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Report No. 15836

PROJECT COMPLETION REPORT

BANGLADESH

**REFINERY MODIFICATION AND LPG RECOVERY
AND DISTRIBUTION PROJECT
(CREDIT 1749-BD)**

JUNE 28, 1996

**Energy and Project Finance Division
Country Department I
South Asia Region**

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CURRENCY EQUIVALENTS

Currency Unit	=	Taka (TK)
100 Paisa	=	1.0 Taka 19
US\$1.0	=	31.0 Taka at Board approval (as of December 1986)
		37.0 Taka at credit closing (as of December 1993)

CONVERSION FACTORS¹

Liquid Fuels (Cubic meters)	Physical Units Per Toe ²
LPG	1.85
Gasoline	1.38
Jet Fuel	1.34
Kerosene	1.25
Diesel oil	1.19
Fuel oil	1.06
Coal (ton)	1.5
Natural gas (MCF)	43.57

ABBREVIATIONS AND ACRONYMS

BBL	-	Barrel
BOC	-	Burmah Oil Corporation (United Kingdom)
BPC	-	Bangladesh Petroleum Corporation
BUET	-	Bangladesh University of Engineering and Technology
EMU	-	Energy Monitoring Unit
ERL	-	Eastern Refinery Limited
ESPC	-	Energy Study and Planning Cell, Planning Commission
GOB	-	Government of Bangladesh
LPG	-	Liquified Petroleum Gas
MCF	-	Thousand Cubic Feet
LPGL	-	Liquified Petroleum Gas Limited

FISCAL YEAR

July 1 - June 30

¹ Unless otherwise stated, all units are on metric system basis.

² 1 Ton of Oil Equivalent (Toe) = 41.0 million British Thermal Unit (BTU)

The World Bank
Washington, D.C. 20433
U.S.A.

Office of the Director-General
Operations Evaluation

June 28, 1996

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

**SUBJECT: Project Completion Report on Bangladesh
Refinery Modification and LPG Recovery and
Distribution Project (Credit 1749-BD)**

Attached is the Project Completion Report (PCR) on the Refinery Modification and LPG Recovery and distribution Project (Credit 1749-BD, approved in FY87) prepared by the South Asia Regional Office, with Part II prepared by the Borrower. The credit was closed in December 1993, one year behind schedule. Of the original credit amount of US\$47.0 million, US\$40.5 was disbursed, and US\$6.5 million was canceled.

The objectives of the project were: (i) to upgrade the Chittagong refinery to increase the production of high value middle distillate products (kerosene and diesel fuel) and decrease the production of residual fuel oil; and (ii) to increase the use of domestic liquid petroleum gas (LPG) by recovering LPG at the Kailashtia gas field, establishing an institutional framework for private sector participation in LPG distribution, and implementing a joint venture for LPG bottling and distribution. In that connection the Credit provided for the removal of Government controls on LPG prices.

The refinery modification program was successfully implemented with only relatively minor delays and cost overruns. However, the LPG recovery and distribution components (about 30% of the original project cost) did not get implemented. The reasons for the failure to implement the LPG recovery plant at Kailashtia are not discussed in the PCR, and no lessons are drawn. The PCR states that the joint venture LPG distribution project component was abandoned because it was found that the transport costs were too high. A more likely explanation is that the GOB maintained the controlled retail price for LPG below that needed to cover transport and distribution costs, in contravention to the project covenant on LPG pricing. There is no discussion in the PCR of what needs to be done to overcome the problems of the LPG subsector.

The project outcome is assessed as unsatisfactory because of the failure to implement two important components in the critical area of LPG distribution. Institutional development is rated as negligible, since there was no progress on the LPG side, and the refinery already had a satisfactory institutional structure before the project. In contrast, the PCR judges the project in the light of the successful refinery upgrading, and therefore rates the project outcome as satisfactory and the institutional development as partial. Sustainability of the implemented refinery component is rated as likely. The performance of the Bank is rated as satisfactory, in spite of the project's shortcomings, since the causes of the failure of the LPG program appear to have been beyond its control.

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The PCR is rated as unsatisfactory: it gives only superficial attention to the project components that failed, focusing its attention, instead, on the successful components, from which there was little to learn. It does not explain the reasons for the failure of the LPG component in sufficient depth to provide insight into how a subsequent effort could address the outstanding issues in the LPG sector.

No audit is planned at this time.

A handwritten signature in black ink, consisting of several loops and a final upward stroke, positioned to the right of the text.

PROJECT COMPLETION REPORT**BANGLADESH****REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT**
(CREDIT 1749-BD)**TABLE OF CONTENTS**

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PROJECT COMPLETION REPORT

BANGLADESH

REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT (CREDIT 1749-BD)

Preface

This is the Project Completion Report (PCR) for the Refinery Modification and LPG Recovery and Distribution Project in Bangladesh for which Credit 1749-BD in the amount of SDR 40 million (US\$47.0 equivalent) was approved on December 16, 1986. The credit closed on December 31, 1993, one year behind schedule. It was 87.8 percent disbursed and the last disbursement was made in June 1, 1994. A total of SDRs 5,494,000 (US\$6,456,000) was cancelled.

The PCR was jointly prepared by the Energy and Project Finance Division, Country Department 1, South Asia Region and the Oil and Gas Division, Industry and Energy Department of the Finance and Private Sector Development Vice Presidency (Evaluation Summary, Parts I and III), and the Borrower (Part II).

Preparation of this PCR was started during IDA's final supervision mission of the project in December 1993, and is based, inter alia, on the Staff Appraisal Report; the Credit Guarantee and Project Agreements; supervision reports; correspondence between IDA and the Borrower; and internal IDA memoranda.

PROJECT COMPLETION REPORT

BANGLADESH REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT (CREDIT 1749-BD)

Evaluation Summary

Objectives

1. The project includes several components with the common objective to minimize the net cost of supplying essential petroleum products to the country. An important part of this objective was to develop the commercialization of indigenous liquid petroleum gas (LPG) as a substitute for imported kerosene and fuel wood, thereby reducing foreign exchange needs and deforestation.

Project Description

2. The project had five main components: (a) the installation of a mild hydrocracker to convert poor quality vacuum gas oil to high grade diesel oil, (b) a visbreaker to reduce the viscosity of fuel oil while producing a small quantity of diesel oil, (c) facilities to recover and bottle LPG, (d) establishment of a joint venture with the private sector to bottle and market LPG; and (e) provision of technical assistance to implement the project and train staff.

Implementation Experience

3. The implementation of the project was carried out by four agencies, the Eastern Refinery Limited (ERL), the Liquefied Petroleum Gas Limited (LPGL), Bangladesh Petroleum Corporation (BPC) and Petrobangla. All four beneficiaries had experienced staff. One project component ("c" above) had to be partly abandoned due to the fact that the anticipated feed was contingent on the completion of another project and did not materialize; another component ("d" above) could not be implemented due to higher than expected prices quoted for shallow-bottomed tankers. The three refinery components representing the main part of the project, however, were implemented efficiently and with commendable speed.

4. A major set-back to the project was the withdrawal of the general contractor with the most competitive offer for the refinery components due to a minor technicality. The second lowest bidder was invited, but he declined to extend the validity of his bid. Finally, the third lowest bidder was awarded the contract. This delayed the implementation of the project by about nine months.

5. Further, there was a catastrophic cyclone which hit the Chittagong area scattering material and work in progress. This added at least another three months to the implementation schedule. Despite these set-backs the project was completed just one year behind schedule, with about 88 percent of the Credit (SDR 40 million) disbursed. The exemplary manner in which ERL staff and the general contractor performed contributed to the efficient implementation of the project.

6. The implementation of the project was helped considerably by the work done under the previous Energy Efficiency and Refinery Rehabilitation Project (Cr. 1357- BD). Under this project, all the viable options and implementation strategies were defined, which facilitated the expeditious implementation of the project.

Project Results

7. The addition of the two process units enabled the refinery to reduce the production of fuel oil and increase the yield of more valuable distillate petroleum products. While not adequate to satisfy all

demand for products, the benefits from the modifications are significant. Under the project, LPG cylinders and regulators were also procured, which enabled LPGL to increase the sale of LPG.

Project Sustainability

8. As Bangladesh increases its production of natural gas, the demand for fuel oil will decrease. The demand for diesel oil for busses and trucks will, however, continue to increase. Hence, the project refinery modifications, which resulted in a reduction of fuel oil production and an increase in the output of diesel oil, will continue to prove beneficial to the country. The project sustainability will be further enhanced by the growing demand for diesel oil in the Asia region and the resulting increase in the margin between diesel oil and crude oil. In view of the above, prospects for the sustainability of project benefits are good.

Findings and Lessons Learned

9. The most significant lesson from this project is that effective, results-oriented project preparation and design are keys to efficient implementation. Particularly for Bangladesh, there is a need to minimize the number of procurement packages and to minimize the delays resulting from the approval process by the several layers of bureaucracy. Engagement of consultants to work alongside the beneficiaries' staff facilitated procurement. Finally, the dedication of the beneficiaries' staff helped in a large measure to implement the project.

PROJECT COMPLETION REPORT

BANGLADESH

REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT (CREDIT 1749-BD)

PART 1: PROJECT REVIEW FROM IDA'S PERSPECTIVE

1. Project Identity

Project Name:	Refinery Modification and LPG Recovery and Distribution Project
Credit Number:	1749-BD
RVP Unit:	South Asia Region
Country:	Bangladesh
Sector:	Energy
Sub-sector:	Petroleum

2. Background

2.1. The energy assessment study prepared in 1982 under the Joint World Bank/UNDP Energy Assessment Program for Bangladesh identified major weaknesses in the energy sector planning and supply of essential petroleum products. Among the main weaknesses were inefficiencies in the Eastern Refinery at Chittagong, which could process only limited quantities of crude oil, well below its design capacity, and the unusually high cost of petroleum product imports. At the time of the energy assessment, petroleum products and crude oil imports equalled nearly 40 percent of the total export earnings. The refinery was in poor mechanical condition and experienced frequent unscheduled shut-downs due to mechanical failures and non-availability of parts essential for regular maintenance. The IDA financed Energy Efficiency and Refinery Rehabilitation Project (Cr. 1357-BD), which followed as a result of the energy assessment study, provided funding and assistance to effect essential repairs to improve the mechanical integrity and safety of the refinery.

2.2. While the Energy Efficiency and Refinery Rehabilitation Project provided short term relief, the problems in the energy sector went beyond that of the high cost of supply of petroleum products. Exploitation of natural gas, the only indigenous commercial energy source (except for a limited hydropower potential), was constrained due to lack of funding and technical expertise. While two of the world's largest rivers, the Ganges and the Brahmaputra, flow through Bangladesh, the flat terrain provides limited potential for hydropower, which is estimated at not more than 400 MW. The extensive use of natural gas was also constrained by the inability of the refinery to reduce the output of fuel oil, which natural gas could replace in industry and power sectors. In parallel with the exploitation of natural gas for power and industrial uses, the Government of Bangladesh (GOB) also recognized the need to minimize the cost of petroleum imports, which were making disproportionate claims on the country's limited foreign exchange resources.

2.3. A refinery modification study was conducted under the Energy Efficiency and Refinery Rehabilitation Project (Cr. 1357-BD) to determine the optimum strategy for improving the refinery's processing efficiency and reduce the output of fuel oil. This study identified the need for secondary conversion facilities to convert excess, low value fuel oil to premium value middle distillate products, like kerosene and diesel oil. This study gave rise to the Refinery Modification and LPG Recovery and Distribution Project.

2.4. While the refinery modification project was under preparation, GOB realized that substantial quantities of liquefied petroleum gas (LPG), which could substitute for imported kerosene, were likely to be available from the natural gas production at the Kailashtila fields. As neither the LPG marketing skills nor the required institutional framework existed in the country, a pilot project was included to

develop the required expertise as well as to provide a limited quantity of LPG to the northern areas of Bangladesh.

3. Project Objectives and Description

3.1. The main project objectives were to minimize the net cost of petroleum imports to the country by rationalizing the supply of petroleum products and promoting the use of LPG to substitute for kerosene.

3.2. To meet these objectives, the project provided for:

- (a) the installation of a mild hydrocracker, to convert poor quality vacuum gas oil to high grade diesel oil;
- (b) the installation of a visbreaker, to reduce the viscosity of fuel oil and produce some diesel oil;
- (c) facilities to recover and bottle LPG at Kailashtila;
- (d) the establishment of a joint venture with the private sector to bottle and market LPG; and
- (e) the provision of technical assistance to implement the project and training of staff.

4. Project Design and Organization

4.1. The project was implemented by four agencies: Eastern Refinery Limited (ERL) for the project components which involved the addition of the mild hydrocracker and the visbreaker, Liquefied Petroleum Gas Limited (LPGL) for the LPG bottling and marketing facilities, Bangladesh Petroleum Corporation (BPC) for the joint-venture LPG distribution facility and Petrobangla for the LPG recovery plant at Kailashtila.

4.2. The major project component was the modification of the Eastern Refinery at Chittagong, for which approximately 65 percent of the Credit was allotted. This project component included the mild hydrocracker, the visbreaker and associated utilities and off site facilities and was the most complex project component. Under the Energy Efficiency and Refinery Rehabilitation Project, ERL staff had been trained in project management and gained valuable experience. The project implementation unit established for the refinery component was well managed and facilitated the implementation of this component. CE Lummus Company of the United States provided project design and implementation assistance. Technip of France was the general contractor for detailed engineering, procurement and construction.

4.3. Another major component was the Small Scale LPG Recovery Facility at Kailashtila for which the designated implementing agency was Petrobangla. Dependent on the completion of this facility were other components, i.e. LPG Recovery Facilities at Kailashtila and LPG Storage and distribution equipment, including bottling plant, LPG cylinders, trucks and a barge, retail filling units and technical assistance to implement downstream activities associated with the proposed recovery of LPG at Kailashtila. The LPG supply to the facilities did not materialize as the Second Gas Development Project (SGDP) credit closed without implementing its LPG component. As a result, all components of the LPG recovery, distribution and marketing components were suspended. Another component of the project was the formation of a joint venture between BPC and a private sector company to bottle and market LPG around Khulna. This joint-venture could not be formed due to the excessive cost of transporting LPG from Chittagong to Khulna. LPGL was provided cylinders and regulators under the project. Technical assistance was also provided.

5. Project Implementation

5.1. The project was taken to the Board on December 16, 1986, and became effective on September 18, 1987. The original closing date was December 31, 1992 and the Credit was closed on December 31, 1993, after a one year extension of the closing date. Of the total Credit of SDR 40 million, SDR 34.73 million was disbursed, representing 87.8 percent of the Credit. Taking into account the fact that the SDR had appreciated about 15 percent in respect to the US dollar between Credit negotiation and closing, disbursement can be considered to be very satisfactory. Two project components, the small scale LPG recovery plant at Kailashtila and the joint venture LPG bottling and marketing company, could not be implemented for the reasons stated earlier.

5.2. **The Refinery Modification Component.** Consultants were engaged to assist the very dedicated and efficient group of staff headed by the Project Implementation Director. This component could have been completed well ahead of schedule, but for the performance of the bidder who submitted the most competitive bid and was selected for the award of the contract for detailed engineering, procurement, installation construction and start-up of the facilities. This contractor withdrew his offer for no justifiable reason, and ERL then negotiated, after IDA's approval, with the next most competitive bidder. However, this bidder refused to extend the validity of his bid. At this stage, the first contractor renewed interest, stating that he had acquired a subsidiary company and would now be able to undertake the contract (divulging the true reason for the withdrawal). Since there was a substantial price difference, this placed GOB in a difficult situation. There was strong pressure to award the contract to the original contractor. IDA, however, advised that this would not be acceptable as the contractor had already withdrawn his offer and to readmit him would be contrary to IDA guidelines. The contract was finally awarded to the third most competitive bidder.

5.3. This delayed the contract award by about six months and, consequently, project implementation. A further reason for slippage was the unusually severe cyclone which hit the refinery and literally scattered all material and work in progress, and this delayed the project by at least another three months. The contractor for project management assistance as well as the general contractor performed quite well in assisting the ERL team to make-up for lost time.

5.4. Initially disbursements were slow, but with the award of the contract for the refinery component, disbursements picked-up. Nearly 88 percent (in SDR terms) of the Credit was disbursed.

6. Project Results

6.1. The main quantifiable results of the project are illustrated by the performance indicators for the refinery yields for naptha, diesel and fuel oil before and after the project as summarized below:

	Before Project		After Project	
	'000 MTPA	(%)	'000 MTPA	(%)
Naptha	102	(6.84)	114	(7.93)
Diesel	341	(22.86)	428	(29.76)
Fuel Oil	631	(42.29)	478	(33.24)
ERR	Appraised 21%	-	Actual 22%	-

6.2. The slightly higher actual rate of return is due to the decrease in the price of crude and an increase in the margins between distillate petroleum products and crude oil.

6.3. The project also provided valuable experience and know-how to ERL staff in management and execution of major projects. Provisions were made to train key technical and administrative staff. However, the benefits of staff training were limited due to delays in the approval of nominated staff.

7. Project Sustainability

7.1. The benefits from the project should be sustainable for the following reasons:

- (a) ERL has been transformed into a mechanically reliable, moderately efficient and economically viable operation through the first Energy Efficiency and Refinery Rehabilitation Project and with the completion of this project. It is by no means a modern refinery, but its mechanical integrity has been restored to acceptable levels;
- (b) due to the increasing shortage of middle distillate petroleum products, the margin between these products and crude oil increased and is likely to remain at fairly high levels, which would ensure adequate net returns to the refinery;
- (c) the increased use of natural gas to replace fuel oil has further justified the installation of facilities to convert fuel oil to higher value middle distillate; and
- (d) the provision of LPG cylinders and accessories facilitated the expansion of the LPG market. LPG has become the domestic cooking fuel of choice, assuring LPGL an important role in the development of this market.

8. IDA Performance

8.1. With regard to the refinery modification and LPG components, the major components of the project which were implemented, IDA's performance met the expectations of the Borrower. On the other components, the joint venture with the private sector and the small scale LPG recovery component, IDA endeavored to initiate their implementation. However, due to circumstances beyond the control of IDA, neither component could be implemented. Nevertheless, IDA's efforts were appreciated by both agencies involved. IDA assisted all agencies involved to expedite project implementation. A case in point was the award of the contract for the implementation of the refinery modification component, when the selection of the contractor was held-up (see para 5.2). IDA's intervention enabled ERL to award the contract to the bidder selected by BPC and ERL.

9. Borrower/Beneficiary Performance

9.1. ERL managed the implementation of its project components efficiently and in an exemplary manner. Project documentation was good, and reports were received on time. ERL monitored the general contractor's work very efficiently and at every stage kept abreast of project progress. LPGL staff worked diligently to implement their project components. Both BPC and Petrobangla, despite the fact that their components could not be implemented due to circumstances beyond their control, demonstrated initiative and tenacity in trying to overcome the problems which confronted them.

9.2. ERL and LPGL staff worked conscientiously on the respective project components. While ERL had some familiarity with IDA's procurement procedures, initially there was some frustration on the need to get IDA's approval on procurement. However, as the project progressed, easy communication with IDA was established, which made it possible to obtain clearances with minimum delay. IDA's staff was cooperative and helpful and facilitated the expeditious implementation of the project.

10. Project Relationship

10.1. The relationship between the various beneficiaries and IDA was good. Despite some procurement problems, there were no reversals of procurement decisions. IDA did not receive a single

complaint from disappointed bidders against any of the implementing agencies. A major reason for this was the efforts made by IDA and the implementing agencies to keep the bidders informed of all steps taken in the bid invitation, evaluation and award cycle and responding quickly to questions.

10.2. In addition to supervision of the project, IDA missions were involved in discussions on further activities in the energy sector, which may become necessary to meet the increased demand for petroleum products, natural gas and LPG. BPC and ERL have discussed the future role of the refinery in the context of more liberalized policies in the energy sector.

11. Project Documentation and Data

11.1. The Staff Appraisal Report is comprehensive, well prepared and provides a suitable refinery modification strategy, as well as procurement and implementation arrangements. The rationale for the other components was also well justified and explained. The SAR provided valuable guidelines for the implementing of the project.

12. Findings and Lessons

12.1. The main lessons are:

- (a) the first refinery project, the Energy Efficiency and Refinery Rehabilitation Project, was completed three years behind schedule. A small but important component of this project was training of staff and strengthening of institutional arrangements. Most project delays were due to the limited experience ERL staff had of project implementation and general refinery operations. The project of this PCR benefitted from the work done under the previous rehabilitation project. Completion of the refinery modification project just 12 months behind schedule, despite the withdrawal of the selected contractor and the unforeseen major cyclone, was primarily due to the dedication and training of ERL staff. The experience ERL gathered from the previous IDA operation was evident in the efficient manner in which the project was managed;
- (b) the importance of a well focused study to identify the most appropriate and cost effective project design and the engagement of well qualified consultants;
- (c) thorough project preparation, strengthening of the implementing agency and the design of an appropriate and realistic implementation strategy are prerequisites for successful project implementation;
- (d) the need to engage consultants of the appropriate qualifications and experience early in the project implementation cycle to assist the implementing agency as well as to keep such consulting support to the bare minimum to ensure meaningful involvement of ERL staff in the implementation of the project; a parallel lesson both for IDA and GOB is the need to avoid multiplicity of consultants and the duplication or over-lapping of functions;
- (e) the need for implementing agencies to have adequate authority to take decisions pertaining to project matters. Only with appropriate interventions by IDA was ERL able to get the timely support and approval of agencies above ERL for quick decisions, which facilitated expeditious project implementation; and
- (f) the failure to implement LPG recovery and the transport and distribution components illustrates the risks of designing project components, which are dependent on the performance of other projects. The lesson is that the necessary supplies and other project inputs should be assured before Board presentation.

REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT
(CREDIT 1749-BD)

PROJECT COMPLETION REPORT

PART II: PROJECT REVIEW FROM THE BORROWER'S PERSPECTIVE¹

General Comments

1. Part III was reviewed by Senior staff of the ERL and LPGL. Part III is adequate, factual and accurate.
2. Part I of the PCR was also reviewed by ERL and LPGL. Here, again, the analysis reflects the objectives, scope, implementation characteristics and benefits which ERL and LPGL derived from the project. Our specific comments on various aspects of project implementation and monitoring by IDA are given below:
 - (a) As a general comment, we consider IDA's monitoring procedures at times to be restrictive. Greater latitude for the implementing agencies to make decisions on procurement related matters could have been helpful. While IDA responded and cleared documents expeditiously, nevertheless, some delay is involved and we believe that the implementing agencies should be given the freedom to make procurement decisions, within the guidelines established by IDA;
 - (b) With regard to the LPGL project components, we are disappointed that the Small Scale LPG Fractionation Facility could not be implemented under the project, resulting in the delays in the implementation of the bottling plant; and,
 - (c) The procurement of 20,000 LPG cylinders and 1 00,000 regulators under the credit increased the quantity of LPG marketed. This was one of the major benefits for LPGL from the project.

IDA Performance

3. We consider the timely execution of the major components of this project to be the direct result of cooperation between ERL, LPGL and IDA. IDA staff has been helpful and responded to our requests readily. We appreciate particularly efforts made by IDA to finalize a contract for the refinery modification project, which was delayed due to the selected contractor withdrawing his offer after notification. This delayed the project by at least six months.

Lessons Learned

4. The ERL refinery component, which represented about 65 percent of the credit was completed just 1 2 months behind schedule despite a major catastrophic cyclone and withdrawal of the proposal of the initially selected contractor. This was due primarily to effective project implementation and monitoring arrangements. The project demonstrated the value of good project preparation and follow-up.

¹ Comments by GOB, prepared by ERL and LPGL.

Performance of Beneficiaries

5. ERL and LPGL staff worked conscientiously on the respective project components. While ERL had some familiarity with IDA's procurement procedures, initially there was some frustration on the need to get IDA's approval on procurement. However, as the project progressed, easy communication with IDA was established, which made it possible to obtain clearances with minimum delay. IDA's staff has been most cooperative and helpful and facilitated the expeditious implementation of the project.

**REFINERY MODIFICATION AND LPG RECOVERY AND DISTRIBUTION PROJECT
(CREDIT 1749-BD)**

PROJECT COMPLETION REPORT

PART III - STATISTICAL INFORMATION

Table 1

SUMMARY ASSESSMENTS

A. <u>Achievement of Objectives</u>	<u>Substantial</u>	<u>Partial</u>	<u>Negligible</u>	<u>Not Applicable</u>
Macroeconomic Policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(✓)
Sector Policies	(✓)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial Objectives	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>
Institutional Development	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>
Physical Objectives	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>
Poverty Reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(✓)
Gender Concerns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(✓)
Other Social Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(✓)
Environmental Objectives	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>
Public Sector Management	(✓)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private Sector Development	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(✓)
B. <u>Project Sustainability</u>	<u>Likely</u>	<u>Unlikely</u>	<u>Uncertain</u>	
	(✓)	<input type="checkbox"/>	<input type="checkbox"/>	
C. <u>Bank Performance</u>	<u>Highly Satisfactory</u>	<u>Satisfactory</u>	<u>Deficient</u>	
Identification	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Preparation Assistance	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Appraisal	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Supervision	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
D. <u>Borrower Performance</u>	<u>Highly Satisfactory</u>	<u>Satisfactory</u>	<u>Deficient</u>	
Preparation	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Implementation	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Covenant Compliance	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	
Operation (if applicable)	(✓)	<input type="checkbox"/>		
E. <u>Assessment of Outcome</u>	<u>Highly Satisfactory</u>	<u>Satisfactory</u>	<u>Unsatisfactory</u>	<u>Highly Unsatisfactory</u>
	<input type="checkbox"/>	(✓)	<input type="checkbox"/>	<input type="checkbox"/>

Table 2

RELATED IDA CREDITS

<u>Project ID</u>	<u>Project Name</u>	<u>Year of Approval</u>	<u>Project Status</u>
A. Preceding Operations:			
9415	Gas Development	1981	Completed
15695	Eco. Value of Nat. G.	1982	Completed
19432	Energy Efficiency and Refinery Rehabilitation	1983	Completed
9448	Gas Development II	1985	Completed
B. Subsequent Operations:			
15718	LPG Pricing	1989	Active
15719	Nat Gas Consumption	1990	Active
9462	LPG Distribution	1991	Active
15722	Gas Subsector Review	1993	Active
9533	Gas Infrastructure	1995	Active

Table 3

PROJECT TIMETABLE			
Item	Date Planned	Date Revised	Date Actual
Identification	01/85	01/85	01/85
Preparation	03/85	07/85	07/85
Appraisal Mission	09/85	09/85	09/85
Post Appraisal	-	-	06/86
Negotiations	04/86	05/86	07/86
Board Approval	10/86	12/86	12/86
Credit Signature	01/86	01/86	01/87
Credit Effectiveness	03/87	06/87	09/87
Credit Closing	12/92	12/93	12/93
Credit Completion	04/93	04/94	04/94

Table 4

CREDIT DISBURSEMENTS

Disbursements (in US\$ million)
(Credit 1749-BD)

IDA Fiscal Year & Quarter	Estimated Cumulative	Actual Cumulative	Actual % of Estimated
1986/1987			
1	-		
2	5.0		
3	5.2		
4	5.5		
1987/1988			
1	7.2		
2	9.0		
3	11.0		
4	13.1		
1988/1989			
1	17.4		
2	21.7		
3	26.0		
4	30.3	0.64	2.11
1989/1990			
1	33.1	0.64	2.13
2	35.9	0.64	3.48
3	38.6	0.64	1.66
4	41.3	1.52	3.68
1990/1991			
1	42.3	2.11	4.99
2	43.3	2.90	6.70
3	44.1	17.43	3.92
4	44.9	18.63	41.49
1991/1992			
1	45.5	26.55	58.35
2	45.9	29.37	63.99
3	46.3	32.19	69.52
4	46.7	42.48	90.96
1992/1993			
1	46.9	43.34	92.54
2	47.0	44.64	94.98
3	-	47.35	100.74
4	-	48.00	102.13
1993/1994			
1	-	48.32	102.81
2	-	48.32	102.81
3	-	-	-
4	-	-	-

NOTE: The depreciation of the US dollar against the SDR resulted in a higher than 100 percent disbursements.

Table 5

A. PROJECT COSTS
(US\$ million)

	<u>Approximate Estimates</u>			<u>Actual</u>		
	Local Costs	Foreign Exchange	Total	Local Costs	Foreign Exchange	Total
1. Refinery Modification	19.3	36.0	55.3	26.5	34.5	60.9
2. LPG Recovery Facilities	1.2	4.8	6.0	-	-	-
3. LPG Storage & Distribution	8.3	11.7	20.0	0.5	1.1	1.6
Total	8.8	52.5	81.3	27.0	35.6	62.5

Comments: The cost overrun in the refinery modification component is mainly attributed to the withdrawal of Mannesman, whose price was nearly \$9 million below that of the next best offer. Mannesmann's withdrawal and the resulting nine months delay also contributed to higher costs.

B. PROJECT FINANCING
(US\$ million)

Source	Credit Agreement	Revised	Final
IDA	47.0	35.2	35.2
Government	19.5	17.3	17.3
Internal Cash Generation	7.3	10.0	10.0
Private Investor	7.5	-	-
Total	81.3	62.5	62.5

Comments: None

Table 6

PROJECT RESULTS

A. DIRECT BENEFITS

REFINERY YIELD				
	Before Project		After Project	
	'000 MTPA	(%)	'000 MTPA	(%)
LPG	13	(0.87)	13	(0.90)
Naptha	102	(6.84)	114	(7.93)
Gasoline	49	(3.28)	49	(3.41)
Kerosene	331	(22.18)	331	(23.02)
Diesel	341	(22.86)	428	(29.76)
Fuel Oil	631	(42.29)	478	(33.24)
Bitumen	25	(1.68)	25	(1.74)
Total (Net Products)	1492	(100.w)	1438	(100.w)

B. ECONOMIC RATE RETURN

Underlying Assumptions	Appraisal Estimate	Estimated at Closing
1. Refinery Production ('000 MTPA)	1,500	1,500
2. Capacity Utilization	100%	100%
3. Mid-distillate Production ('000 MTPA)	672	802
4. Margin (\$/ton) between:		
- Kerosene and crude oil	43	50
- Diesel and crude oil	38	48
- Fuel oil and crude oil	-34	-30
Economic Rate of Return	21%	22%

Table 7

STATUS OF COVENANTS

	<u>Covenant</u>	<u>Status/Comments</u>
1.	BPC to : (a) limit credit to less than 45 days; (b) charge interest on amount outstanding for more than 30 days; and (c) reduce outstanding amounts receivable by at least Taka 50 million per month.	Complied
2.	Price LPG annually to ensure LPGL's financial viability.	Complied
3.	By January 1, 1987, introduce a processing fee for ERL.	Complied
4.	Review and adjust as necessary ERL's financial authority by June 30, each year.	Complied
5.	BPC to enter into a LPG bottling, storage, marketing and distribution agreement with a private company.	Memorandum of Understanding; signed, but a contract was not consummated.
6.	By June 30, 1989 to remove all price controls on LPG.	Not complied. Under the subsequent LPG Transportation and Distribution Project (Cr. 2263-BD), it was agreed to increase the LPG price in phases to reach the import parity price.

Table 8

USE OF STAFF RESOURCES

A. Inputs

	<u>Staff Weeks</u>
Project preparation	40.6
Appraisal	77.3
Board through effectiveness	19.5
Supervision (including procurement)	<u>88.3</u>
Total	<u>225.7</u>

B. Supervision Missions

<u>Mission Date</u>	<u>Number of Persons</u>	<u>Specialization^{a/}</u>	<u>Overall Status^{b/}</u>
April 1987	2	E,F	1
July 1987	2	E,F	1
February 1988	2	E,F	1
April 1988	2	E,F	1
August 1988	2	E,F	1
November 1989	2	E,F	2
January 1990	2	E,F	2
June 1990	2	E,F	2
January 1991	2	E,F	2
May 1991	2	E,F	2
October 1991	2	E,F	2
April 1992	1	E	2
March 1993	1	E	2

^{a/} Engineer (E); Financial Analyst (F)

^{b/} Minor Problems (1); Moderate Problems (2); Major Problems (3)

