Bangladesh

"Bakhrabad Natural Gas Development Project(Ⅱ)"

Project Summary

Borrower	The People's Republic of Bangladesh
Executing Agency	Bangladesh Gas Fields Company Ltd.
Exchange of Notes	March 1994
Date of Loan Agreement	June 1994
Final Disbursement Date	September 1998
Loan Amount	¥1,405 million
Loan Disbursed Amount	¥1,270 million
Procurement Conditions	General Untied
Loan Conditions	Interest Rate: 1.0% Repayment Period: 30 years (10 years for grace period)

<Reference>

(1) Currency: Taka

(2) Exchange Rate: (IFS annual average market rate)

Year		1994	1995	1996	1997	1998
Rate	Taka/US$	40.2	40.3	41.8	43.9	46.9
	Yen/US$	102.2	94.1	108.8	121.0	130.9
	Taka/Yen	2.5	2.3	2.6	2.8	2.8
CPI (%)		92.1	100	104.1	109.5	118.6

Consumer price index (CPI): 1995 = 100

(3) Rate at the time of appraisal: 1 TK = JP¥2.7
(US$ 1.00 = ¥107.8 = 39.9 TK)

(4) Fiscal Year: July 1 ~ June 30

(5) Unit:

MMSCFD: Million Standard Cubic Feet per Day at 60 ° F, 1atm: 60 ° F

BCF: Billion Cubic Feet

(6) Abbreviations:

Ashucanj-Bakhrbad Gas Pipeline:
Key pipeline connecting between Ashucanj and Bakhrabad in northeastern Dhaka.

BGSL: Bakhrabad Gas Systems Ltd.

BGFCL: Bangladesh Gas Fields Company Ltd.

BAPEX: Bangladesh Petroleum Exploration Company Ltd

MEMR: Ministry of Energy and Mineral Resources

PETROBANGLA: Bangladesh Oil, Gas & Mineral Corporation

(7) Terminology

Workover:

This term refers to repairing faults in active wells and performing the following operations in order to increase production:

(1) Repair within the well damaged equipment and faults that could result in reduced production

(2) Apply acid processing, water pressure breaking method and other techniques to improve production

(3) Develop different levels in the same well when production has been exhausted

(4) Operations to halt the production of sand, water and gas in the well when such materials are not targeted by the project.

The term "workover" is used in this project to refer to the operations described in (3) above.

Drilling:

This term refers to discovering a liquid stratum of oil or natural gas underground, and then digging a well for the purpose of extracting these materials. Drilling for the purpose of discovering oil and gas layers is called "exploratory drilling". Drilling to confirm the range and unique characteristics of these layers is called "prospecting". The drilling of a well for the purpose of collecting oil or natural gas from layers located by exploratory drilling and prospecting is called "development drilling".

Well Completion:

This term refers to establishing the production casing, performing perforation (see next term) and other operations needed for producing oil and gas once the drilling has been completed.

Wellhead pressure:

The term refers to gas pressure that is controlled by the wellhead equipment at the surface section of the well. If there is a sufficient amount of gas in the ground, the wellhead pressure will decrease and gas production will increase. Furthermore, well pressure can also be manipulated to control, to some extent, the amount of gas, sand, and water that is produced.

Exploration:

Generally this term refers to the searching for underground locations of valuable minerals.

Geophysical prospecting:

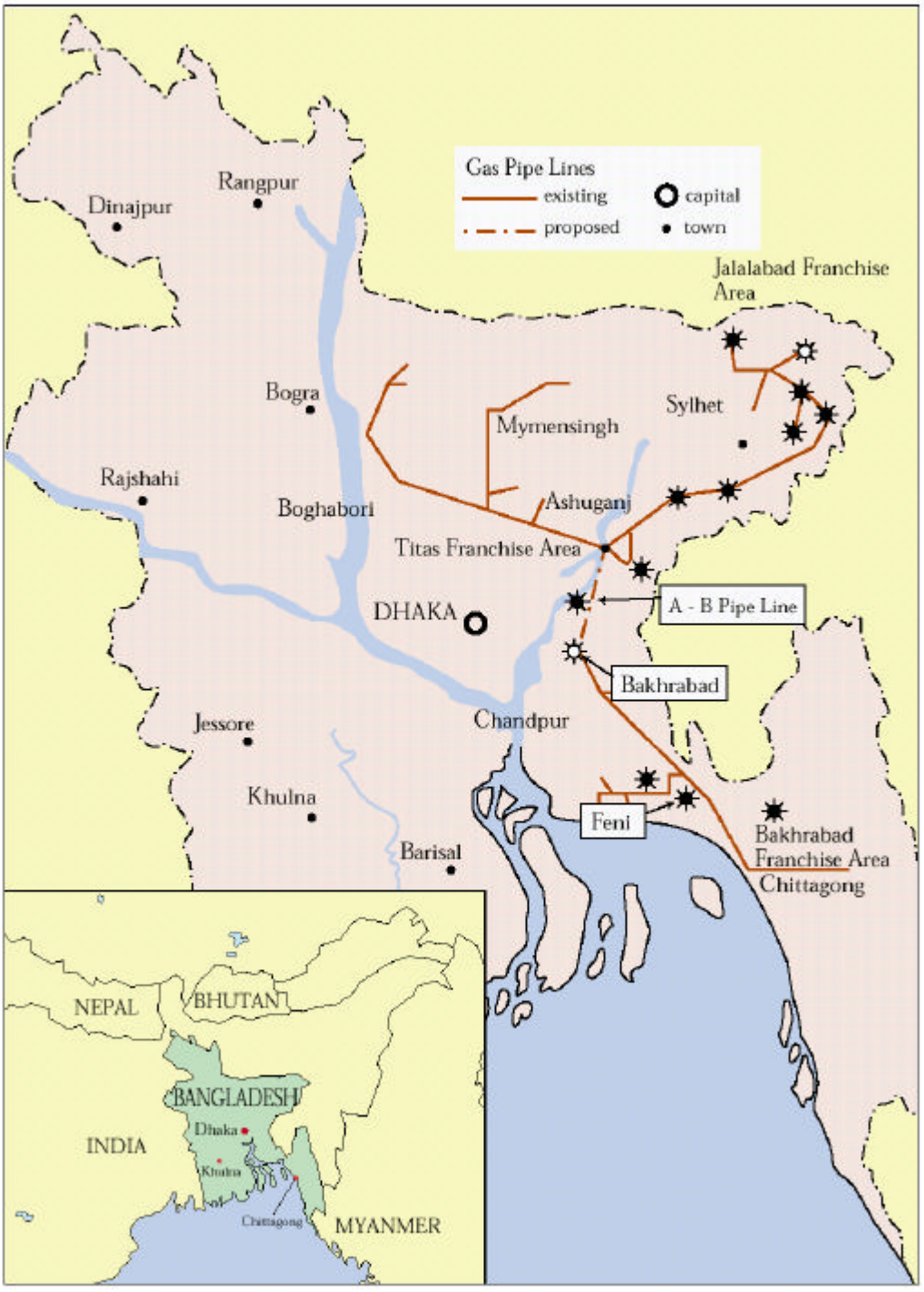
This is a general term for technologies that make use of the physical characteristics of underground rocks and minerals when searching for the locations of underground structures, valuable minerals and underground water. These technologies are used not only in the oil drilling industry, but also in metal mining and in the search for hot springs. Seismic, gravitational and magnetic prospecting are the main methods used in the search for oil. Physical prospecting is performed in the initial stage of developing an oil or gas field. If these results indicate a promising collection of oil or gas, exploratory drilling will then be performed. This is the basic procedure. However, in recent years there have been many cases in which a physical prospecting, especially seismic prospecting, is repeated several times after the exploratory drilling. By repeating the same prospecting several times, the production probability is improved through prospecting, exploratory drilling and development drilling.

Perforation:

This term refers to opening holes through the casing and the outer cement to reach the production level so that oil and gas can flow from this level through the well. This operation is performed after the well has been completed and the production casing has been set. Re-perforation was performed as an additional scope to this project. The term “re-perforation” refers to the operation of using concrete to close holes made by the initial perforation, and then creating new holes at different locations.

1. Project Summary and Comparison of Original Plan and Actual

1.1 Project Location



1.2 Project Summary and ODA Loan Portion

The purpose of the Bakhrabad Natural Gas Development Project (II), hereinafter referred to as the "project", was to bolster the capabilities to supply natural gas from the Bakhrabad Franchise Area[1] in order to meet a projected shortage in supply to the Chittagong economic zone in southeastern Bangladesh, which was expected to occur between December 1994 and May 1996. These capabilities were to be improved by conducting a workover of two existing wells in the Bakhrabad Gas Field[2] and the drilling and completion of one new well in the Feni Gas Field[3]. The ODA loan covered the entire foreign currency portion for necessary expenses and the local currency portion excluding management and operating expenses, taxes and fees for preparing the land.

1.3 Background (at the time of appraisal)

1.3.1 Bangladesh Natural Gas Sector

Natural gas is Bangladesh's only plentiful energy source. The Bangladeshi government has been promoting the development of the country's natural gas reserves since the start of its 1st Five-Year Plan (1973~1980). As a result of these efforts, 17 gas fields (approximately 21,354 BCF in in-place reserves and 10,428 BCF in recoverable reserves) had been developed by 1994. The use of natural gas has also gradual increased due to the country's policies for promoting the resource. In fact, the average annual growth rate was 14% from the early 1980's until 1993.

Demand for gas had expanded greatly by 1994 when the ODA loan was provided to this project, particularly in the Dhaka and Chittagong areas[4], and improving the capabilities for providing natural gas to these regions had become a pressing policy issue. The shortage of gas to the Chittagong area was especially pronounced, and so there were great expectations for promptly bolstering supply capabilities.

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1 The region providing gas via the Bakhrabad-Chittagong Pipeline is known as the Bakhrabad Franchise Area (refer to the project location map).

2 The Bakhrabad Gas Field was explored by the Pakistan – Shell Co. in 1970 and production was started in 1984. A total of eight wells had already been drilled at this field (BK-1, BK-2, BK-3, BK-4, BK-5, BK-6, BK-7, BK-8). In 1980 a loan agreement was signed under which the Bakhrabad Natural Gas Development Project would perform drilling of wells BK-2, BK-3, BK-4 and BK-5 and would also perform a workover of well BK-1. Drilling of wells BK-6, BK-7, and BK8 were performed through ADB financing.
Plans were for this project to perform a workover of two wells that had shown a decrease in production (BK-2, BK-4).

3 The Feni Gas Field was explored by BAPEX in 1980. Drilling was performed for one well (FN-1) and production was started.

4 Since the 1980's the Bangladesh government has stressed "export promotion", "foreign investment" and "domestic business development" as important policy issues, and has moved forward with preparing the Chittagong area as an export processing region. This region has continued to develop as Bangladesh's number two city and as a major international trading port.

The Bakhrabad and Feni Gas Fields covered by this project are both located in the Chittagong economic zone. It has been projected that this zone will see a sharp increase in its demand for natural gas as fertilizer factories, power plants and other new plants started operations in 1993. This region relies on the Bakhrabad Franchise Area for 99% of its natural gas, and so developing gas in this region had become an urgent issue.

1.3.2 Positioning of this Project in the Development of the Natural Gas Sector

New fertilizer factories, power plants and other facilities were established in the Chittagong area from 1990. This led to a sharp increase in demand for natural gas at the peak period, especially from 1991. It was estimated that the Chittagong area would need a minimum of 204MMSCFD of natural gas. However, in the early 1990's the Bakhrabad Franchise Area was only capable of providing 150MMSCFD in natural gas.

In order to meet the sharp increase in natural gas demand in the Chittagong area, the Bangladeshi government established the A-B (Ashucanj-Bakhrabad) Gas Pipeline to better utilize the Bakhrabad Franchise Area in the northeast region, which had achieved abundant production of natural gas. Unfortunately, this project, which was supposed to be completed in May of 1994, was greatly delayed due to delays in procurement procedures and other problems. As a result, realizing a rapid increase in the production of natural gas from the Bakhrabad Franchise Area became more difficult. Therefore, in 1993 it was concluded that there would likely be a shortage in natural gas for the 18 months from December 1994 to May 1996. It was assumed that such a shortage would not only impact the operations of the power plants, fertilizer factories and other plants, but would also spread to other related industries and have a major negative impact on the entire Chittagong economic zone.

Under these circumstances the Bangladeshi government decided to improve natural gas production by performing a workover of two wells in the Bakhrabad Gas Feld (BK-2, BK-4) and drill and complete[5] a new gas well (FN-2) in the Feni Gas Field. A request for financial cooperation for this project was submitted to the Japanese government in June of 1993. Project planning was preformed by Petrobangla and other energy-related organizations. JBIC recognized the urgency of this project and conducted a project appraisal in December 1993 based on the project's implementation plan, and in June of 1994 loans were provided for the project.

[5] Refer to the explanation of terminology provided on page 3.

1.3.3 History

1980	December	JBIC signs loan agreement for the Bakhrabad Natural Gas Development Project (Phase 1).
1984	May	Bakhrabad Gas Field operations start.
1993	May	Visit to Bangladesh by F/F mission of JBIC
	June	Bangladeshi government draws up the project plan, and submits loan request with the Japanese government.
1993	October	Visit to Bangladesh by government mission
	December	Visit to Bangladesh by JBIC appraisal mission
1994	February	Prior notification on this project by Japanese government
	March	Issue notification on successful bids excluding ground equipment for the Feni Gas Field.
	March	Exchange of Notes
	June	Loan Agreement signing
1995	September	Bangladeshi government asks the Japanese government to extend the loan period.
	September	Dispatch of Interim Monitoring Mission by JBIC
	September	JBIC agrees to the above mentioned loan extension request after receiving approval from the Japanese government.
1996	September	Bangladeshi government asks the Japanese government for a second extension to the final disbursement date, and also requests an additional scope for the project. JBIC dispatches Interim Monitoring Mission.
	September	JBIC agrees to the above mentioned second extension to the final disbursement date and expanded project scope after receiving approval from the Japanese government.

1.4 Comparison of Original Plan and Actual

1.4.1 Project Scope

Project Scope	Plan	Actual	Difference
(1) Project Scope ① Bakhrabad Gas Field - Workover of well BK-2	Workover to upper D level for well BK-2	Recompletion to lower D level for well BK-5	Change of workover targeted wells
- Workover of well BK-4	Workover to G level for well BK-4	As planned	
② Feni Gas Field (FN-2) - Drilling of production well FN-2 and well completion	Drilling of new well FN-2 and well completion to lower level	Drilling of new well FN-2 and well completion to upper level	Change of well completion level
- Procurement and installation of ground equipment	Construction of plant with treatment capacity of 60MMCFD	As planned	
③ Engineering service	Dip digging, cement work etc.	As planned	Implementation of additional scope
④ Consultant service	Construction supervision, procurement monitoring etc	As planned	Implementation of additional scope
<Additional scope> ⑤ Production studies and repairs	No plan	Investigation on production status of BK-1, 2, 3, 7, 8 and repair	
⑥ Pipeline laying	No plan	Laying of gas pipeline (28km)	

1.4.2 Implementation Schedule

	Plan	Actual	Difference
1. Initial Scope			
① Procurement/installation	Feb. 1994 ~ Jul. 1994	Mar. 1994 ~ Nov. 1994	+4 months
② Workover of Bakhrabad Gas Field	Feb. 1994 ~ Nov. 1994	Feb. 1994 ~ Jan. 1995	+2 months
③ Drilling of Feni Gas Field	Feb. 1994 ~ Nov. 1994	Feb. 1994 ~ Jan. 1995	+2 months
④ Consulting service	Jan. 1994 ~ Dec. 1994	Jun. 1994 ~ Sep. 1996	+21 months
⑤ Engineering service	Feb. 1994 ~ Dec. 1994	May 1994 ~ Jul. 1996	+19 months
⑥ Gas Treatment Plant	Feb. 1994 ~ Dec. 1994	Apr. 1995 ~ Jun. 1996	+18 months
2. Additional Scope			
① Pipeline laying	Dec. 1996 ~ Dec. 1997	Dec. 1996 ~ Jun. 1997	−6 months
② Investigation of Bakhrabad Gas Field	Sep. 1997 ~ Sep. 1998	Dec. 1997 ~ Sep. 1998	−3 months

1.4.3 Project Cost

(Unit: million yen)

Item	Plan (at the time of appraisal)			Actual			Difference		
	Foreign currency (JBIC portion)	Local currency (JBIC portion)	Overall (JBIC portion)	Foreign currency (JBIC portion)	Local currency (JBIC portion)	Overall (JBIC portion)	Foreign currency (JBIC portion)	Local currency (JBIC portion)	Overall (JBIC portion)
Original Scope									
Procurement / installation of materials and equipment	789 (789)	108 (108)	897 (897)	666 (666)	388 (-)	1,054 (666)	-123 (-123)	280 (-108)	157 (-231)
Engineering service	237 (237)	17 (17)	254 (254)	252 (252)	6 (0)	258 (252)	15 (15)	-11 (-17)	4 (-2)
Land improvement	0 (0)	4 (0)	4 (0)	0 (0)	0 (-)	0 (0)	0 (0)	-4 (-)	-4 (-0)
Transport cost	0 (0)	35 (35)	35 (35)	0 (0)	9 (-)	9 (0)	0 (0)	-26 (-35)	-26 (-35)
Consulting service	35 (35)	1 (1)	36 (36)	18 (18)	0 (-)	18 (18)	-17 (-17)	-1 (-1)	-18 (-18)
Civil works cost	0 (0)	22 (22)	22 (22)	0 (0)	18 (-)	18 (0)	0 (0)	-4 (-22)	-4 (-22)
Operation and maintenance cost	0 (0)	27 (-)	27 (-)	0 (0)	27 (-)	27 (0)	0 (0)	0 (-)	0 (0)
Tax	0 (0)	366 (-)	366 (-)	0 (0)	9 (-)	9 (0)	0 (0)	-357 (-)	-357 (0)
Interest rate during construction	-	-	-	0 (0)	24 (-)	24 (0)	- (-)	24 (-)	24 (0)
Contingency	102 (102)	59 (59)	161 (161)	0 (0)	0 (0)	0 (0)	-102 (-102)	-59 (-59)	-161 (-161)
Additional Scope									
Procurement / installation of materials and equipment	-	-	-	156 (156)	25 (-)	181 (156)	156 (156)	25 (0)	181 (156)
Engineering service	-	-	-	0 (0)	111 (92)	111 (92)	0 (0)	111 (92)	111 (92)
Land improvement	-	-	-	0 (0)	16 (-)	16 (0)	0 (0)	16 (0)	16 (0)
Transport cost	-	-	-	0 (0)	8 (-)	8 (0)	0 (0)	8 (-)	8 (0)
Civil works cost	-	-	-	0 (0)	6 (-)	6 (0)	0 (0)	6 (-)	6 (0)
Operation and maintenance cost	-	-	-	0 (0)	19 (-)	19 (0)	0 (0)	19 (-)	19 (0)
Tax	-	-	-	0 (0)	73 (-)	73 (0)	0 (0)	73 (-)	73 (0)
Interest rate during construction	-	-	-	0 (0)	14 (-)	14 (0)	0 (0)	14 (-)	14 (0)
Investigation and repair of existing wells	-	-	-	87 (87)	0 (-)	87 (87)	87 (87)	0 (-)	87 (87)
Total	1,163 (1,163)	639 (242)	1,802 (1,405)	1,179 (1,179)	753 (92)	1,932 (1,271)	16 (16)	-114 (-150)	130 (-134)

[Exchange rate] At the time of plan (as of 26th May, 1994): (1TK=JP¥2.70)
Actual (based on actual weighted average) (1TK=JP¥2.99)

2. Analysis and Evaluation

2.1 Evaluation on Project Implementation

2.1.1 Project Scope

At the time of the appraisal it was agreed that the following items would be covered by the ODA loan.

(1) Expenses for transporting materials needed to perform a workover of the BK-2 and BK-4 wells in the Bakhrabad Gas Field
(2) Expenses for procuring materials and equipment[6] needed for completing the new FN-2[7] well in the Feni Gas Field.
(3) Expenses for procuring and installing ground equipment[8] at the Feni Gas Field.
(4) Fees for hiring consultants to procure and monitor needed materials and carry out the drilling of the FN-2 well and the workover of the BK-2 and BK-4 wells.
(5) Expenses to pay engineers for the cement operations, drilling inspections and production inspections related to the drilling and completing of the FN-2 well.

The following items were changed during the implementation of this project.

(1) Change in Target Well

During implementation of the project it was determined that well BK-5, and not BK-2, of the Bakhrabad Gas Field would receive the workover. The original plan called for increasing the production of natural gas by performing a workover from the lower D level[9] to the upper D level of the BK-2 production level, and from the upper D level to the G level of the BK-4 production level. However, the workover of the BK-2 well was not performed for the reasons shown below.

Gas was being produced from the lower D level of the BK-2 well at the time of the appraisal, but water and sand were mixed with the produced gas and so plans were for this project to change the production level. However, in 1994 the amount of water and sand produced in the BK-2 well had decreased and consequently a completion of this well was not performed. Afterwards, pressure at the opening of the well was lowered, and production was continued.[10] Meanwhile, in June of 1994 there was a sudden increase in the amount of water and sand produced in BK-5, which had been smoothly producing gas since 1991. Because this was

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6 Financing, equipment and materials needed for casings and other underground constructions, as well as equipment and materials needed for drilling.

7 Wells in the Fieni Gas Field are indicated as FN-1 and FN-2. Unlike with the FN-1 well, this projectstarted the FN-2 well as a direct production well, without first performing prospecting and exploratory drilling.

8 Among the ground facilities is a plant for removing moisture from the gas produced by FN-2. This plant is producing natural gas for sale and condensate. The FN-1 well, at which production had already started, was using two moisture removing plants. Still, at the time of the appraisal there were concerns that these plants would not be able to keep pace with the expected increase in production to be brought about by this project.

9 The production layers at the Bakhrabad Gas Field are divided as layer B, upper layer D, lower layer D, layer G and layer J.

10 The D layer of BK-2 continued to smoothly produce gas up until 1998. Therefore, a workover was not performed until production was stopped in late 1998.

expected to result in a sharp falloff in the production of gas, Petrobangla and BGFCL decided that BK-5 needed an immediate workover and such operations were performed in December 1994.

It is thought that this change was an appropriate decision as stable gas production was achieved from BK-2 and a fixed amount of gas was produced from BK-5 from 1994. In particular, BK-5 was able to produce 10MMSCFD on average for the three years from 1994 to 1997 when there was a tight supply and demand situation. This helped to alleviate the tight supply and demand situation in the Bakhrabad Franchise Area.

(2) Additional Scope

In September 1996 it was determined that the contingency[11] of the ODA loan would be used to (1) construct a pipeline (28km) connecting the BK-9 well[12] with the Bakhrabad Franchise Area, and (2) make production studies and repairs[13] (re-perforation) for some of the wells in the Bakhrabad Gas Fields (BK-1, 2, 3, 7, 8).

In September of 1996, the scope of the project was extended, because completion of the A-B gas line was again delayed and it became apparent that the planned increase in production for both the Bakhrabad and Feni Gas Fields would not be achieved[14]. In particular, there were concerns that the shortfall in supply to the Chittagong area would become an even more serious problem[15].

Aware of this situation, JBIC conducted a SAPI study in August of 1996, dispatched another Interim Monitoring Mission in September of the same year, and consultations were held with the Bangladeshi government on the measures needed for improving the supply of natural gas from the Bakhrabad Franchise Area. The Bangladeshi government, realizing the importance of improving the ability to provide natural gas from the Bakhrabad Franchise Area over the long-term, made a request to use the ODA loan contingency for implementing the above-mentioned additions to the project scope. Based on these consultations, the Bangladeshi government submitted a formal request to the Japanese government and this request was approved in September of 1996. (The loan disbursement period was extended by two years and the contents of the agreement were changed to reflect the expanded project scope.)

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11 The entire scope of the original plan was completed in September 1996.

12 Petrobangla has classified BK-9 as being part of the Bakhrabad Gas Field, but the well is actually located in the Meghna Gas Field in the northwest corner of the Bakhrabad Gas Field. This well, which is not actually connected with the gas layer of the Bakhrabad Gas Field, was drilled by BAPEX in 1990.

13 These repairs refer to investigating production methods needed for continuing production while limiting the output of sand and water produced in existing wells, and then performing perforation when necessary to maintain and bolster well production capabilities. Refer to page 2 for an explanation of the term "perforation".

14 In 1996 the Bakhrabad and Fieni Gas Fields saw 50% and 30% drops in production respectively from the previous year. The main causes for the drops in production were exhausted gas sources and an increase in the amounts of water and sand produced.

15 During this period 160MMSFC of natural gas was provided to the Chittagong area each day, but demand at peak times was 175MMSCFD. As a result of this supply shortage, limits were placed on how much natural gas could be provided to the fertilizer factories and power plants, which led to a reduction in industrial activity in the Chittagong area.

Construction[16] of the pipeline mentioned above was carried out in order to carry natural gas produced by the BK-9 well in the Meghna Gas Field to the Bakhrabad Gas Field. This pipeline made it possible to transport 18MMSCFD of gas from this field from June 1997, which helped to raise the supply capabilities of the Bakhrabad Franchise Area.

Production studies and repairs of existing wells as mentioned refer to repairs and other operations to improve production stability and prolong production life after first gaining an understanding of the water and sand produced in wells BK-1, 2, 3, 7 and 8, and re-administering production tests. These studies and repairs were based on the results of an SAPI study. In order to improve production at the Bakhrabad Gas Field, SAPI recommended detailed testing, repairs and the introduction of compressors. However, these would all involve suspending well operations to conduct the detailed test, and this was not possible due to supply shortages. Therefore, production conditions were studied and repairs were made while not halting production.

Technology transfers for studying production conditions are not limited to the Bakhrabad Gas Field alone, but are expected to be used for studies and analysis of other gas fields in the future.

(3) Changes to Well Completing Levels

The level to be completed for the FN-2 well was changed from the lower level to the upper level. The underground gas distribution and conditions for FN-2 noted in the project plan at the time of the request were based on data collected while digging FN-1 and on FN-1 production trends. Based on estimations that the FN-2 lower level would hold a comparatively abundant supply of natural gas, plans were to drill and complete the lower production level of FN-2. Unfortunately, during the actual drilling of the well it was determined that there was not any gas in the lower layer that was originally to be completed. Therefore, the plan was changed so that production could be carried out from the upper level where there was expected to be a fixed amount of gas.

There were no cost overruns or other such problems related to this change, and an average production of 8MMSFCD was achieved from 1994 through completing the upper section of this well. Changing the target level is seen as an appropriate decision as it contributed to the supply of gas from the Bakhrabad Franchise Area.

2.1.2 Implementation Schedule

The original plan called for this project to be completed in December 1994 (project is deemed to be completed upon completion of the gas processing plant). However, the original scope of the project was not completed until June of 1996, and the overall project, including the extended scope, was not concluded until September of 1998.

[16] Some of the equipment needed to realize production at BK-9 was actually equipment not being used at other gas fields, which were dismantled and then rebuilt at BK-9. BGSL carried out the construction of the pipeline.

(1) Implementation Schedule for Original Project Scope

Delays in the original project scope were due to delays in procuring the moisture removing plant for the Feni Gas Field, and time needed to make repairs to some of the drilling equipment that became damaged during the drilling of FN-2. The start of gas production had to be pushed back due to these delays. Procurement of the moisture removing plant was due to the fact that bids had to be resubmitted after all of the initial bids for this plant exceeded the price planned by the project. All other aspects of the project scope, excluding the ground equipment for the Feni Gas Field, were completed by January of 1995, and there were no particular problems in realizing the planned project effects.

(2) Implementation Schedule for Additional Project Scope

Procurement procedures began in December 1996 for the construction of the pipeline, an addition to the project scope, and the provision of gas to the Bakhrabad was started in June of 1997. Contracts were signed in December of 1997 for conducting production studies and repairs on existing wells, and these contracts were concluded in September of 1998. At the time of approving the additional project scope there were no particular delays in carrying out the project within the range of the planned schedule.

2.1.3 Project Cost

Total costs for this project came to around 1.9 billion yen, which was a roughly 130 million yen, or 7%, cost overrun. The cost overrun was due primarily to the financial burdens of the expanded project scope. The portion covered by the ODA loan saw a cost underrun of approximately 100 million yen, 12% (including the expanded scope section). A decrease in the number of consultant M/M, lower prices due to increased international competition for contracts for financing and providing and installing equipment were some of the reason cited for the cost underrun.

2.1.4 Implementation Scheme

(1) Executing Agency

Bangladesh Gas Fields Company Ltd. (hereinafter referred to as BGFCL) was the executing agency. BGFCL was established in June of 1980 under Petrobangla, a wholly owned state-run oil and gas company. BGFCL has carried out development, management and production at not only the Bakhrabad and Feni Gas Field, but at other major fields in the country such as Titas and Habiganj.

Petrobangla falls under the jurisdiction of Bangladesh's Ministry of Energy and Mineral Resources, and has eight units in addition to BGFCL working in the areas of prospecting, production and supply.

(2) Consultants

This project employed consultants for overall construction supervision and handling individual technical problems. Canadian consultants were hired to supervise procurement and execution. BGFCL reported that there were no particular problems in terms of the performance of these consultants.

Engineering consultants were hired in a total of six lots. Consultants were hired from Germany, Malaysia and other locations, and BGFCL reported that there were no particular problems in terms of the services they provided.

(3) Contractors

Construction in this project included infrastructure development in the areas surrounding the Bakhrabad and Feni Gas Fields, the drilling of FN-2, workovers of BK-4 and BK-5, and the construction of a pipeline from BK-9.

BGFCL used its own financing to hire local consultants for the infrastructure development in the areas surrounding the Bakhrabad and Feni Gas Fields. Furthermore, BGFCL used its own funds to hire BAPEX to dig well FN-2 and workover wells BK-4 and BK-5 under the control of BGFCL and its consultants. There were no particular problems in the execution of the various construction projects, except for some damage to equipment during the drilling of well FN-2 which resulted in a delay of about six months to make repairs.

(4) Suppliers of materials and equpiment

Necessary materials and equipment were procured for the drilling and completing of well FN-2, the workover of wells in the Bakhrabad Gas Field and the construction of ground facilities at the Feni Gas Field. Equipment and materials were provided by suppliers in Singapore, America, England, Japan and other countries in a series of 21 lots. There were no particular problems reported in terms of procurement.

2.2 Evaluation on Operations and Maintenance

BGFCL was responsible for the management of project operations and maintenance, excluding the pipeline from BK-9, which was part of the expanded scope. The Bakhrabad Gas System Ltd. (hereinafter referred to as BGSL) was in charge of managing operations and maintenance of this pipeline project.

2.2.1 Operational Scheme and Performance

Management of production in the Bakhrabad and Feni Gas Fields is performed by the management offices[17] at each field. Data on gas production amounts, wellhead pressure and other information is collected for each well by the management offices and used to make decisions on gas production amounts. This information is also periodically provided to Petrobangla. Whenever there is some irregularity, such as changes in wellhead pressure or increases in the production of sand and water, Petrobangla may issue instructions to restrain production or take other actions. In this manner it appears that there is a good system of cooperation with Petrobangla. Taking into consideration the tight supply and demand situation with the overall Bakhrabad Franchise Area, Petrobangla has been issuing instructions for controlling total production at each gas field (setting upper and lower limits for total production).

A control room near the Bakhrabad Gas Field constantly monitors the status of the moisture removing plants and other major electrical machinery within the field. This control room has a system in place to contact BGFCL whenever there is a fault or abnormality with the equipment.

2.2.2 Maintenance Scheme and Performance

Maintenance of the Bakhrabad and Feni Gas Fields is performed by the staff stationed at the management offices located at each field. Each management office submits budget requests for necessary maintenance expenses every year to the Operation and Maintenance Division of BGFCL in Dhaka. Budget is then distributed to each management office after being reviewed by the BGFCL head office. Each management office enforces the approved budget. Currently 22 staff members have been assigned to the Bakhrabad Gas Field where five wells[18] are in operation.

The amounts of produced sand and water, as well as wellhead pressure, are periodically measured for each well in the Bakhrabad Gas Field in order to monitor production conditions. According to BGFCL, the drop in production at the Feni and Bakhrabad Gas Fields was due to a main underground gas layer being exhausted, as opposed to any problems in terms of maintenance and operations[19].

Production was halted at the Feni Gas Field in 1998 as the amount of gas located here was almost completely exhausted. Among the equipment and materials no longer being used at the Feni Gas Field, Petrobangla determined that the moisture removing plant could still be used, and had the plant moved to the Beanibazar Gas Field in 1998 where it is now being used.

BGSL prepared the pipeline from the Meghna Gas Field, which was part of the expanded

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17 Production at the Feni Gas Field has currently been halted, and the above ground equipment has already been moved to another gas field and so is no longer being managed at the Feni Gas Field.

18 Wells from BK-1 to BK-8, but excluding BK-4, -5 and -6. Production at wells BK-4, BK-5, and BK-6 were halted in 1997, 1998 and 1998 respectively.

19 For some of the wells in the Bakhrabad Gas Field, especially BK-3 and BK-4, there was a drop in wellhead pressure from 1993, and continued production under an increased burden could have shortened the production life of the wells.

project scope. Petrobangla reported that there were no particular problems in the maintenance and management of this pipeline.

2.2.3 Financial State of Executing Agency

The financial state to BGFCL, the executing agency, is as explained below.

The natural gas sector makes a large contribution to the national exchequer. In 1997 BGFCL paid 7.573 billion Taka to the government, or 89% of its sales, in the form of value-added tax, supplemental tax, corporate tax and other contribution to the national exchequer. The financial state of BGFCL itself is generally good. Its liquidity ratio and fixed assets and liabilities to long term capital ratio are both stable. BGFCL's interest coverage ratio is high and there is no problem with its ability to make payments over both the near and long-term. BGFCL's main problems are the low gas charges and its large amounts of accounts receivable. The company is able to produce earnings, but profit ratios are low. Customers are all group affiliate companies and so there is a large amount of accounts receivable, and the trend has been toward prolonging the periods for the turnover of receivables.

Low gas charges have been set within the Petrobangla group. This combined with a high rate of value-added taxes and supplementary taxes means that BGFCL has a weak earnings structure and a delicate financial situation. The Petrobangla group has been posting a profit in recent years, but the World Bank is predicting that the group will post a loss of around $1.2 million both in 2000 and 2001. In order to avoid this situation, the World Bank has suggested that gas rates will need to be raised by at least 40% for two years. At the rate revision in December 1998, rates were increased only 15%, and so a further increase is still necessary. It is also thought that preferential corporate taxes and other measures could help to improve the earnings of the Petrobangla group. 65% of all earnings for the Petrobangla group are paid to the government.

Table 2-1 Balance Sheet (Unit: million Taka)

Assets	97—98	96—97
Current assets	4,866	3,754
(trade receivables)	3,528	2,640
(inventories)	118	110
Fixed assets	6,051	6,725
Total assets	10,917	10,479

Liabilities, equity and reserves	97—98	96—97
Current liabilities	3,052	2,618
Fixed liabilities	1,861	2,163
Capital	6,004	5,689
(surplus funds)	2,502	2,331
Total liabilities, equity and reserves	10,917	10,479

Table 2-2 Statements of Income (Unit: million Taka)

	97—98	96—97
Turnover	8,484	8,089
Value-added tax, complementary tax	6,924	6,488
After tax turnover	1,560	1,601
Operating expenses	613	609
Operating income	947	992
Non-operating income	222	205
(interest received)	200	186
Non-operating expenses	306	344
(interest paid)	111	106
Ordinary profit	863	853
Reserve for WPF*	43	43
Before-tax profit for the current term	820	810
Reserve for corporate tax	328	324
After-tax profit for the current term	492	486
Carry-over profit for previous term	2,176	2,021
Payment earmarked to the Government	321	331
Carry-over profit for next term	2,347	2,176

*Workers Participation Fund

Table 2.3 Main Financial Indicators

	97—98	96—97
Return on total assets	4.5%	4.6%
Return on sales	5.9%	6.0%
Total asset turnover	0.78	0.77
Current ratio	159.4%	143.4%
Stockholder's equity ratio	55.0%	54.3%
Ratio of fixed assets and liabilities to long-term capital	76.9%	85.6%
Accounts receivable to monthly sales	5.0 months	3.9 months
Interest coverage ratio	10 times	11 times

2.2.4 Environmental and Social Impact

BGFCL and Petrobangla reported that there were no noticeable negative impacts on the environment or society due to this project.

2.3 Project Effects and Impacts

2.3.1 Quantitative Effects

Daily production of natural gas from the Bakhrabad Franchise Area following the completion of this project is as shown in the table below.

Table 2-4 Average Gas Daily Production

(Unit: MMSCFD)

	FY1994/1995*	FY1995/1996	FY1996/1997
Overall Bakhrabad Franchise Area	150	152	108
Target well of this project (BK4,5,FN-2)	35	32	13

*Production after the supply from the project was realized.

The direct effects of the ODA loan were measured by the increase in the gas supply planned by this program (increased production from BK-4, BK-5 and FN-2). This project was established with the aim of lending urgently needed support for the supply of gas from the Bakhrabad Franchise Area for the period from December 1994 to May 1996[20] when the A-B gas pipeline was established.

Therefore, this period was the period for realizing the project results.

Gas production at the Bakhrabad Franchise Area during the relevant period for this project was 152MMSCFD, with the wells covered by this project accounting for 37MMSCFD, or 24% of the total.

At the time of the appraisal it was determined that the supply-demand gap for the Chittagong area would have expanded in the manner shown in the table below if this project was not enacted.

Table 2.5 Comparison of Gas Supply and Demand Estimates for the Chittagong Area (Bakhrabad Franchise Area) and Actual Results (Unit: MMSCFD)

	Estimates					Actual	
	Demand Estimates (average)	Supply		Supply-Demand Gap		Overall Bakhrabad Franchise	Wells covered by this Project
		If project is not implemented	If project is implemented	If project is not implemented	If project is implemented		
FY94/95	202	118	133	-84	-69	150	35
FY95/96	202	95	204	-107	2	152	32
FY96/97	203	68	196	-135	-7	108	13

[20] Completion of the A-B gas pipeline was actually delayed until May 1997.

There was a gas shortage as the drop in gas production in the Bakhrabad Franchise Area was larger than initially projected and the completion of the A-B pipeline was delayed. This shortage forced many factories in the Chittagong area to temporarily halt operations, and suspension of operations by some major gas users became unavoidable. The 75MMSCFD initial daily production target for the three wells was not reached after the implementation of this project. Still, it has been said that this project contributed to easing the supply-demand gap and helped to lessen the negative impact on the industrial activities of the Chittagong economic area.

Production amounts for the Bakhrabad and Feni Gas fields could not be obtained during the project planning phase. However, during the appraisal stage a sufficient study and analysis of the gas field development plan was made (recoverable reserves, gas level characteristics [geological structures, thickness of gas deposit layers, distribution], past production, pressure behavior, gas production capabilities). The result was that the projected amount could not be obtained during the production stage, but this is seen as an unavoidable risk when drilling for a resource such as natural gas.

As mentioned above, the end result following this project was an actual drop in the production. Still the project can be appreciated for the following reasons: 1) it contributed to alleviating the supply-demand gap for the period between December 1994 and June 1996, and 2) the Interim Monitoring Mission dispatched by JBIC and the SAPI showed that the best policies for increasing production had been selected.

2.3.2 Qualitative Effects

This project helped to realize stable production at the gas fields and made it possible for the executing agency to improve its monitoring skills.

Studies of production conditions and repairs (re-perforation) were made for existing wells in the Bakhrabad Gas Field from January 1998 to August 1998 as part of the expanded project scope. Through this service the productions conditions at each well[21] were studied and re-perforation was performed when necessary. This made it possible for each well to produce gas by the most appropriate method.

This project introduced stable production methods for the target wells. The introduction of these methods will likely be recognized as helping to provide stable production and longer well life for the overall Bakhrabad Gas Field.

Furthermore, such technology transfers have likely helped BGFSL to accumulate expertise on methods for stable production of underground gas. BGFCL is currently using this expertise to perform periodic monitoring of wellhead pressure and the amount of water and sand produced in the target wells. It is also very likely that this expertise is being shared with other gas fields. In this manner it can be said that this service is tied to BGFSL's capacity building.

[21] BK-1, 2, 3, 7 and 8 were targeted wells.