	Schedule A -	$6,200,100
	Schedule B -	$ 626,000
Fishback and Moore:	Schedule A -	$9,815,585
	Schedule B -	$ 646,106

Negotiations are to begin in Dacca about July 15. The projected schedule for key events from July 1 to completion follows:

Date	Event
July 14, 1978	SPA presents its evaluation of construction contractor proposals and recommendations for negotiations to the PDB and USAID in Dacca. SPA also presents proposed contract amendment for its services.
August 1	SPA Contract amendment approved.
August 15	AID funds authorized.

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Date	Event
Sept. 1, 1978	SPA Project Manager on site. Construction Contract negotiations completed.
Sept. 15, 1978	Loan amendment signed. Construction contract signed.
Nov. 1, 1978	CP's met. Notice to Proceed issued to Construction Contractor.
Dec. 1, 1978	Contractor mobilized on site.
Sept., 1980	Terminal date for commitments.
Dec. 31, 1980	Estimated completion date for installation.
June 30, 1981	Project assistance completion date (PACD).

C. Monitoring and Evaluation

Since construction activities will be supervised by a U.S. engineering consultant and reports of progress issued monthly, USAID evaluation efforts can be limited to an annual project evaluation in December 1979 and 1980. A final project evaluation should be undertaken within six months after the generator is installed and operating (estimated June 1981). The USAID will be responsible for normal implementation monitoring and control functions. Ongoing financial mechanisms and disbursement procedures will be continued.

PART III

D. Conditions Precedent and Covenants

The following Conditions Precedent and Covenants are proposed for inclusion into the Project Agreement or, as appropriate, Amendment:

1. Prior to any disbursement, or the issuance of any commitment documents financed by the proceeds of this loan, Borrower shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactor to A.I.D.:

a. An opinion of the Ministry of Law of Bangladesh or other counsel acceptable to A.I.D. that the Agreement or Amendment making available these funds has been duly authorized or ratified by and executed on behalf of the Government, and that it constitutes a valid and legally binding obligation of the Government;

b. Evidence that the Government and the Bangladesh Power Development Board have made satisfactory arrangements for the provision and disbursement of local currency support financing in accordance with the needs of the project and any contracts financed by A.I.D.

c. Evidence that the Power Development Board or its Agent has entered into contract(s) with a firm(s) for the provision of all equipment, materials and services needed to complete the installation and commissioning of the Third Unit.

2. Covenants

The Government covenants and warrants that, except as A.I.D. may otherwise agree in writing, the Borrower shall:

a. Provide and utilize for the Project financial and other resources compatible with the Resources Plan to be attached as Annex I, Project Description, to the Loan Agreement;

b. Sustain its project obligations, responsibilities and covenants as agreed to in Article of the previous Loan Agreement, dated

GOVERNMENT OF BANGLADESH

Application for Project Assistance*

Dear Dr. Lucas:

The Government of the People's Republic of Bangladesh have been pleased to approve the Proposal for the installation of the Third Unit on a "Turnkey Basis". I would accordingly request you to kindly move USAID Washington for financing the additional expenditure involving foreign exchange. It is requested that the additional financing be provided as grant. The Government of Bangladesh agrees to provide the necessary additional local currency.

The Government of Bangladesh further desires that in order to improve the capability of our counterpart staff, there should be adequate provision for training our personnel by the consultants and contractors to be appointed for the purpose.
Signed: Mohammed Lutifullahil Majid, Joint Secretary, ERD.

* Original letter on file in USAID/Dacca.

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BANGLADESH

KARNAPHULI THIRD UNIT (SUPPLEMENTARY)

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Joseph S. Toner, Mission Director, the principal officer of the Agency for International Development in Bangladesh, having taken into account, among other things, the maintenance and utilization by the Bangladesh Government and its agencies of projects previously financed by the United States, do hereby certify that in my judgment Bangladesh has the financial and human resources capability effectively to utilize the project to be financed by this grant.

This judgment is based upon considerations discussed in the Project Paper to which this certification is attached.

Joseph S. Toner
Director

Mar 4 1975
Date

1. Socio-Cultural Considerations

a. The Social Landscape

The population of Bangladesh is approximately 83.5 million with 90 percent living in rural areas and substantially dependant on agriculture and agro-related industries for their livelihood. In addition, any upper and middle class urban dwellers retain title to agricultural land and receive income from agricultural production. Although agriculture accounts for 54 percent of Bangladesh's gross domestic product, per capita food production is among the lowest in Asia.

An important element of the social hierarchy in rural Bangladesh is the land tenure system. Land is considered the most secure form of investment and a primary determinant of social status in rural Bangladesh. In a situation where institutions are weak, resources scarce and population expanding rapidly, land ownership is the firmest guarantee that one can provide the necessary subsistence for one's family.

Under Moslem inheritence practices, all sons are entitled to equal shares of their father's land, while daughters receive lesser shares. This leads to a perceived need to pass on to one's sons sufficient land to ensure their survival and that of their families. Thus the pressure to hold on to the land one has, or, if possible, acquire new land is enormous. Given these pressures, profits derived from agricultural production are very likely to be invested in procuring additional land. Conversely, agricultural production losses, over a period of time, are apt to result in the loss of land.

Previous research into the land tenure situation has cast most Bangladeshi farmers as small landowners. That is, most farmers own small holdings which they till with their own and family labor. The Bangladesh Government's Land Occupancy Study has indicated this is not the case and, in fact, the owner-cultivator, as defined above, is more the exception than the rule. The Study indicates that 38.8 percent of the farmers till the soil in whole or in part on a sharecrop or lease arrangement. An equal amount of land is estimated to be cultivated by agricultural laborers supervised by owner-managers.

There are three general groups of Bangladeshi agricultural participants:

1. Sharecroppers - Those who own no land, except possibly their homestead, and till and land of others in exchange for a share of the crop.

2. Owner-cultivators - Those who till their own land using their own or family labor.

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3. Owner-managers - Those who oversee the cultivation of their own land by agricultural laborers.

b. Motivation

The primary motivating factor for all three of the principal tenurial groups to adopt new methods is economic, but dependent on the financial situation of the farmer and his benefit/cost allowances with respect to investments in agricultural inputs.

The sharecropper normally bears the full cost of inputs (seed, labor, fertilizer, animal power, etc.) while paying exorbitant interest rates to non-institutional sources to meet his credit requirements. At the same time, he is required in nearly all cases to surrender half of his crop to his landlord at the time of harvest. Under these conditions he is in a poor position to undertake further investments and is in constant danger of losing cultivation rights to the landlord.

Owner-cultivators are in a much better position, if only because they can keep their own crop. In addition, their status as landowners at least entitles them to low-cost institutional credit, even though only a minority are in practice able to obtain it.

The owner-manager faces much the same situation as the owner-cultivator. The very nature of his status, however, indicates that he is in a position to be more "risk taking" and innovative than either of the other two groups. It is unlikely that a single crop failure will result in a decline in his status, although inheritance practice may place his children in the owner-cultivator category. A key element for both the owner-cultivator and the owner-manager is that increased income will tend to be used for the acquisition of more land, displacing marginally productive land-owners. This substitution may, however, be necessary to achieve country level goals of self-sufficiency in food production and, providing off-farm employment is increased, could result in improved living standards for all Bangladeshis. Increased returns on production and the continued decline in agricultural wages to farm labor 1/, could attract present absentee landlords into the ranks of the owner-managers, thereby contributing to the forces tending toward the decline of the sharecropper.

c. Employment Patterns

Keith Griffin has noted:

".....an unequal distribution of land ownership, a defective tenure system, and privileged access to the capital market may combine

1/ The Quarterly Journal of the Bangladesh Institute of Development Studies, Vol. IV, No. 4, October, 1976, "Institutional Change and Agricultural Wages in Bangladesh" by Edward Clay.

to give landowners monopsony power over laborers and where this occurs the result will be lower wages and less employment than would otherwise be the case." 1/

Empirical evidence has been produced in Bangladesh which lends credence to this hypothesis. A recent UNDP/FAO study notes the components of growth in the agricultural sector are such that the growth in crop yields has been greater than the growth in demand for labor. Further, since 1960, the growth of demand for agricultural labor has been only one-half of the rate of growth of the agricultural labor force. The UNDP/FAO study goes on to note that the cost of living index, using 1963-64 as the base of 100, stood at 560 in 1975. On the other hand, the index of real agricultural wages, using 1963 at 100, had regressed to sixty-six. 2/ Thus it is not surprising that although farm output prices have not risen significantly in recent years, landowners have chosen to move from lease and sharecrop arrangements to the use of daily labor in view of the availability of cheap labor and cheap credit.

The Mission expects this will be the national trend for some time to come. Considering the period up to the year 2000, the potential labor force has already been born. The present rate of under-employment is estimated at 40 percent with the rate of growth in the agricultural labor force projected at 2.1 percent over the next decade.

c. The Alternatives

There is, quite obviously, the option of doing nothing, but this is acceptable to no one. Another alternative is through industrial development in the major cities of Bangladesh, i.e., Dacca, Narayanganj and Chittagong. This would involve a major and costly effort, would be at variance with current Government policies and would be an approach with which AID could not associate. Further, it probably wouldn't work, since it would mean a diversion of Government resources to the major urban centers from the rural areas and thus would have little or no effect on growth in the agricultural sector. This in turn would lead either to an inflationary spiral or increased Bangladesh dependence on imported food. Also, as rural labor was drawn into the cities, social services would tend to break down, and finally, rural underemployment would become urban unemployment, with more serious implications for stability.

1/ Keith Griffin. The Political Economy of Agrarian Change: An Essay on the Green Revolution, p. 31.

2/ UNDP/FAO Working Paper XI. Agricultural Employment in Bangladesh. April 1977. pp. 15-17.

A third alternative is the one which the Government and most donors are at least implicitly following, the spread of HYV technology. It is generally accepted that the use of HYV technology is considerably more labor-intensive than traditional crop technologies, particularly when large-scale mechanization is not introduced. The aforementioned fragmentation of holdings effectively prohibits mechanization. Complementary to the HYV strategy as employment generators have been the Rural Works and Food for Work programs. The HYV strategy, however has had as its primary goal the attainment of foodgrain self-sufficiency with employment as a by-product or secondary goal. Moreover, the UNDP/FAO study notes that only in certain cases does adoption of HYVs create more labor. For example, the adoption of HYV boro (winter rice crop) combined with a transition from traditional to modern irrigation methods leads to a decline in labor demand. 1/ The crop sector employment projection of the study, ".....implies that employment even under the most optimistic agricultural growth assumption will scarely keep pace with the expansion of the agricultural work force." 2/ Given present unemployment and underemployment rates, this is not good enough. Rural Works and Food for Work cannot make up the difference because they would require an ever expanding bureaucracy to administer them at the required levels and ever increasing amounts of donor assistance.

The Mission will continue to support the spread of HYV technology and the full array of rural public works activities but believes another component is needed, rural industrialization.

d. The Case for Rural Industry

A recent AID publication noted:

"The tendency of many LDCs to concentrate industrial investment in only a few central metropolitan areas has had the effect of widening the income gap between rural and urban areas. It has

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1/ Ibid., p. 3

2/ Ibid., p. 6

also encouraged urban congestion with all of the accompanying problems. By moving some industries to rural areas, it should be possible to capitalize upon the large supply of underemployed and unemployed rural labor. In the initial stages of decentralization, particularly attractive candidates are those industries which process agricultural raw materials. From the standpoint of the individual entrepreneur, advantages include lower land and labor costs, and reduced shipping charges (by virtue of transporting processed goods rather than raw materials). Early industries could be meat slaughter and packing plants, oilseed processing facilities, fiber mills, fruit and vegetable processors, etc. On the agricultural input side, fertilizer mixing facilities and small equipment manufacturers are possibilities.

Additional investment in infrastructure, particularly in such things as rural electrification, sewage systems, and water purification plants, can contribute substantially to the attractiveness of the move and may in fact constitute a necessary condition to decentralization on a meaningful scale. The experience of Japan and Taiwan in achieving industrial decentralization probably has much to offer other countries contemplating such a course of action." (Underscoring supplied) 1/

The development of market towns and decentralized rural industries is critical for two reasons. First, there is the problem of surplus labor discussed above. Second, there is the problem of surplus capital in the hands of the wealthier farmers. At present, the ownership of relatively large plots of land allows the large farmer access to both cheap credit and cheap labor. The pricing of these two factors enables him to engage in profitable farming operations even if the price of grain remains low. The only outlet for these profits, at this time, is additional investment in more land. Land reform is not a workable option because: 1) there simply isn't enough land to provide supportable farming units to all of the tillers; 2) land ownership ceilings cannot be enforced as a practical matter given the opportunity for subterfuge through the extended family, and 3) reform, even if it were possible in land/population

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1/ Russell H. Brannon and David J. Jessel. "Unemployment and Underemployment in the Rural Sector of the Less Developed Countries." TAB Occasional Paper No. 4, January 1977, p. 61.

ratio terms, is not feasible for domestic political reasons. Market towns however can provide the absorptive capacity for both the surplus labor and capital.

The Mission is presently engaged in a Rural Industries Study (See Part I.B above) as a component in developing of a market town strategy. A number of prerequisites to rural industrial development are expected to be identified by the Study, e.g., transport and communications systems, policy reforms, capital resources, development of local skills, etc. Among these prerequisites will be energy sources for grain drying and storage, commercial fertilizer mixing, milling and processing operations and small repair and maintenance shops.

Of the presently available alternative energy sources, electricity is the cheapest and most reliable. In towns where electricity is available, almost every commercial establishment has a connection. Further, according to a survey conducted by the feasibility Consultant for this project, market bazars which have electricity also tend to have both a greater number and a greater variety of shops. Each electrified bazar covered by the feasibility survey had at least 100 shops, employing primarily family labor but with one or two hired laborers. At present these market bazars serve very localized areas. Thus as the transportation system improves to make these bazars more readily accessible, expansion of commercial and industrial activity in the bazar should increase. As new bazars are electrified they should also expand significantly. In each case, additional labor demand should be created.

2. Social Consequences and Benefit Incidence

a. Access to Resources and Opportunities

One of the main criteria for selection of the project areas is the consideration that 75 percent of the population is estimated to be able to afford the minimum monthly rate charges. Historically, the Mission has defined its rural target group as farmers owning two acres or less and landless tenants and sharecroppers. According to national aggregate LCS data, 75 percent of the rural

population meets this definition. Thus the overlap between the population which can afford electricity and the target group would mean that up to two-thirds of the target group can afford electricity at the rates proposed.

It is not expected that the provision of electricity to the houses of the target group will significantly change their lifestyle in the short term. For the most part it will mean a conversion to electrical lighting from kerosene lamps, although some families may be able to purchase small radios. Over the longer term, assuming significant growth in rural purchasing power, the target group will be able to afford small appliances. Most of the benefits to the target group however will derive from employment creation, discussed above.

There is also a nation-building aspect to rural electrification. The Thana headquarters is the center for the implementation of rural development activities and the main point of interface between the Government and the people. In the selected project areas, ten Thana headquarters do not have electricity. The provision of electricity to these Thana headquarters is expected to enhance their operations through interior lighting for offices, for the classrooms of the Thana Training and Development Center, for telecommunications with District headquarters and Dacca, for health center lighting and refrigeration units, etc. Electrification of Thana headquarters would also make field assignments more attractive to Government personnel.

b. Employment

The generation of employment is the primary focus of the project. As noted above, rural unemployment and underemployment is high and the trend is toward increasing numbers of rural laborers working for a daily subsistence wage. The development of decentralized rural industries is critical to providing employment in the rural areas. With the expected increased spread of pumps through electrification, land currently fallow in the winter season can be brought under production. Thus, the adoption of HYV rice and irrigation will create additional employment also, although

as discussed above this type of activity is subject to limits and does not in any event have the potential of the market towns.

c. Rural Displacement, Migration and Urbanization

The combination of population growth, agricultural input/output pricing policies which favor wealthier farmers, and lack of investment outlets for private capital in the rural areas is displacing small farmers, particularly sharecroppers, at an appalling rate. That large scale migration to the major cities has not already taken place is due probably in the first instance to difficulties of travel but also to the fact that when this hurdle is passed, the migrant comes up against constant Government efforts to move destitute migrants to "squatters' camps" outside the major cities, not an encouraging prospect even for the poor rural unemployed.

Nevertheless, the present urban population is expected to grow from an estimated 10 percent of the total population to an estimated one-third of the total population by 2000. In actual numbers of people, this means a growth from 8.5 million to 50 million people living in urban areas, an increase of nearly 600 percent. This growth is unavoidable unless a catastrophe of major proportions occurs to curtail population growth. Government policies and programs can however influence where this urban population will be located, i.e., whether it will center in a few major metropolitan areas or be spread over a number of small cities serving regional areas. The Mission believes the latter is the preferable course and while no formal Government policy has been announced, Government officials with whom the Mission has discussed the Rural Industries Study have indicated they also favor this approach.

e. The Role of Women

On the directly beneficial aspects of electrification, women should also share. A great majority of power connections are for households, where availability of lighting should lead not only to a perception of self improvement for women whose families have electricity, but also should contribute to a better sense of security as households and villages are better lit. On the energy side, as households are able to afford appliances, these become a principal means for improving the standards of living of women. On employment, the potential for local handicrafts development should be a particular benefit for women. Finally, the availability of lighting for education both at the home and in the villages, as well as the potential for better health care and preventive sanitary protection, are all benefits which impact first upon women.

It is expected therefore that as the PBS systems grow, the benefits and participation of women in the group will tend to reinforce each other so that whether it is employment, household conveniences, better security, self education or improvement, better lighting, whichever of these alone or together, women should be immediate beneficiaries. The results could not help but improve their status and role within the community, particularly as the next generation matures.

In the realization of higher farm incomes, women and men will, of course, benefit equally from this project. Moreover, rural women could utilize part of the incremental household earnings for investments in further development of cottage industries, which provide sustenance to many a rural household, and thereby further improve their family's well-being. The opportunity for learning or improving the skills for such activities may be provided through a companion AID FY 1977 project for the National Women's Development Academy which is specifically directed to development of skills for rural women.

ANNEX D

Initial Environmental Examination

(Kept on file in USAID/Dacca)

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COUNTRY CHECKLIST

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistant pattern of gross violations of internationally recognized human rights ?

Yes, it can be demonstrated

2. FAA, Sec. 181. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependants, or from entering the U.S. unlawfully ?

No, Department of State has not so determined.

3. FAA. Sec. 620(b). If assistance is to Government has the Secretary of State determined that it is not controlled by the International Communist movement ?

Yes.

4. FAA.Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where(a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government ?

No.

5.	FAA.Sec.620(e). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing expropriating, or otherwise seizing ownership .or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities ?	In 1972 the BDG nationalized five firms which were fully or partially owned by U.S. entities. The BDG has announced a compensation policy and is taking steps to discharge its obligations toward U.S. citizens and entities.
6.	FAA Sec. 620(f); App.Sec 108. Is recipient country a Communist Country ? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos ?	a) No b) No
7.	FAA.Sec.620(i). Is recipient country in anyway involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression ?	No
8.	FAA.Sec.620(l). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property ?	No
9.	FAA.Sec.620(l). If the country has failed to institute the investment guarantee program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason ?	OPIC bilateral agreement was signed January 15, 1975.
10.	FAA.Sec.620(o). Fishermen's Protective Act, Sec.5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters.	Not applicable.

	a. has any deduction required by Fishermen's Protective Act been made ?	
	b. has complete denial of assistance been considered by AID Administrator ?	
11.	FAA.Sec. 620(q):App.Sec. 504. (a) is the government of the recipient country in default on interest or principal of any AID loan to the country ? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App.Act appropriate funds, unless debt was earlier disputed or appropriate steps taken to cure default ?	a) No b) No
12.	FAA Sec. 620(s). What percentage of country budget is for military expenditures ? How much of foreign exchange resources spent on military equipment ? How much spent for the purchase of sophisticated weapons systems ? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)	Approximately seven percent. The Soviet Union has provided a limited number of aircraft for the BDG airforce. This non-sophisticated equipment was purchased on credit at reduced prices. The BDG is not diverting development assistance funds for military expenditures.
13.	FAA Sec.620(t). Has the country severed diplomatic relations with the United States ? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption ?	No.

14.	FAA Sec.620(u). What is the payment status of the country's U.N. obligations ? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget ?	Not in arrears.
15.	FAA Sec.620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism ?	No
16.	FAA, Sec.666. Does the country object, on the basis of race, religion, national origin or sex, to the presence of any offices or employees of the U.S. there to carry out economic development program under FAA.?	No
17.	FAA Sec.669. Has the country delivered or received nuclear reprocessing or enrichment equipment materials or technology, without specified arrangements on safeguards, etc. ?	No
18.	FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate ?	No

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec.102(c),(d). Have criteria been established, and taken into account to assess commitment and progress of country in effectively involving the poor in development, on such indexes as : (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution and (5) unemployment.	1. Yes 2. Yes 3. Yes 4. Yes 5. Yes
b. FAA Sec.201(b)(5),(7) & (8);Sec. 208;211(a)(4),(7). Describe extent to which country is :	Increasing foodgrain production is a major objective of the Bangladesh Five Year Development Plan (FYP). Included also in the FYP are programs for storage and distribution of food.
(1) Making appropriate efforts to increase food production and improve means of food storage and distribution.	
(2) Creating a favorable climate for foreign and domestic private enterprise and investment.	BDG policy encourages both foreign and domestic private enterprise and investment, and in January, 1975 an OPIC bilateral agreement was concluded. In addition, the new Martial Law Administration (since November 7, 1975) has particularly emphasised the role of private enterprise, is looking to the denationalization of a number of firms, and has announced a new private sector oriented investment policy.

(3) Increasing the public's role in the development process.	Implementation of Bangladesh's development plans required a large public role in development. Cooperatives are encouraged by the Government, directly involving the public in a participation role, In addition, the national rural works program also requires a high decree of local decision-making and participation.
(4) (a) Allocating available budgetary resources to development.	Bangladesh's budgetary resources are overwhelmingly allocated to relief and development expenditures.
(b) Diverting such resources for unnecessary expenditures and intervention in affairs of other free and independent nations.	Bangladesh's military expenditures are very low in absolute and real terms. The level of of defense spending is not a diversion of development funds.
(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press and recognizing the importance of individual freedom, initiative, and private enterprise.	Bangladesh is predominantly a nation of small farms, and while a large proportion of these are cultivated by shareholders and lease farmers as well as farmers who both own some land and lease or sharehold, the average area per family is under 2 acres and large holdings are the exception. Accordingly, land tenure changes while necessary in the long term equity question, are not as critical an element for the development of Bangladesh as for other LDCs. On the other question, the new

		Martial Law Administration has evidenced a concern for each of these; this has been manifested through tighter public administration return of newspapers to private control, and encouragement of private enterprise. Recognition of the importance of individual freedom and initiative also appear to be marks of the new Government. Martial Law has been extended to the country in what appears principally to to be an effort to clear up carry-over problems of corruption and abuse of power. Respect for the rule of law is stated as underlying the current measures.
(6)	Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	The new Government evidences' a concern for these questions and has been taking action to improve the public service, to release economic activity from constraints formerly imposed by governmental intervention, and to alleviate conditions of the people through rural works programs, food for work and other self-help programs.
(c)	FAA Sec.201(b),211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made ?	Yes.
(d)	FAA Sec.115. Will country be furnished, in same fiscal year, either security supporting assis-	No

tance or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs?

2. Security Supporting Assistance Country Criteria

a.	FAA Sec.502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights ? Is Program in accordance with policy of this Section ?	No Program is in accordance.
b.	FAA Sec.531. Is the Assistance to be furnished to a friendly country organization, or body eligible to receive assistance?	Not applicab
c.	FAA Sec.609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	Not applicabl
e.	App. Sec.113 Will security Assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country to the Universal Declaration of Human Rights ?	Not applicable.

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C. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;	a) A Congressional Notification will be prepared and filed prior to authorization
(b) Is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%)?	b) This funding requirement was not included in the FY 78 OYB because the exact amount and the timing were not clarified until bids were received from U.S. contractors for the work.
2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	a) Yes b) Yes
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	Not applicable
4. FAA Sec. 611(b); App. Sec. 101 If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaced Memorandum of May 15, 1962; see Fed. Register, Vol. 38, No. 174, Part III, Sept. 10, 1973)?	Not applicable

5. FAA Sec. 611(e). If project is capital assistance (e.g. construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?	Yes, certificate included herein.
6. FAA Sec. 209, 619. As project susceptible of execution as part of regional or multilaterial project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?	No. However, the Asian Development Bank is financing a companion project to improve distribution facilities in the Chittagong region and PDB management.
7: FAA Sec. 601(a); (and Sec. 201 (f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competion; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	The project will support an expansion of private industry and improve its technical efficiency and productivity. Because some of the power generated will be used in the Rural Electrification Program, coops should benefit substantially.

8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	The plant will undoubtedly lead to follow on trade opportunities for materials and equipment supply and Technical assistance services.
9. FAA Sec.612(b); Sec.636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.	The host country contribution is almost 100 percent local currency. All contractor services local cost will be paid with US owned TAKA.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release ?	No.

FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec.102(c); Sec.111;Sec.281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out	Use of electric power for pumping and increased productivity should result in chance for improvement in incomes of the rural poor, thereby helping to

from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democtatic private and local governmental institutions?	give them a basis for greater participation in development, including participation in the development of and through cooperatives. The urban poor will be helped by having better and cheaper power and to the extent rural development takes place, migration of the rural poor to the cities may be reduced.
b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph — e.g. a, b. etc. — which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source). (1) (103) for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, is full account taken of needs of small farmers. (2) (106) Technical assistance and energy development.	(1) Improved rural electric power will increase the productivity of small farmers and support increased small industries and jobs. (2) The project is completing an original program to make full use of a renewable energy resource (Karnaphuli River)
c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurance that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?	BDG will be providing for in excess of 33 percent of the project costs.

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Contress been made, and efforts for other financing?	Not applicable
e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.	The project directly contributes to the country's self-help efforts to increase foodgrain production and meet its own food needs. Although it is not specifically directed to training of manpower or development of the institutions under (1) whatever rural income increase results from the project should assist in development or support of a rural standard of living; in augmanted incomes lies the greater potential for encouraging such institutions. Similarly, health and increased roles for women, although not specifically addressed by the project, should benefit from any increase in rural income and living standards. For the items under (5), development of heavy industry can be expected to result from the success of this project; the other items under (4), are not sufficiently related to the project objectives to include comment.
f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.	The project is specifically targeted to the basic rural development and foodgrain production needs of the country through the Rural Electrification Project. The accomplishment of the objectives of the project may result in increased cooperative activity and greater participation by the poorer and rural population, thus involving greater participation in basic self-government type activities and development of institutions.

g. FAA Sec. 201(b)(2)-(4) and -8; Sec. 201(e); Sec. 211(a) (1)-(3) and -(8). Does the activity give reasonable promise of contribution to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	The project supports increased agricultural production through electrification and indirectly to other aspects of rural development. It is related to and consistent with other projects, contributes to long range goals. The PP documents the project's economic and technical soundness.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.	Approximately 80% of the project expenditures will accrue to US suppliers of industrial equipment and [illegible]

STANDARD ITEM CHECKLIST

D. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?	Yes.
2. FAA Sec. 604(a). Will commodity procurement be financed from the U.S. except as otherwise determined by the President or under delegation from him?	Yes.

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?	Yes, agreement will so provide.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?	Not Applicable.
5. FAA Sec. 608(e). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?	Yes.
6. MMA Sec. 901(b). (a). Compliance with requirement that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	Project Agreement will so provide.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	Yes. Not Applicable.

8. International Air Transport Fair Competitive Practices Act, 1974	
If air transportation of persons or property is financed on grant basis, will provision be made that U.S. flag carriers will be utilized to the extent such service is available?	Yes.
B. Construction	
1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?	Yes.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	Yes.
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million?	Aggregate value of U.S. assistance will not exceed $100 million..
C. Other Restrictions	
1. FAA Sec. 201(d). If development loan is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	Yes
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization does Comptroller General have audit rights?	Not Applicable.
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of communist-Bloc countries, country to the best interests of the U.S.?	Yes.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?	Such is not permitted.
5. Will arrangements preclude use of financing:	
a. FAA Sec. 114: to pay for performance of abortions or to motivate or coerce persons to practice abortions?	Yes.
b. FAA Sec. 620(a). to compensate owners for expropriated nationalized property?	Yes.
c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?	Yes.
d. FAA Sec. 662. for CIA activities?	Yes
e. App. Sec. 103. to pay pensions, etc., for military personnel?	Yes.
f. App. Sec. 105. to pay U.S. assessments?	Yes.
g. App. Sec. 106. to carry out provisions of FAA Sections 209(d) and 251(h) (transfer to multilateral organization for lending).	Yes.
h. App. Sec. 501. to be used for publicity or propaganda purpose within U.S. not authorized by Congress?	Yes.

BANGLADESH POWER DEVELOPMENT BOARD (BPDB)*

Background

BPDB was established in 1972 by Presidential Order No. 59, which constituted a Water Development Board and a Power Development Board to replace the East Pakistan Water and Power Development Authority (EPWAPDA). BPDB is a statutory corporate body which functions under the close supervision and control of the Ministry of Power, Flood Control and Water Resources.

An organization chart for BPDB is shown in Appendix 5. The board consists of a Chairman and four other members, with all appointments being made by the Government; the period, terms and conditions of appointment, functions and other powers of BPDB are determined by the Government. Foreign loans and assistance can be obtained by BPDB with the sanction of the Government, but although BPDB is owned by the Government, the latter has, in the past, had no direct equity investment, and all funds invested by the Government in BPDB have been treated as interest bearing loans. The Government prescribes the manner in which the accounts and financial records of BPDB are maintained and supervises the audit of BPDB accounts. The annual budget of BPDB has to be submitted to the Government each year for approval and allocation of funds

BPDB Power System Operations

BPDB is responsible for the generation, transmission and distribution of power throughout Bangladesh; there are no other private or public utilities engaged in commercial generation or sale of electricity. The power system has in the past been beset with a number of serious problems which have led to the unreliable supply of power to all sectors of the Bangladesh economy, and have contributed to BPDB's unsatisfactory financial operations. While certain specific improvements have been achieved over the past two years, and system failures have been substantially reduced in the East Zone, the complete rehabilitation of the power system, together with substantive improvements in BPDB's organization and operational policies are necessary to achieve reliable power supplies in Bangladesh.

* Extracts from ADB Appraisal Report - November 1977

Over the past three years, BPDB have been assisted in its operations by a small team of power system experts provided by the Canadian International Development Agency (CIDA), who have provided technical support, and assistance in setting up training programs. The Mission has been advised by CIDA that it proposes to carry out an overall review of the experts' program in early 1978, in order to determine the appropriate scope and extent of further technical support for BPDB. The Bank has been invited to assign staff to participate in the CIDA review.

A summary of the major problems associated with the operations of the power system, which have been noted by the Mission is as follows:

(a) Power System Maintenance. Although BPDB has had difficulty in obtaining sufficient and timely foreign exchange allocations for procurement of spare parts, many of the problems relating to lack of maintenance are attributable to lack of forward planning and maintenance policies. The Energy Consultants have stressed that poor system maintenance and inadequate number of trained personnel at all levels of BPDB, constitute the major constraint to efficient operation of the power system. Rehabilitation of the power system, with particular regard to generation and distribution, is given overall priority amongst the investment recommendations made for the power sector.

(b) Training. BPDB acknowledges the importance of the training aspects of its operations, and a separate training directorate is responsible for the preparation and supervision of all BPDB's training programs. Five centers have been established for basic and refresher training for both engineering and financial staff, and the training programs have been assisted by a number of foreign agencies, notably CIDA UNDP and the USSR. BPDB suffer a continuous loss of trained staff both to the private sector and over-

seas, and there is clear need for considerably greater use of the existing training centers which are well equipped but under utilized. In discussions with the Mission, representatives of CIDA and UNDP indicated that their respective organizations proposed to continue assistance to BPDB in the fields of training and general technical support.

(c) System Losses. Power system energy losses for the past few years have approximated 35 per cent, comprising an estimated 18 per cent of technical system losses, and the balance (about 17 per cent) unaccounted for, and reasonable attributable to unbilled energy consumption and theft.

The Energy Consultants have estimated that a substantial portion of the technical system losses could be saved by installation of capacitors to achieve power factor correction.1/ In April 1977, BPDB initiated an urgent program of disconnection of illegal power supplies and other measures which may reasonably be expected to cut system losses significantly,2/ and the proposed power system rehabilitation consultants will conduct a study to determine the extent of power factor correction necessary for the system.3/ BPDB have undertaken to reduce overall system losses to a level of 20 per cent by 1980/81.4/

(d) Protection and Relaying. Until 1975, BPDB had no Relay and Protection Department in its organization, a function which is essential for successful technical operation of any power utility, and for protection of major items of equipment from damage by transient system faults. In recent months, with the assistance of the CIDA technical assistance team, a relay and protection division was created, but with the subsequent departure of the CIDA expert concerned, the division dwindled to only one engineer. The department has no premises, vehicles or testing laboratory, and only limited testing equipment. The

1/ A poor 'power factor' causes high current flow in power lines, overheating and consequent system losses.

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Bank has been advised by CIDA that subject to the findings of their overall review of technical assistance to BPDB, they would be prepared to include the further services of a relay and protection engineer in a new package of technical support, to strengthen the relay and protection aspects of BPDB operations. BPDB have undertaken to actively develop this aspect of its organization, and provide appropriate personnel, premises, vehicles and equipment[5/], and to keep the Bank informed of its progress in this regard through its quarterly progress reports.

(e) Utilization of the Hydro Resources. The existing 60 MW hydropower station (Kaptai) has been operated at only about 45 per cent of its capability, partially because of over-use of thermal stations, and partially because the Kaptai reservoir level has consistently been maintained below its designed capacity. As a result of the Energy Study recommendations, BPDB has made some headway in optimizing hydro generation, and the completion in 1978 of a system control center, which is presently under construction with financial and technical assistance from CIDA, should substantially improve the load despatching practices of BPDB. The situation will further improve as the system load grows.

(f) Procurement Procedures. While improvements in BPDB's procurement procedures have recently been implemented, these procedures remain cumbersome, and the time lapse between a request for spare parts and the placing of an order, is often very lengthy. Such delays have contributed substantially to system outages. Specific recommendations have been made by the Management Expert, towards improving BPDB's procurement procedures.

A reliable power system is essential for the recovery and development of all sectors in Bangladesh. The Mission is of the firm view that rehabilitation of the present power system in Bangladesh, together with the implamentation of revised maintenance policies, must be a priority consideration with regard to any future investments in the Bangladesh power sector. The power situation is particularly serious in the West Zone of the country, where in the first six months of 1977, in addition to local distribution outages, some 24 total system failures have occurred, together with some 60 partial grid failure. The Energy Consultants have accorded the highest priority to rehabilitation of the power system, over all other investments proposed for the power sector.1/

Organization, Management and Staff

Since appraisal of the West Zone Power Project in 1973, successive Bank Missions have witnessed the gradual improvement of BPDB's institutional performance. These improvements included the appointment of a full-time Chairman as Chief Executive of BPDB (a post which had been vacant for over one year), and the reorganization of BPDB in early 1975, with the creation of regional offices under Zonal Chief Engineers - a move which has achieved some degree of decentralization. Improvements have taken place in BPDB's procurement procedures, and the degree of autonomy of BPDB from the Government has been substantially increased over the past two years, with consequent improvement in labor discipline and control.

1/ Project preparatory assistance towards system rehabilitation is included under the proposed Project (see paras. 59-63).

A Government committee was established in 1976 to carry out a detailed investigation of BPDB's operations and to determine appropriate provisions for a Financial Recovery Plan[1/] to meet the Bank's requirements. The committee revealed a number of weaknesses in BPDB's operations and consequently in April 1977, on Government directive, BPDB instituted an urgent program of reforms and improvements in several key areas. The program included measures to strictly control expenses; correct inadequate billing procedures; replace defective meters on an urgent basis; remove unauthorized connections and detect instances of under-billing of consumers. A Vigilance and Discipline Directorate was created to enforce staff discipline, and severe disciplinary measures were instituted for employees implicated in unauthorized use of electricity.

BANGLADESH POWER DEVELOPMENT BOARD
Electricity Tariff Structure

I RATE A - **Low and Medium Voltage Supply For Domestic Purposes (Light, Fan and Domestic Appliances Combined)**

1. **Unit Rates**
   (i) Monthly consumption up to 30 units 29 paise/kwh
   (ii) Monthly consumption from 31 to 150 units 33 paise/kwh
   (iii) Monthly consumption in excess of 150 units 46 paise /kwh
2. **Minimum Charge**
   Minimum Charge per Month Tk 6.00
3. **Late Payment Surcharge**
   Surcharge for payment beyond due date 6 paise/kwh

II RATE B - **Low and Medium Voltage Supply For Ceremonial Purposes**

1. **Unit Rates**
   For all consumption 1000paise/kwh
2. **Late Payment Surcharge**
   Surcharge for payment beyond due date 20 paise/kwh

III RATE C - **Low and Medium Voltage Supply For Small Industrial and Commercial Services**

1. **Unit Rates**
   (i) Monthly consumption up to 100 kwh per kW of connected load 38 paise/kwh
   (ii) Monthly consumption from 101 to 200 kwh per kW of connected load 38 paise/kwh
   (iii) Monthly consumption in excess of 200 kwh of connected load 48 paise/kwh
2. **Minimum Charge**
   Minimum charge per month Tk12.00/kwh of connected load or major fraction thereof but not less than Tk12.00
3. **Late Payment Surcharge**
   Surcharge for payment beyond due date 10 paise/kwh

IV RATE D - **High Voltage Bulk Supply For Large Industrial Services (Connected Load Above 50 kW)**

1. **Fixed Charge** Tk42.00/kVa of billing demand per month
2. **Energy Charges**
   (i) Monthly consumption up to 200 kwh per kVa of billing demand 36 paise/kwh
   (ii) Monthly consumption in excess of 200 kwh per kVa of billing demand 31 paise/kwh
3. **Minimum Charge**
   Minimum charge in any month shall not be less than the Fixed Charge
4. **Late Payment Surcharge**
   1% per month on the total billed amount

V RATE E - **High Voltage Bulk Supply For Large Commercial Services (Connected Load Above 50 kW)**

1. **Fixed Charge** Tk42.00 per kVA of billing demand per month
2. **Energy Charges**
   (i) Monthly consumption up to 200 kwh per kVa of billing demand 38 paise/kwh
   (ii) Monthly consumption in excess of 200 kwh per kVa of billing demand 34 paise/kwh
3. **Late Payment Surcharge**
   1% per month on the total billed amount

VI RATE F - **Low Tension Bulk Supply For Large Industrial Services (Connected Load Above 50 kW)**

1. **Fixed Charge** Tk44.00/kVA of billing demand per month
2. **Energy Charges**
   (i) Monthly consumption up to 200 Kwh per kVA of billing demand 38 paise/kwh
   (ii) Monthly consumption in excess of 200 kwh per kVA of billing demand 34 paise/kwh
3. **Late Payment Surcharge**
   1% per month of the total billed amount.

VII RATE G - **Low Tension Bulk Supply For Large Commercial Service (Connected Load Above 50 kW)**

1. **Fixed Charges** Tk44.00 per kVA of billing demand per month
2. **Energy Charges**
   (i) Monthly consumption up to 200 kwh per kVA of billing demand 48 paise/kwh
   (ii) Monthly consumption in excess of 200 kwh per kVA of billing demand 33 paise/kwh
3. **Late Payment Surcharge**
   1% per month on the total billed amount

VIII RATE H - **Low or Medium Voltage Supply For Agricultural Purposes**

1. **Unit Rate**
   For all consumption 25 paise/kwh
2. **Late Payment Surcharge**
   Surcharge for payment beyond due date 6 paise/kwh

IX RATE I - **Low and Medium Voltage Supply For Public Lighting Purposes Applicable to Pourasava**

1. **Unit Rate**
   Same as Rate A for domestic purposes.
2. **Late Payment Surcharge**
   Surcharge for payment beyond due date 6 paise/kwh

X **EXTRA HIGH VOLTAGE BULTLK AND SPECIAL INDUSTRIAL PURPOSE SUPPLIES**

For bulk supplies at 33 KV and above and special industrial purpose supplies, rates will be determined by the Government.

Actual and Projected Income Statement, 1974/75-1982/83
(Tk million)

As of 30 June	Estimated Actual 1974/75	1975/76	1976/77	Projected 1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Energy Generated (GWh)	1,322.1	1,444.3	1,571.8	1,628.0	1,661.0	1,669.0	1,731.0	1,859.0	1,994.0
Energy Losses (%)	37.2	34.5	34.7	32.0	28.0	24.0	20.0	20.0	20.0
Energy Sales (GWh)	831.4	946.9	1,024.9	1,107.0	1,196.0	1,291.0	1,385.0	1,487.0	1,595.0
Average Tariff/kWh(Tk)	0.36	0.47	0.47	0.47	0.47	0.58	0.68	0.86	0.95
Revenues									
Electricity Sales	302.2	445.4	482.1	520.2	562.1	748.7	941.8	1,278.8	1,515.2
Other Revenues	15.9	11.7	12.8	10.4	11.2	15.0	18.8	25.6	30.3
Total Revenues	318.1	457.1	494.9	530.6	573.3	763.7	960.6	1,304.4	1,545.5
Expenses									
Generation:									
Fuel	131.2	223.3	241.7	265.8	292.4	321.7	353.9	389.2	428.2
Others	38.7	51.1	41.6	45.7	50.3	55.3	60.9	67.0	73.7
Total	169.9	274.4	283.3	311.5	342.7	377.0	414.8	456.2	501.9
Transmission	8.2	11.6	12.0	13.2	14.5	15.9	17.6	19.3	21.3
Distribution	72.2	99.0	101.0	111.1	122.2	134.4	147.8	162.7	178.9
General & Administrative	9.9	14.2	15.3	16.8	18.5	20.4	22.4	24.6	27.1
Depreciation	46.8	113.9	132.9	154.6	174.0	210.4	232.7	257.1	283.9
Total Expenses	307.0	513.1	544.5	607.2	671.9	758.1	835.3	919.9	1,013.1
Net Income Before Interest	11.1	(56.0)	(49.6)	(76.6)	(98.6)	5.6	125.3	384.5	532.4
Interest	161.7	200.7	289.6	144.1	188.2	251.5	315.6	366.2	421.5
Net Income (Loss)	(150.6)	(256.7)	(339.2)	(220.7)	(286.8)	(245.9)	(190.3)	18.3	110.9
Ratio									
Total Cost/Total Revenue Ratio	147	156	168	142	150	132	120	98	93

Actual and Projected Balance Sheets, 1974/75 - 1982/83
(Tk million)

As of 30 June	Estimated Actual 1974/75	1975/76	1976/77	Projected 1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
ASSETS									
Fixed Assets									
Gross Fixed Assets in Operation	1,045.7	3,559.0	4,151.8	4,831.8	5,438.4	6,576.1	7,225.6	8,034.5	8,874.9
Less: Accumulated Depr'n.	339.9	453.8	586.7	741.3	915.3	1,125.7	1,358.4	1,615.5	1,899.4
Net Fixed Assets in Operation	705.8	3,105.2	3,565.1	4,090.5	4,523.1	5,450.4	5,912.2	6,419.0	6,975.5
Work-in-Progress	2,815.7	1,348.5	1,941.3	2,621.2	3,227.8	4,365.5	5,060.0	5,823.9	6,664.2
Total Fixed Assets	3,521.5	4,453.7	5,506.4	6,711.7	7,750.9	9,815.9	10,972.2	12,242.9	13,639.7
Current Assets									
Cash	110.5	186.2	141.2	122.3	103.8	80.3	60.4	41.2	21.9
Accounts Receivables	206.2	195.7	173.6	170.4	187.2	218.3	274.7	372.9	441.9
Loans and Advances	68.7	74.5	82.0	86.1	90.4	94.9	99.7	104.6	109.8
Inventories	46.9	74.4	97.1	78.6	96.8	130.9	151.8	174.7	199.9
Other Assets	140.5	141.8	141.9	115.4	88.6	62.5	36.1	10.1	10.6
Total Current Assets	572.8	672.6	635.8	572.8	566.8	586.9	622.7	703.5	784.1
TOTAL ASSETS	4,094.3	5,126.3	6,142.2	7,284.5	8,317.7	10,402.8	11,594.9	12,946.4	14,423.8
LIABILITIES AND EQUITY									
Current Liabilities:									
Accounts Payable	152.6	125.1	137.2	150.9	165.9	182.6	200.9	220.9	243.1
Accrued Expenses	290.5	453.4	408.1	362.7	317.4	272.1	226.7	181.4	136.1
Deferred Credits	110.0	123.1	379.1	470.4	665.0	808.3	890.8	789.9	600.8
Total Current Liabilities	553.1	701.6	924.4	984.0	1,148.3	1,263.0	1,318.4	1,192.2	980.0
Long-Term Debt	3,874.7	5,014.9	6,147.2	4,127.5	4,946.5	6,556.9	7,489.2	8,514.4	9,615.5
TOTAL LIABILITIES	4,427.8	5,716.5	7,071.6	5,111.5	6,094.8	7,819.9	8,807.6	9,706.6	10,595.5
Equity									
Capital				3,323.1	3,659.8	4,265.7	4,660.4	5,094.6	5,572.2
Reserve & Surplus	(333.5)	(590.2)	(929.4)	(1,150.1)	(1,436.9)	(1,682.8)	(1,873.1)	(1,854.8)	(1,743.9)
Total Equity	(333.5)	(590.2)	(924.4)	2,173.0	2,222.9	2,582.9	2,787.3	3,239.8	3,828.3
TOTAL LIABILITIES & EQUITY	4,094.3	5,126.3	6,142.2	7,284.5	8,317.7	10,402.8	11,594.9	12,946.4	14,423.8
Ratio:									
Debt/Equity Ratio	100:0	100:0	100:0	65:35	69:31	72:28	73:27	72:28	72:28

Cash Flow Statement
(Tk million)

As of 30 June	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
SOURCES								
Net Profit (Loss) Before Interest	(56.0)	(49.6)	(76.6)	(98.6)	5.6	125.3	384.5	532.4
Add: Depreciation	113.9	132.9	154.6	174.0	210.4	232.7	257.1	283.9
Internal Cash Generation	57.9	83.3	78.0	75.4	216.0	358.0	641.6	816.3
Government Capital Contribution	-	-	378.5	336.7	605.9	394.7	434.2	477.6
Long-term Borrowings	1,170.6	1,185.6	981.4	876.4	1,669.6	994.2	1,093.6	1,203.0
Total Sources	1,228.5	1,268.9	1,437.9	1,288.5	2,491.5	1,746.9	2,169.4	2,496.9
APPLICATION								
Debt Service								
Principal	30.4	53.3	56.5	57.4	59.2	61.9	68.4	101.9
Interest	200.7	289.6	144.1	188.2	251.5	315.6	366.2	421.5
Total Debt Service	231.1	342.9	200.6	245.6	310.7	377.5	434.6	523.4
Capital Expenditures	1,046.1	1,185.6	1,359.9	1,213.2	2,275.4	1,389.0	1,527.8	1,680.7
Increase (Decrease) in Working Capital	(48.7)	(259.6)	(122.6)	(170.3)	(94.6)	(19.6)	207.0	292.8
Total Application	1,228.5	1,268.9	1,437.9	1,288.5	2,491.5	1,746.9	2,169.4	2,496.9
RATIOS:								
Debt Service Ratio (times)	0.25	0.24	0.39	0.31	0.69	0.95	1.48	1.56
Self-Financing Ratio(%)	0	0	0	0	0	0	13.5	17.4

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THE POWER SECTOR *

A. Development of the Power System

Bangladesh is divided into two separate (East and West) zones by the Ganges-Brahmaputra river complex, and no electrical interconnection exists between the two zones.1/ The East Zone contains the two primary centers of commerce and industry in Bangladesh: Dacca, the capital city, and Chittagong, the country's major port.

In 1947, the installed capacity in Bangladesh (then East Pakistan) was about 21 MW, of which 12.5 MW was industrial in-house generation, and the balance owned by private utilities or cooperatives. From 1947 until 1960, little investment was made in the expansion of power facilities, although small steam generators were installed at Siddhirganj in the East Zone and Goalpara and Bheramara in the West Zone. In 1960, the Government Electricity Directorate was merged with the East Pakistan Water and Power Development Authority (EPWAPDA) after formation of the latter in 1959, and more systematic development of electric power supply in the country commenced.

Major expansion of the power system took place between 1965 and 1970. A power market study carried out in 1962/63 had projected that the peak load in the country would increase to 500 MW by 1970. As a result, an urgent program was initiated to provide generation to meet this demand. It was further assumed that the East and West zones would be electrically interconnected across the

1/ The Ganges and Brahmaputra (Jamuna) rivers join in Bangladesh to form the Padma River (see map, page (iii).

* Asian Development Bank, Appraisal of the Chittagong Power Distribution Project, November 1977.

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Table 1: Installed & Available Capacities of Major Power Stations

Station	Units No.	Units Type	Year Inst'd	Fuel	Capacity, MW Inst'd	Capacity, MW Available a/
1. Installed Capacity- East Zone						
Kaptai	2	Hydro	1962		90	90
Ashuganj	2	Steam	1970/71	Nat. Gas	144	143
Siddhirganj	3	Steam	1958/59	Fuel Oil	30	17
Siddhirganj	1	Steam	1970	Nat. Gas	50	50
Ghorasal	2	Steam	1974	Nat. Gas	110	110
Shahjibazar	3	Gas Turbine	1968/69	Nat. Gas	44	30
Shahjibazar	4	Gas Turbine	1968/69	Nat. Gas	64	39
Chittagong	2	Gas Turbine	1967	Diesel Oil	13	8
Serviceable diesel capacity, approx.					14	5
Sub-total (East Zone)					559	492
2. West Zone						
Goalpara	4	Steam	1959/60	Fuel Oil	16	9
Goalpara	3	Gas Turbine	1967/69	Naptha	32	14
Khulna	1	Steam	1971/72	Fuel Oil	60	60
Bheramara	2	Steam	1954/55	Fuel Oil	8	3
Bheramara	2	Gas Turbine	1976	Fuel Oil	40	40
Serviceable diesel capacity, approx.					52	30
Sub-total (West Zone)					208	156
TOTAL INSTALLED					767	648
Under Construction						
Kaptai	1	Hydro		-	50	
Chittagong	1	Steam		Fuel Oil	60	
Khulna	1	Steam		Fuel Oil	110	
Sub-total (Under Construction)					220	

a/ Available capacity assumes all major units serviceable and takes account of generator de-rated output.

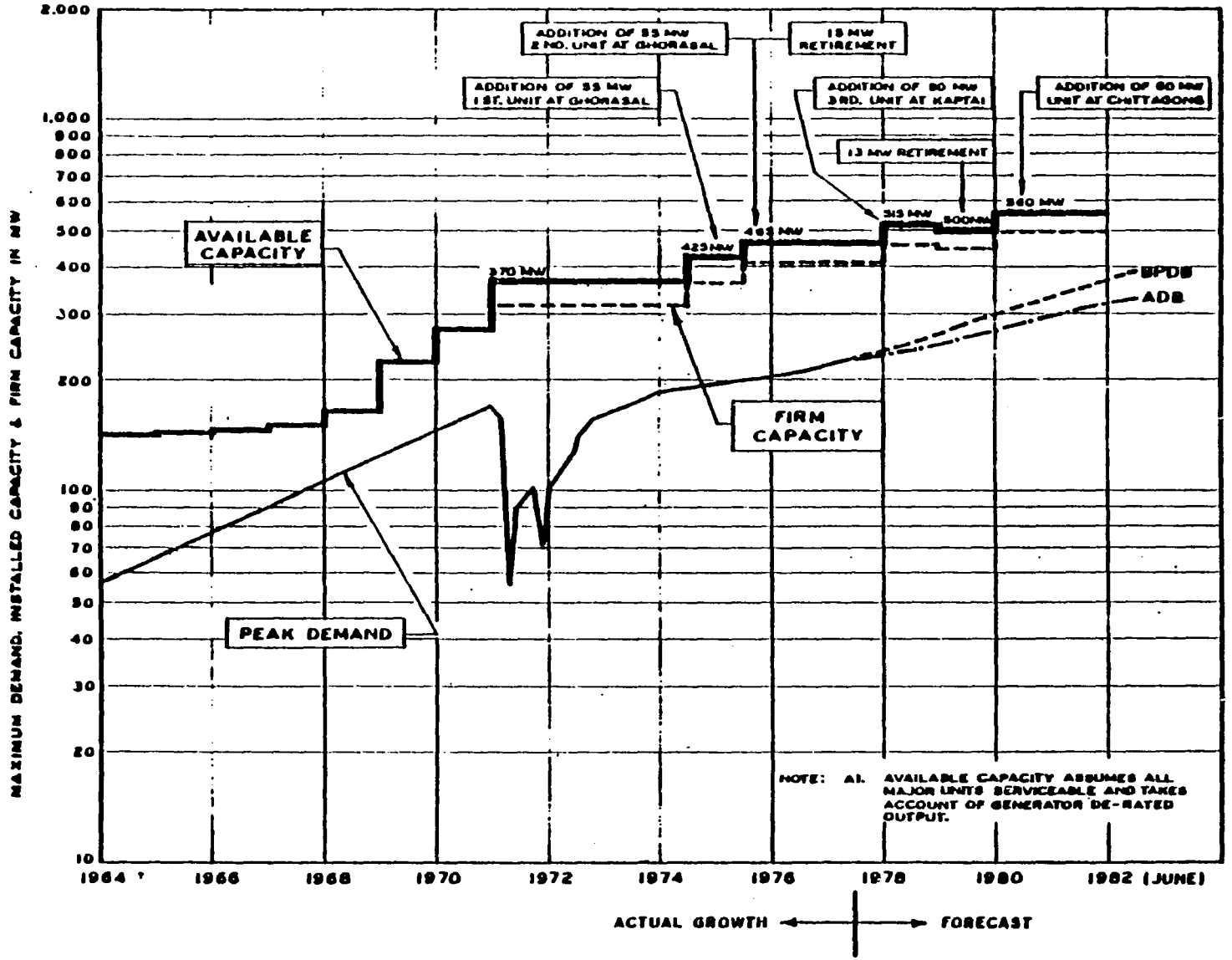
Jamuna River by 1970, and on the basis of these considerations, relatively large generator unit sizes of 50-60 MW were installed in both zones. By the end of 1970, however, power demand had increased to only 213 MW, while 370 MW of installed capacity had been commissioned. Annual generation of energy had reached only 1,128 GWh, in contrast with the projected 2,500 GWh. Further, the schedule for construction of the electric interconnection between the East and West zones was postponed indefinitely because of its high estimated cost of construction.

Investment decisions taken during the 1965-70 period, therefore, have contributed to many of the financial and technical problems experienced in the operations of the Bangladesh power system. There has been sharp imbalance between generation over-capacity and inadequate distribution capacity in the system, and with the absence of the interconnector there is a shortage of firm generation capacity in the West Zone, while there is over-capacity in the East Zone. The 50-60 MW units selected for the system have proved too large for the relatively small individual power systems of the East and West Zones of Bangladesh, resulting in operational difficulties and expensive inefficiency of generation. (In order to achieve reliable operation of a power system, no individual unit should normally exceed 20 per cent of the system load.)

Extensive damage and losses were sustained in 1971 to installed electrical equipment and stores inventory, and civil and labor disturbances in 1972 and 1973 contributed to an almost total lack of maintenance; the system deteriorated badly. While about 15 per cent annual rate of power growth had been sustained between 1960-70, the pre-1971 peak demand of 225 MW was not achieved again until September 1973. The primary installations damaged during the events of 1971, however, have now been substantially restored.

The total installed generation capacity owned by BPDB in mid-1977 was 767 MW, of which 54 per cent is fuelled by natural gas, 34 per cent by imported oil and the remaining 12 per cent by hydroelectric generation.[1/]

BANGLADESH EAST ZONE
PEAK DEMAND AND GENERATING CAPACITY



SOURCE: BPDB PLANNING DEPARTMENT

Present available capacity for bulk generation, assuming all major units serviceable, and taking into account the derated output of older generators, is approximately 648 MW, of which 492 MW is located in the East Zone of the country. With the exception of a number of rural diesel sets, the East Zone generation facilities are interconnected through a 132 kV transmission grid with all major load centers including the Project area.

Maximum demand in Bangladesh by September 1977 was 324 MW, of which 253 MW or 78 per cent was in the East Zone[1/] and of this, 67 MW or about 21 per cent was in the Chittagong area (the Project area). Total energy generated in fiscal year 1976/77 was 1,572 GWh. By mid-1977, the overall power system included some 928 miles of transmission lines, and 8,744 miles of sub-transmission and distribution lines. Approximately 316 of Bangladesh's 422 thanas[2/] were served by electricity and just over 2 per cent of the 64,493 villages in Bangladesh electrified. Per capita generation of Bangladesh in 1976/77 was 19.4 kWh. Some 1,280 electrified pumps and tubewells were in operation, and the total number of consumers served by BPDB had reached 328,000. Industrial consumption of power accounted for 70 per cent of energy sales in 1976/77.

The first Bangladesh Five-Year Plan was launched in November 1973. However, in view of a number of implementation difficulties and delays, the targets of the Five-Year Plan were modified, and the Plan superseded by a Three-Year 'Hard-Core Program' (1975-78). In the context of the power system, priority is awarded by both Plans to the completion of the partial

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B. Bangladesh Energy Study[1/]

A major UNDP-financed Energy Study (for which the Bank was Executing Agency) was undertaken in Bangladesh in 1975/76 by a consortium of foreign consultants[2/] in cooperation with the Government of Bangladesh. The study, which was completed in September 1976 was aimed specifically at assisting the Government in formulating an overall energy policy for Bangladesh. The major objectives of the study were: (i) to assess the prospects of utilizing natural gas for meeting internal needs of energy and fertilizers, and to determine the foreign exchange earning potential of natural gas; (ii) to analyze various interrelated energy-supply project alternatives and determine their relevance and priority for implementation up to the end of the century; and (iii) to recommend an immediate investment program for energy related projects in the period up to 1985.

The Energy Study has concluded that to sustain the projected growth in per capita incomes of about 1.85 per cent per annum over the next 25 years, the presently available (known) reserves of gas will be needed to meet internal requirements of energy and fertilizer, and exports of gas or its derivatives will therefore be restricted to that of fertilizers, only if the internal fertilizer demand lags and a short-term surplus is created. Liquification of natural gas for export, or alternatively production of methanol is not recommended for immediate implementation. The Study recommends early construction of further gas transmission pipelines, and emphasis is placed on rapid expansion of gas distribution facilities to minimize imports

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1/ Document R94-75 approved October 1974

2/ Montreal Engineering, Canada; Meta Systems, USA; Snamprogetti Spa, Italy and Carlo Lotti Associates, Italy.

of fuel oil, and to conserve electricity which is a less efficient use of energy. An investment program for the period up to 1985 has been recommended, and recommendations have been made for additional investigations and studies on which to base future investment decisions. The need to rationalize energy pricing policies is emphasized, with the objective of recovering economic costs of energy supply from various sources.1/

While the major investment recommendations concentrate on the early development of Bangladesh's natural gas resources, the Energy Study included a nationwide power market survey, and makes recommendations for both medium and long-term investments to provide for systematic development of the power system; of these, a number of specific recommendations are of major importance to BPDB in terms of achieving improvement in the operations and efficiency of the power system in the near term, without major investments. The findings of the Energy Study related to the power sector are discussed below.2/

On completion of the Energy Study, two Government committees were appointed; the first to review the Study, and make specific recommendations for implementation of its findings, and the second to continuously review and update the Study in the light of Bangladesh's economic development and international energy pricing. A follow-up report was prepared by the former committee in August 1977, which supports implementation of all the major recommendations of the Study, but goes further to recommend that recovery of coal deposits in Bangladesh and development of nuclear

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1/ A summary of the major recommendations of the Energy Study is contained in Appendix 1.

2/ Power Market Projections (paras. 18-23)
Power Expansion Program (paras. 24-27)
BPDB Power System Operations (paras. 38-41)

power[1/] (investments not recommended by the Study prior to 1990) should receive further early feasibility studies. The Project proposed for Bank financing falls clearly within the priority investments approved by the Government for the power sector.

C. Rural Electrification

Since 1975, BPDB has embarked on an extensive program of rural electrification within Bangladesh, in compliance with the 1972 Constitution of Bangladesh which, as a national policy, provides for the accelerated electrification of the villages and thanas of the country. During 1975 and 1976 with the assistance of external aid, principally from Yugoslavia and USSR, BPDB completed a total of over 700 miles of transmission and sub-transmission lines, which have served to connect some relatively large outlying communities to the national grid (e. g. Mymensingh, Chandpur) and have also connected some 18 isolated diesel power systems to the main grid, allowing ..e diesel generators to be retired or relocated. While the economics of rural electrification have not been advantageous to BPDB, the successful completion to date of this major construction program is to the credit of BPDB, and lends support to their ability to successfully undertake the Chittagong Distribution Project.

The Government advised the Mission that negotiations for a loan of $50 million from USAID are in an advanced stage for a major project to continue expansion of rural electrification. In preparation for this project, the Government has made arrangements for the creation of a semi-autonomous organization, the Rural Electrification Board, to be responsible for all aspects of existing and future rural electrification, including construction, oper:tion and maintenance. The Rural Electrification

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1/ See para. 27

Board will operate administratively in parallel with BPDB, will take over BPDB's existing rural electrification assets, and will thereafter purchase bulk power from BPDB for rural distribution. Rural Electric Cooperatives will be set up throughout the country to be administered by the Rural Electrification Board; these consumer-owned entities will purchase power from the Rural Electrification Board and will be responsible for distribution among cooperative members. The Mission considers that the handing over of rural distribution responsibilities to the Rural Electrification Board is a desirable step, and will make BPDB a more manageable organization. Formal implementation of the Rural Electrification Board, which is a provision of BPDB's Financial Recovery Plan, is anticipated late in 1977, and it is a further provision of the Plan that all future investment in rural electrification shall be on a grant basis.

D. Power Market Projections

Power market projections in Bangladesh have previously been based on extrapolation of historical trends, adjusted to take account of specific development projects in various sectors. The power market survey carried out by the Energy Consultants in 1975 has concluded that the growth of power demand in Bangladesh will follow one of three alternative projections ('low scenario', 'mid-scenario' or 'high scenario'), with each of the three levels relating to a particular rate of economic growth of the country.

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Table 2: Growth of Power Demand (Energy Study)[1/]

(Per Cent)

	1974-1983		1984-1993		1994-2000	
	GDP	Power	GDP	Power	GDP	Power
Low Scenario	2.9	5.7	4.9	7.3	3.9	6.8
Mid-Scenario	4.4	7.3	5.4	8.0	4.1	7.2
High Scenario	4.7	7.9	7.3	9.5	5.3	7.3

These projections were not developed from extrapolation of past trends, but from a step-by-step estimation of energy requirements in different sectors, taking into account the average energy consumption requirements per unit of production output of various manufacturing processes. This step-by-step approach resulted in the identification of the present inefficient use of energy by a number of major industries, which have been operating considerably below capacity in recent years. It is noted that when these industries reach higher levels of capacity utilization, use of energy will become more efficient, and this aspect has been recognized as an important factor affecting projections for energy consumption.

The pre-1971 power demand of 225 MW was regained in 1973, and since that time load growth rates, while erratic, have averaged 11 per cent annually. Energy sales growth in 1975/76 and 1976/77 was 14 per cent and 8.2 per cent, respectively.

BPDB has advised the Mission that it proposes to carry out a further detailed power market study in early 1978, for purposes of the detailed planning of distribution network extensions, and in this regard has already secured proposals from local consulting companies.

1/ Background and rationale for the Energy Consultants projections are set out in Appendix 2. Relevant sections of the Energy Study final report are Part 2.3 and Appendix 1 Part 2, Chapter 6.

In the meantime, interim power market projections up to 1981-82 have been prepared by BPDB, which anticipate that a growth rate for both energy sales and demand of 11 per cent will be sustained until 1982.

The Mission has noted that certain major factors are clearly inhibiting normal load growth in Bangladesh, and have contributed to the erratic growth rates. The most significant of these are the inadequate and unreliable distribution facilities throughout the country, with consequent high system losses, suppressed demand, and low power delivery by virtue of low distribution voltages, and also the poor overall operational condition of the power system, which has resulted in regular power interruptions and lengthy blackouts. With the completion of the ongoing project for the rehabilitation and extension of the Dacca distribution network[1/], and the implementation of the proposed Project, the above distribution constraints should be considerably eased. Successful rehabilitation of the power system, resulting from the project preparatory technical assistance proposed under the Project, will further provide considerably improved continuity of supply, and foster power sales growth.

Taking into account the BPDB and Energy Consultants' load growth projections, and the above contributory factors, the Mission has concluded that as a conservative estimate of BPDB's load growth, the 8 per cent load growth maintained by BPDB in 1976/77 will be sustained until 1979/80 for both energy sales and demand, after which it is assumed that the growth rate will decline to the 'mid-scenario' level of 7.3 per cent projected by the Energy Consultants. Historical load growth rates, and power market projections on the above basis are shown in Appendix 3.

1/ This UK assisted project commenced in late 1975, and is scheduled for completion in 1981.

E. Power Expansion Program

Alternatives for the longer term power expansion program for Bangladesh have been studied in depth by the Energy Consultants and BPDB have advised that they propose to adopt the investment recommendations of the Study. For the immediate future BPDB will complete a number of ongoing projects which include an oil/natural gas fired power station at Chittagong (60 MW) scheduled for commissioning in 1981; an additional hydroelectric generator under construction at Kaptai (50 MW), and a large (110 MW) oil-fired steam unit being installed at Khulna in the West Zone. The Energy Consultants have recommended a third 20 MW gas turbine for the West Zone to meet the shortage of firm capacity, and negotiations are underway for German bilateral aid to provide this unit. Several extensions to the 132 kV grid are under construction particularly in the West Zone, where the presently isolated diesel power systems are being integrated with the main 132 kV grid. On completion of these facilities and on the assumption that the remaining power facilities are restored to adequate operational capability, BPDB's major generation and high voltage transmission requirements will be satisfied until approximately 1984.

The Energy Consultants have recommended the early construction of the inter-zone transmission interconnection across the Jamuna River. While natural gas for power generation and hydroelectric resources are available in the East Zone, West Zone power facilities must be operated on expensive imported fuel oil, thus substantial savings in fuel oil would be afforded if either an electrical interconnection existed between the two zones, or a gas pipeline was constructed to supply the West Zone generating facilities. Both alternatives pose formidable technical problems in terms of crossing the Jamuna River. The Energy Consultants have carefully evaluated all possible alternatives, and have concluded that an electrical interconnection consisting

of a 230 kV double circuit transmission line should be constructed across the river. This conclusion is in conformity with the findings of a feasibility study for the power crossing which was completed in 1970. In view of the substantial economic merit of the Project, it is awarded the highest priority of new investments for the power system. The Government advised the Mission that negotiations are presently underway with the Government of Abu Dhabi for financial assistance towards the early updating of the feasibility study for the Project.

Certain investment possibilities were found unattractive by the Energy Consultants, on the basis of present assumptions regarding fuel costs and the economic growth of Bangladesh. Development of nuclear power before the end of the century was not found economically attractive over a wide range of assumptions; development of a new hydroelectric project on the Sangu River was not found economically attractive, and extension of the existing (Kaptai) hydroelectric station by addition of two further units (Nos. 4 and 5) was found only marginally viable in the mid-1990s, although it is noted that this project would be more attractive if load growth in Chittagong is more rapid than anticipated. Development of Bangladesh's known coal and peat deposits for power generation was not found technically or economically viable on the basis of presently available technology.

Although the development of nuclear power is not recommended by the Energy Consultants, the Government in September 1977, commissioned a French consulting company to carry out a fresh feasibility study for a nuclear power station tentatively proposed for location in the West Zone. No time frame for the advent of nuclear power in Bangladesh has yet been proposed. The Government has agreed to consult with the Bank prior to making any major additional investment in generation in the power system.1/

1/ Loan Agreement, Schedule 6, para. 8

3880018
Karnaphuli Third Unit

ROLE OF OTHER DONORS

ANNEX H
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Recent Major External Assistance to Bangladesh Power Sector

Country/Organization	Project	Date	Terms (year)	Interest %	Amount($ Mn)
West Germany	Ashuganj Power Station	1974	48	0.75-3	30.18
USAID	Bangladesh Power Distribution (Dacca and Chittagong Improvement)	1962	40	4	8.60
USAID	Karnafuli Third Unit	1964	40	4	5.30
USAID	Siddhirganj Thermal Power Station Extension	1964	40	4	8.50
USAID	Two Transmission Lines (391-H-094) Kannafuli	1964	40	4	2.80
USAID FCIC	Karnafuli Third Unit	1976	40	4	2.50
Canada FCIC	Isolated Generation and Distribution	1963 and 1965	16	6	11.30
Canada CIDA	East-West Interconnection Study	1967	40	Interest free	0.20
French	Improvement and distribution (Khulna, Kushtia)	1962	10	5	2.70
French	150 MW Package Type Turbine Generating Units	1966	20	5½	8.45
Italian	Emergency Power Generating Gas Turbine	1965	10	6	4.99
Italian	Gas Turbine Shahjibazar Power Station	1966	10	6	6.50
Italian	Secondary Transmission	1969	10	6	1.76
UK	Dacca Power Distribution	1976		grant	49.00
India	Power Generating Equipment	NA	13	5	5.37
USSR	110 MW Ghorasal Thermal Power Station	1973	12	2	18.87
USSR	Poles, Tower and Equipment	1973	12	2½	9.86
USSR	11 & 33 KV Transmission Line	1973	12	2	15.98
Yugoslavia	11 & 33 KV Transmission Line	1972	12	2	4.89
Yugoslavia	132 KV Transmission Line	1973	12	2	3.83
Yugoslavia	132 KV Transmission Line	1973	12	2	2.70
Yugoslavia	33 KV Secondary Transmission and Distribution Line	1973	12	2	4.32
Czechoslovakia	60 MW Khulna Thermal Power Station and 60 MW Chittagong Thermal Power Station	1972	12	2	NA
ADB	West Zone Power Plant	1973	16	7½	1.20
	West Zone Power Plant	1973	30	1	9.25
	West Zone Power Plant (Supplementary)	1974	30	1	4.55

3880018
Karnaphuli Third Unit

ROLE OF OTHER DONORS

ANNEX H
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Recent Major External Assistance to Bangladesh Power Sector

Country/Organization	Project	Date	Terms (year)	Interest %	Amount($ Mn)
East Germany	Ashuganj Power Station	1974	48	0.75-3	30.18
USAID	Bangladesh Power Distribution (Dacca and Chittagong Improvement)	1962	40	4	8.60
USAID	Karnafuli Third Unit	1964	40	4	5.30
USAID	Siddhirganj Thermal Power Station Extension	1964	40	4	8.50
USAID	Two Transmission Lines (391-H-094) Karnafuli	1964	40	4	2.80
USAID FCIC	Karnafuli Third Unit	1976	40	4	2.50
Canada FCIC	Isolated Generation and Distribution	1963 and 1965	16	6	11.30
Canada CIDA	East-West Interconnection Study	1967	40	Interest free	0.20
French	Improvement and distribution (Khulna, Kushtia)	1962	10	5	2.70
French	150 MW Package Type Turbine Generating Units	1966	20	5½	8.45
Italian	Emergency Power Generating Gas Turbine	1965	10	6	4.99
Italian	Gas Turbine Shahjibazar Power Station	1966	10	6	6.50
Italian	Secondary Transmission	1969	10	6	1.76
UK	Dacca Power Distribution	1976		grant	49.00
India	Power Generating Equipment	NA	13	5	5.37
USSR	110 MW Ghorasal Thermal Power Station	1973	12	2	18.87
USSR	Poles, Tower and Equipment	1973	12	2½	9.86
USSR	11 & 33 KV Transmission Line	1973	12	2	15.98
Yugoslavia	11 & 33 KV Transmission Line	1972	12	2	4.89
Yugoslavia	132 KV Transmission Line	1973	12	2	3.83
Yugoslavia	132 KV Transmission Line	1973	12	2	2.70
Yugoslavia	33 KV Secondary Transmission and Distribution Line	1973	12	2	4.32
Czechoslovakia	60 MW Khulna Thermal Power Station and 60 MW Chittagong Thermal Power Station	1972	12	2	NA
ADB	West Zone Power Plant	1973	16	7½	1.20
	West Zone Power Plant	1973	30	1	9.25
	West Zone Power Plant (Supplementary)	1974	30	1	4.55

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KARNAPHULI THIRD UNIT
(Supplementary Financing)

Project Description

The Project consists of the design, fabrication, civil works construction, mechanical and electrical erection, testing and commissioning of the Third Generator Unit (50 MW) at the Karnaphuli Power House, located on the Karnaphuli River at Kaptai, Chittagong Hill Tracts, in Bangladesh, and includes the following activities:

Design and Engineering
Equipment and Materials Procurement
Shipping, Forwarding and Insurance
Construction and Erection
Testing and Commissioning
Technical Assistance and Operations Training
Provision of Supporting Goods and Services

The Project shall be deemed to have been completed as of the date when the Unit and its ancillary equipment have been installed, tested, commissioned and successfully run "On Line" at its rated capacity. The Project is expected to be completed by October, 1980.

Financing for the Project will be provided by A.I.D. and the Government of Bangladesh. In the case of A.I.D., eligible items or categories of expenditure shall be, except as A.I.D. may otherwise agree hereafter in writing, goods and services relating to the activities described above The Government of Bangladesh shall provide the Taka financing required for local materials, services and support costs as specified in the following Financing Plan and Disbursement Schedule. *

* To be negotiated by USAID and made a part of the Agreement prior to signature.

(DRAFT)
PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS
PART II

Bangladesh

Karnaphuli Third Unit
(Supplementary)

AID Loan 388-0018

Pursuant to Part I, Chapter 1, Section 106 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a loan ("Loan") to the Peoples' Republic of Bangladesh (the "Cooperating Country") of not to exceed seven million United States Dollars ($7,000,000)(the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services requried for the Project as described in the following paragraph.

The Project to be carried out with the resources of the Government together with the resources provided herein shall be made available to the Bangladesh Power Development Board or its Agent for the civil works construction, assembly, placement and commissioning of the Third Generator Unit (50 MW) complete with control equipment, transformers and switchgear at the Karnaphuli Power House, Kaptai, Chittagong Hill Tracts in Bangladesh, together with Engineering and other technical services as appropriate.

I hereby authorize the initiation of negotiations and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms and conditions:

1. Interest and Terms of Repayment:

Borrower shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of the first disbursement under the Loan, including a grace period not to exceed ten (10) years. Borrower shall pay to A.I.D. in United States Dollars on the disbursed balance of the Loan interest at a rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter.

2. Source and Origin:

Unless otherwise agreed by A.I.D. in writing, goods and services (including ocean shipping and marine insurance) financed under the Loan shall have their source and origin in countries which are included in Code 941 of the A.I.D. Geographic Code Book. Marine insurance may be financed under the Loan if it is obtained on a competitive basis and any claims thereunder are payable in freely convertible currencies.

3. Other Terms and Conditions:

Prior to any disbursements or the issuance of commitment documents, the Borrower shall furnish in form and substance satisfactory to A.I.D.:

(a) An opinion of the Ministry of Law of Bangladesh or other counsel acceptable to A.I.D. that the Agreement or Amendment making available these funds has been duly authorized or ratified by and executed on behalf of the Government, and that it constitutes a valid and legally binding obligation of the Government;

(b) Such other terms and conditions as A.I.D. may deem advisable.

Signature _____
Assistant Administrator
Bureau for Asia

_____
Date

Leonard

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

NOV 17 1978

ACTION MEMORANDUM FOR THE AA/ASIA

FROM: ASIA/PD, Dennis J. Brennan

SUBJECT: Bangladesh - Karnaphuli Third Unit
AID Project No. 388-0018

Action Requested: To obtain your approval and authorization for the FY 79 Karnaphuli Third Unit supplementary financing action, increasing the existing AID Loan 388-W-007 from $2,500,000 to a new total of $9,500,000. This proposal was reviewed and approved by the Asia Bureau Project Assistance Committee on July 25, 1978.

Background: The goal of this project is to improve the quality of life of the Bangladeshi people by improving electric power availability for both industrial and residential consumers in the Eastern Transmission Grid. The timely installation of the third Karnaphuli generating unit is needed to stabilize power generation and deliveries in the Chittagong and surrounding rural areas, and will contribute towards improved productivity and employment in the commercial sector as well as accelerated private consumer socio-economic development. This hydrogenerator will increase the output of the Power Development Board and allow it to shift its base loads to thermal plants and use Karnaphuli as a more economic "peaking" generation unit as it was originally designed.

The Kaptai multi-purpose dam and power station was originally financed by AID with two of the three turbogenerators installed. The installation of this third unit will allow complete development of the existing power station and power from this facility will support the ADB's Chittagong Area Distribution System project and the new AID-financed Bangladesh Rural Electrification program. Power from this turbogenerator will be obtained from a renewable energy source (Kaptai Drainage Basin) and will make use of water now wasted over the dam's spillway part of the year. The operation of this unit will generate net power sales revenues of Taka 54 million per year and save an estimated 335,900 barrels of imported fuel oil annually. It will also enable the PDB to meet the currently unsatisfied 5 MW of private consumer demand in the rural areas outside the Chittagong district.

Technical Description: (See the attached "Advice of Program Change" which was cleared as of November 13, 1978.)

Summary Conclusions: The Power Development Board has completed negotiations with a U.S. firm (Vinnell Corporation) for the turnkey installation of the Karnaphuli Third Unit. A suitable mechanism has been developed between the PDB and Vinnell for the disbursement of local currency needed for the project and USAID/Dacca has requested the authorization of the AID funds needed to cover the foreign exchange elements of the turnkey contract. The supervisory consulting engineering service contract has been extended and personnel are in place and ready to initiate construction. The majority of replacement equipment arrived in country during the past three months and is available for assembly at site.

The Project Committee has reviewed the technical, economic and financial aspects of the revised project and, based on information provided by USAID/Dacca, is satisfied that the necessary ingredients for successful project implementation are accounted for. Upon authorization and obligation of the funds requested herein, the Government of Bangladesh and the USAID Mission will initiate actions leading to the completion and operation of this facility.

Recommendation: That you approve an increase of $7,000,000 to the existing AID Loan 388-W-007 by signing the attached authorization.

Attachments:
Tab A - Project Authorization, Parts I and II
Tab B - Advice of Program Change
Tab C - Project Paper

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART I

1. TRANSACTION CODE: [A] (A = ADD, C = CHANGE, D = DELETE) — PAF

2. DOCUMENT CODE: 5

3. COUNTRY/ENTITY: BANGLADESH

4. DOCUMENT REVISION NUMBER: [ ]

5. PROJECT NUMBER (7 digits): [388-0018]

6. BUREAU/OFFICE: A. SYMBOL: ASIA; B. CODE: [04]

7. PROJECT TITLE (Maximum 40 characters): [Karnaphuli Third Unit]

8. PROJECT APPROVAL DECISION — ACTION TAKEN: [A] (A = APPROVED, D = DISAPPROVED, DE = DEAUTHORIZED)

9. EST. PERIOD OF IMPLEMENTATION: YRS. [02] QTRS. [3]

10. APPROVED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 79 F. GRANT	E. 1ST FY 79 G. LOAN	H. 2ND FY ___ I. GRANT	H. 2ND FY ___ J. LOAN	K. 3RD FY ___ L. GRANT	K. 3RD FY ___ M. LOAN
(1) SD	743		825		7,000		-		-
(2)									
(3)									
(4)									
TOTALS					7,000				

A. APPROPRIATION	N. 4TH FY ___ O. GRANT	N. 4TH FY ___ P. LOAN	Q. 5TH FY ___ R. GRANT	Q. 5TH FY ___ S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1)						7,000
(2)						
(3)						
(4)						
TOTALS						7,000

11. PROJECT FUNDING AUTHORIZED (ENTER APPROPRIATE CODE(S)) 1 = LIFE OF PROJECT, 2 = INCREMENTAL, LIFE OF PROJECT

	A. GRANT	B. LOAN
		1

C. PROJECT FUNDING AUTHORIZED THRU: FY [81]

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED ($000)

B. ALLOTMENT REQUEST NO. ___

A. APPROPRIATION	C. GRANT	D. LOAN
(1) SD	-	7,000
(2)		
(3)		
(4)		
TOTALS	-	7,000

13. FUNDS RESERVED FOR ALLOTMENT

TYPED NAME (Chief, SER/FM/FSD)

SIGNATURE

DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES: [ ] 000 [X] 941 [ ] LOCAL [ ] OTHER ___

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR PPC/PIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE MM DD YY	18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE MM DD YY

AID 1330-6 (7-78)

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

AMENDMENT

BANGLADESH

Karnaphuli Third Unit
(Supplementary)
A.I.D. Project No. 388-0018

Pursuant to Part I, Chapter 1, Section 106 of the Foreign Assistance Act of 1961, as amended, I hereby authorize an amendment to the existing loan (the "Loan") (A.I.D. Loan No. 388-W-007) to the Peoples' Republic of Bangladesh (the "Cooperating Country") for the Karnaphuli Third Unit Project (the "Project") to provide additional funds of not to exceed Seven Million United States Dollars ($7,000,000) (the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the Project as described in the following paragraph.

The Project to be carried out with the resources of the Cooperating Country together with the resources provided herein shall be made available to the Bangladesh Power Development Board or its Agent for the civil works construction, assembly, placement and commissioning of the Third Generator Unit (50 MW) complete with control equipment, transformers and switchgear at the Karnaphuli Power House, Kaptai, Chittagong Hill Tracts in Bangladesh, together with engineering and other technical services as appropriate.

The installation of a 40 megawatt generating unit was originally authorized in May, 1964 as A.I.D. Loan No. 391-H-081A at a level of $3.8 Million. It was subsequently amended in June, 1967 to provide an additional $1 Million to increase the generating capacity of the unit to 50 megawatts. Construction was undertaken in 1969, but was interrupted by the War of Liberation in Bangladesh and work was suspended in March, 1971, by which time all funds under the Loan had been expended. The Project was reinstituted to complete construction and upgrade deteriorated portions of the original Project after a new authorization was issued by A.I.D. in May, 1976 as A.I.D. Loan No. 388-W-007 at a level of $2.5 Million through July, 1978. The Project level, including the $2.5 Million authorized previously and the $7.0 Million authorized above, will be $9.5 Million through September 30, 1980.

I also hereby authorize the initiation of negotiations and execution of amendments to the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and major conditions:

1. Interest and Terms of Repayment

The Cooperating Country shall repay the Loan to A.I.D. in United States Dollars within forty (40) years from the date of the first disbursement under the Loan, including a grace period not to exceed ten (10) years. The Cooperating Country shall pay to A.I.D. in United States Dollars on the disbursed balance of the Loan interest at a rate of two percent (2%) per annum during the grace period and three percent (3%) per annum thereafter on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

2. Other Terms and Conditions

Prior to any disbursements or the issuance of commitment documents, the Borrower shall furnish in form and substance satisfactory to A.I.D.:

(a) An opinion of the Ministry of Law of Bangladesh or other counsel acceptable to A.I.D. that the Agreement or Amendment making available these funds has been duly authorized or ratified by and executed on behalf of the Government, and that it constitutes a valid and legally binding obligation of the Government;

(b) Such other terms and conditions as A.I.D. may deem advisable.

In all other respects, the original Loan authorization dated May, 1976, shall remain in full force and effect.

Clearance:	Date	Initial
Herbert E. Morris, GC/Asia	11/17/78	
Dennis Brennan, Asia/PD	11/17/78	
Robert Halligan, Asia/DP	11/17/78	
Priscilla Boughton, Asia/BIS	11/16/78	

Signature

Assistant Administrator
Bureau for Asia

17 Nov. 1978
Date

GC/Asia:AdeGraffenried:hp:11/17/78