

STUDY OF CNG STATION BUSINESS MODEL

**Md. Tariqul Islam
ID#040413003P**

**Submitted for partial fulfillment of the Degree
of Master in Petroleum Engineering**

**Department of Petroleum and Mineral Resources
Engineering
Bangladesh University of Engineering and Technology**

CANDIDATE'S DECLARATION

It is hereby declared that this project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

Signature of the Candidate

(Md. Tariqul Islam)

RECOMMENDATION OF THE BOARD OF EXAMINERS

The project titled "STUDY OF CNG STATION BUSINESS MODEL" submitted by Md. Tariqul Islam, Roll Number--040413003(p), Session: April' 2004, has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Master of Engineering in Petroleum Engineering in 28, April, 2010 .

1. Dr. Mohammad Tamim
Professor and Head
Department of Petroleum and Mineral Resources Engg.
BUET, DHAKA.
Chairman
(Supervisor)

2. Dr. Mohammad Mahabbubur Rahman
Assistant Professor
Dept. of Petroleum & Mineral Resources Engg.
BUET, DHAKA.
Member

3. Mohammad Sohrab Hossain
Lecturer
Dept. of Petroleum & Mineral Resources Engg.
BUET, DHAKA.
Member

Date: 28, April, 2010

**Dedicated to my beloved father and respected teachers
of Petroleum Engineering Department**

TABLE OF CONTENTS

| | Page |
|--|-------------|
| Acknowledgement | ix |
| Acronyms and Abbreviations | x |
| Abstract | xi |
| CHAPTER -1 INTRODUCTION | |
| 1.1 Background and present status | 01 |
| 1.2 Objectives with specific aims and possible outcome | 02-03 |
| CHAPTER -2 CNG MARKET ANALYSIS | |
| 2.1 Role of Government in Promoting CNG Station | 04-05 |
| 2.2 CNG Refueling Guideline 2001 | 05-06 |
| 2.3 The project | 06 |
| 2.4 Use and Users | 06 |
| 2.5 Advantage of CNG over petrol/diesel | 06-07 |
| 2.6 Estimation of demand | 07-09 |
| 2.7 Existing Position of CNG | 09 |
| 2.8 Pricing | 09 |
| 2.9 Quality control | 09 |
| CHAPTER-3 PROJECT ANALYSIS | |
| 3.1 Production capacity | 11 |
| 3.2 Servicing process | 11 |
| 3.3 Technical know-how and assistant | 11 |
| 3.4 Land and location | 12 |
| 3.5 Building and other civil works | 12 |
| 3.6 Machinery and equipments | 12 |
| 3.7 Erection and installation | 13 |
| 3.8 Raw materials | 13 |
| 3.9 Utilities | 13-14 |
| 3.10 Repair and maintenance | 14 |
| 3.11 Safety provision | 14 |

| | |
|--|-------|
| 3.12 Pollution problem | 14 |
| 3.13 Personal and labor | 15 |
| 3.14 Schedule of construction | 15 |
| 3.15 Cost of the project | 16 |
| 3.16 Means of finance | 16 |
| 3.17 Capital structure | 16 |
| 3.18 Financial evaluation | 16-17 |
| 3.19 The profitability forecast | 17 |
| 3.20 Debt Service Coverage Ratios | 18 |
| 3.21 Break-even analysis | 18 |
| 3.22 Cash flow statement | 18 |
| 3.23 Projected Balance Sheet | 18 |
| 3.24 Financial Rate of Return | 19 |
| 3.25 Summary of the project | 19 |
| 3.26 Sensitivity of the project | 20 |
| 3.27 Case study | 20-21 |
| 3.28 Net present value | 21-24 |
| 3.29 Calculation of IRR | 25 |
| | |
| CHAPTER -4 CONCLUSION AND RECOMMENDATIONS | |
| 4.1 Conclusion | 26 |
| 4.2 Recommendations | 26 |
| | |
| References | 27 |

List of Tables

| | |
|---|----|
| Table-1.1 Rated capacity of the station | 02 |
| Table 2.1 Estimation of demand for CNG Refueling Service | 08 |
| Table 2.2 Projection of CNG requirement | 08 |
| Table 2.3 Input and output Price | 09 |
| Table 3.1 Total cost of the project | 10 |
| Table 3.2 Capacity of the station | 11 |
| Table 3.3 Raw materials quantity | 13 |
| Table 3.4 Quantity of fuel | 14 |
| Table 3.5 The aforesaid cost is proposed to be financed as under | 16 |
| Table 3.6 Profitability | 17 |
| Table 3.7 Debt-service coverage ratio worked out | 18 |
| Table 3.8 NPV at usual condition | 21 |
| Table 3.9 NPV at 10% increase in production cost | 22 |
| Table 3.10 NPV at 10% decrease in sales | 23 |
| Table 3.11 NPV at 5% increase in production cost and 5% decrease in sales | 24 |
| Table 3.12 summary of economic parameters | 25 |

List of Figures

| | |
|---------------------------------|----|
| Figure 3.1 Servicing flow-chart | 11 |
|---------------------------------|----|

Annexures

| | | |
|--------|---|-------|
| I. | Fixed cost of the project | 28-29 |
| II. | Detail of building and other civil works | 30 |
| III. | List of machinery to be imported | 31 |
| IV. | List of local machinery and equipment | 32 |
| V. | List of furniture and fixture | 33 |
| VI. | Projected construction time | 34 |
| VII. | Forecast earning | 35 |
| VIII. | Sensitive analysis | 36 |
| IX. | Sensitive analysis | 37 |
| X. | Sensitive analysis | 38 |
| XI. | Revenue estimate | 39 |
| XII. | Operational Cost of CNG Sold | 40 |
| XIII. | Assumptions | 41-43 |
| XIV. | General, Administrative and Selling Expenses | 44-45 |
| XV. | Estimate of financial Expenses and Repayment schedule | 46-48 |
| XVI. | Break Even Analysis | 49 |
| XVII. | Projected Fund Flow Statement | 50-51 |
| XVIII. | Financial Rate of Return | 52-53 |

Acknowledgement

I wish to express my deeper appreciation and gratefulness to Dr. Mohammad Tamim, Professor, Department of Petroleum and Mineral Resources Engineering, for his very much liberal attitude, unforgettable guidance, encouragement, supervision and endeavors throughout the work.

I am also grateful to Dr. Mahbubur Rahman, Associate Professor, Department of Petroleum and Mineral Resources Engineering, for his guidance, inspiration and valuable suggestions for this work.

I would like to thank my managing director, Engr. Md. Shafiul Azam , Engr. Ali Asharf, Engr. Sarwar and also thank my office colleagues for providing assistance to edit this report.

Acronyms and abbreviations

| | |
|-------|---|
| CNG | Compressed Natural gas |
| MMCM | Million cubic meter |
| SCF | Standard cubic feet |
| LPG | Liquefied petroleum gas |
| RPGCL | Rupantarita Prakritik Gas Company Limited |
| DOE | Department of Environment |
| NBR | National Board of Revenue |
| DCFP | Dhaka Clean Fuel Project |
| FRR | Financial Rate of Return |

Abstract

One of the main environmental issues of Bangladesh is high concentration of visible and non-visible pollutants emitted by vehicles in metropolitan Dhaka and other urban areas contributing to the country's air pollution. Pollution free environment is a burning issue of a country. At present clean and pollution free fuel is widely adapted all over the world. CNG is a clean fuel and replacing the use of gasoline gradually. Bangladesh is introducing CNG fuel all over the country. Bangladesh oil, gas and Mineral Corporation (Petrobangla) first launched a pilot project on CNG in Bangladesh during the period 1981-1982. On the successful completion of another project during 1983-1985, a company named "Compressed Natural Gas Company Limited" was formed in 1987 as a subsidiary of Petrobangla. The name of the company was then changed to "Rupantarita Prakritik Gas Company limited" (RPGCL) in 1999. This company installed (four CNG Refueling stations and 1(one) vehicles conversion workshop in Dhaka City during the period of 1995-1997.

The study has been undertaken to determine total investment requirement of a standard CNG business model and to locate its suitable place with financial feasibility study and thereby to determine minimum CNG volume sale and minimum amount of land and investment requirement for both private land and leased land.

CHAPTER -1

INTRODUCTION

1.1 Background and present status

In 1982 Petrobangla started a pilot project with the financial assistance of World Bank and thereby setup a CNG filling station and a conversion workshop. In order to reduce the consumption of liquid fuel and to save foreign currency, in 1987 Petrobangla established a company named RPGCL and in 1997 with the financial assistance of the Bangladesh Government, four CNG filling stations were setup in the premises of four existing petrol pumps. Consequently in 2002 another six CNG filling stations were setup with Government fund and CNG related machineries (Compressor, Cylinder kits etc) were given duty free facilities for import. Now 500 CNG filling stations are running in different districts of the country and out of that there are 123 in Dhaka, 28 in Narayangonj, 29 in Savar, 9 in Manikgonj, 7 in Gazipur, 9 in Tangail, 1 in Jamalpur, 4 in Mymensingh, 3 in Monshigonj, 30 in Norshindi, 4 in Kishorgonj, 3 in Brakhmanbaria, 59 in Comilla, 2 in Chandpur, 2 in Lakhmipur, 5 in Noakhali, 13 in Feni, 61 in Chittagong, 29 in Sylhet, 5 in Moulivibazar, 2 in Habigonj, 19 in Bogura, 6 in Pabna, 1 in Sirajgonj. again Out of 500 stations, 62 stations are in Government land and total Number of different CNG vehicles is 188034 and the average CNG consumption per month from the 500 CNG stations is 34.51 MMCM and 313.3crore BDT is there by saved per month (Monthly report, Feb, 2010,RPGCL).

The project will undertake to determine the present demand of CNG filling stations. It will also look into the investment requirement, Cost analysis and feasibility study of an individual CNG filling station.

1.2 Objectives with specific aims and possible outcome:

- (a) To determine investment requirement of a standard filling station.
- (b) To locate the best suitable place for a CNG filling station with financial feasibility study.
- (c) To conduct cost analysis and to determine minimum CNG volume sale.
- (d) To determine minimum amount of land and investment requirement in case of private land and leased land.
- (e) Sensitivity Analysis.

1.2.1 Investment Requirement

The investment being the part of cost of necessary approval of different organizations, project land, building and machinery cost and cash deposit for gas and Bank Guarantee (in case of loan) varies on location and machineries. If the location is in a city then cost of the project will be higher due to high price of project land.

1.2.2 Amount of land for different location:

Beside highway or local region the land is generally 20 katha and in case of Dhaka city the minimum amount of land is 6 katha which was decided by the CNG one stop committee (Minutes of the CNG committee meeting held on August, 2008) headed by a joint secretary of energy ministry.

1.2.3 Production Capacity

The annual filling capacity of the project, on the basis of 20 hours operation per day and 360 working days in a year of three different capacities of compressors is shown in Table 1.1

Table 1.1 Rated capacity of the station

| I t e m s | | Yearly filling at rated capacity |
|-----------|-------------------------------------|----------------------------------|
| A) | CNG fueling =250 m ³ /hr | 1800000 m ³ |
| B) | CNG fueling =530 m ³ /hr | 3816000 m ³ |
| C) | CNG fueling =750 m ³ /hr | 5400000 m ³ |

The present study will consider a CNG business model that will be operated with a Compressor of capacity of 530 m³/hr and project land of 20 katha (33 decimals).

1.2.4 Different cost parameters of the project

- 01 land, land registration and development
- 02 Building
- 03 Plant and Machinery
- 04 Local Machinery
- 05 Erection and Installation (including security deposit, drawing etc)
- 06 Furniture, fixture and equipments
- 07 Safety equipments
- 08 Consultant's fee
- 09 Pre-operating expenses
- 10 Contingency
- 11 Interest during construction period
- 12 Working capital

The amount of the project cost varies for location of project land, construction design of project building and machineries etc.

CHAPTER-2

CNG MARKET ANALYSIS

One of the main environmental issues of Bangladesh is high concentration of visible and non-visible pollutants emitted by vehicles in metropolitan Dhaka and other urban areas contributing to the country's air pollution. The air pollutants emitted from vehicles include `particulateø which, together with lead and sulfur, are considered to be the most harmful components of vehicle exhaust in terms of their effect on the environment and human beings. In Bangladesh illness like chronic bronchitis, asthma, lung ailments etc have increased along with the number of vehicles.

In addition to emissions, the combustion of gasoline and diesel fuel results in tailpipe emission of many harmful compounds like benzene and 1, 3 butadiene that are not only toxic but also react in the atmosphere to form photo-chemical smog which is also a leading health concern. This creates health hazards and the people mostly the child, the infant and the old have to always prey to various type diseases infecting lung and brain.

Pollution free environment is a burning issue and clean and pollution free fuel is widely adapted all over the world. CNG is a clean fuel and replacing the gasoline use gradually. Bangladesh is introducing CNG fuel all over the country which is an abbreviation of compressed natural gas. It is compressed up to 3600 Psig and stored at high pressure to apply as fuel in vehicles. For the convenient of storage, carrying and usage, natural gas is transferred to CNG which in fact increases the fuel intensity of gas.

2.1 Role of Government in Promoting CNG Station

To address the environmental problem, the government of Bangladesh has undertaken a massive program including the public and the private sectors to introduce a clean alternative fuel. As a first step, the government has banned the use of two stroke scooters, mishuk and tempos and has introduced CNG based scooters, taxi cab, private cars in Dhaka City. Condition has been imposed in the import of car and Jeep with catalytic and CNG radio control set. The Government has exempted customs

duty, sales tax and VAT on CNG machinery and has withdrawn tax from CNG kit and equipment.

To make wide use and availability within the reach of the people, the Government has been giving various fiscal and institutional supports to the importers of CNG vehicles. Duty free import has been allowed at soft terms and conditions.

The Banks are also giving priority in respect to providing financial assistance in procurement of CNG based vehicles as well as for setting up of CNG refueling stations and CNG conversion workshops.

2.2 CNG Refueling Guideline 2001

In order to promote CNG uses, the government in August 2001, has also adopted a guideline for installation, Operation and Maintenance of CNG Refueling Station and Conversion workshop under Private sector including joint venture. Some of the key elements of the guideline are given below:

- a) Investor shall directly apply to RPGCL for registration / permission enclosing document, relating to Trade Licenses, T.I.N. work and layout plans. Technical Human resources, source of procurement of kits, cylinders and machinery.
- b) After, permission of RPGCL, the Inspector of Explosive shall issue licenses in favor of the Investor if they can ensure that the machinery to be imported will be New Zealand / European/USA/Canadian Standard.
- c) In case of installation of conversion workshop, the exhaust of converted vehicles must be within the accepted limit as prescribed by the Department of Environment (DOE)
- d) The Chief Inspector of Explosives shall issue no objection certificate for importing kits, Cylinders and machinery.
- e) Ministry shall issue duty free import permit for National Board of Revenue (NBR) provided that RPGCL and chief Inspector of Explosive issued Registration / Permission and License in favor of the Investor.

- f) GOB or the appropriate authority shall fix the prices of feed gas.
- g) During the execution of installation work and also during normal operation, RPGCL will visit the site from time to time for ensuring quality, safety and standards.
- h) RPGCL shall provide all necessary technical support and advice, if necessary.

2.3 The project

In the present day, the extent or presence of source/deposit of fuel speaks of the degree of development of a nation. The Sponsor of the proposed project envisages setting up of a multiple motor vehicle service plant to provide compressed natural Gas (CNG) refueling services to the CNG based vehicles.

2.4 Use and Users

CNG has multiple uses in the country. At present, it is widely used by the automobile vehicles. But in the near future it will be used in industrial sector for production purpose, household sector for cooking, power-sector for generating electricity as an alternative means of fuel. The main users of CNG are various types of automobile vehicles, such as, taxi cab, 4stroke-three wheeler, bus and mini bus. Besides, at present other automobiles which are running on petrol/diesel will also be the users of CNG after conversion of their fueling system from petrol/diesel to CNG. Besides, water transports are expected to be the users of CNG in near future.

2.5 Advantage of CNG over petrol/diesel

Bangladesh is a Country which has significant natural gas resource in its territory. Introduction of CNG in the country's transport sector may be termed as a breakthrough in the economy of Bangladesh because it is cost effective over the traditional fuelling system of petrol and diesel. The transformation of natural Gas into CNG and its multipurpose uses have already been proved effective from commercial point of view. In short, the advantages of CNG over petrol/diesel may be highlighted as below:

- The cost of CNG is much lower, i .e, one fourth of the cost of petrol/diesel and increases the air quality of urban areas;
- CNG is Sulfur and lead free and hence it is friendly to environment;
- CNG as an import substitute will reduce dependency on imported automotive diesel and gas line fuel and will ensure regular supply of fuel from local source. As a result, foreign currency will be saved;
- Use of CNG will enhance profit due to less operating cost, etc.
- Due to its multiple advantages over traditional fueling system, at present Government has decided not to export natural gas.

2.6 Estimation of demand

The demand for CNG refueling services has been estimated on the basis of some assumptions based on empirical data collected from the users as mentioned below:

- (a) At present 100% auto Rickshaw, 90% taxi cab and 10% of the other vehicles are based on CNG(RPGCL AGM 2009),
- (b) Each Auto Rickshaw requires 30 m³, Cab / motor cars requires 50 m³, bus requires 70 m³ and, CNG daily on an average;
- (c) 330 working days on an average in a year are considered for the operation of vehicles; and
- (d) Each year 10% of the total vehicles are converted from petrol into CNG fueling system.

Considering the above assumptions, demand for CNG has been estimated as shown in Table 2.1

Table 2.1 Estimation of demand for CNG Refueling Service (BRTC Annual report 2008)

| Types of Vehicles | 2004-05 | 2005-06 | 2006-07 | CNG demand (Million m ³) 2006-07 |
|----------------------------|-----------------------|-----------------------|-----------------------|--|
| | Number of vehicles | Number of vehicles | Number of vehicles | |
| 1. Motor Cars | 600926 | 606936 | 613005 | 1011.16 |
| 2. Jeep/St. wagon/Microbus | 38020 | 38400 | 38784 | 63.97 |
| 3. Taxi | 10873 | 11961 | 12089 | 164.67 |
| 4. Bus/Mini bus | 30560 | 10866 | 31174 | 71.99 |
| 5. Truck | 52400 | 53429 | 53963 | 0 |
| 6. Auto Rickshaw | 94830 | 95788 | 96737 | 956.87 |
| 7. Others | 16953 | 17123 | 17941 | 28.53 |
| Total = | 834503 | 844562 | 863693 | 2397.19 |

It is seen from Table 2.1 that the estimated demand for CNG services has been worked at 2397.19 Million m³ and the conversion demand for changing fueling system has been estimated at 863693 vehicles in the year 2007. The future demand for CNG is positively related with the growth of number of vehicles. The average growth of vehicles during the period from 2005 to 2007 was 14%. Based on this growth rate, the projection of CNG requirement has been estimated and shown in Table 2.2

Table 2.2 Projection of CNG requirement

| Year | CNG demand (Million m ³) |
|------|--------------------------------------|
| 2008 | 2389.07 |
| 2009 | 2484.64 |
| 2010 | 2733.10 |
| 2011 | 2842.42 |
| 2012 | 3126.67 |

The present, demand for CNG has been estimated at 2397.19 Million m³ in 2007 which is expected to rise 3126.67 Million m³ in the year 2012.

2.7 Existing Position of CNG

It has been ascertained from Rupantarita Prakritik Gas Company Limited, Dhaka that at present around 500 CNG filling stations are in operation in the country and total number of CNG vehicles is 188034. The demand for CNG refilling stations will be increased while number of vehicles will be increased. But, the existing CNG filling stations are not still able to supply the demand of CNG to the increased numbers of vehicles, especially in the center of Dhaka city.

2.8 Pricing

The government has fixed the procurement price and selling price of CNG. The sponsor will have to procure and to sell CNG at the government fixed price (BERC Annual report, 2009).

Table 2.3 Input and output Price

| Name of the items | Unit price | Proposed price Tk. |
|--|----------------|-----------------------|
| Natural Gas (Purchase from Government) | m ³ | 9.97 |
| CNG (Selling price) | m ³ | 16.75 |

2.9 Quality control

CNG would be stored in the conversion kits of vehicle engines through sophisticated and mechanized process. The unit has been designed and equipped to provide quality services to the customer's demand. Besides, the machinery of the unit would be imported and it would also be installed and operated under the supervision of skilled technical personnel and engineers. So, the quality of CNG is expected to be ensured.

CHAPTER -3
PROJECT ANALYSIS

The proposal envisages setting up of a CNG station business model at a place beside a highway. The project will be equipped with new brand compressor combined packages. After implementation of the project, it will create job opportunity for 32 persons of different grades and categories. The total fixed cost of the project (NAVANA CNG Limited Annual report, 2008) has been estimated at Tk. 579.43 lac as shown in Table 3.1

Table 3.1 total cost of the project

(-0000Taka)

| Sl. No. | Description | F/C equivalent Tk.* -0000 | Cost in L/C Tk.* -0000 | Total Tk.* -0000 |
|---------|---|------------------------------|---------------------------|---------------------|
| 01. | 33 decimals land, land registration and development cost | 0 | 15052 | 15052 |
| 02. | Building | 0 | 8836 | 8836 |
| 03. | PlantandMachinery | 14840 | 666 | 15506 |
| 04. | Local Machinery | 0 | 11150 | 11150 |
| 05. | Erection and Installation (including security deposit, drawing etc) | 0 | 3928 | 3928 |
| 06. | Furniture, Fixture andEquipment | 0 | 450 | 450 |
| 07. | Safety equipment | 0 | 100 | 100 |
| 08. | Consultant's Fee | 0 | 200 | 200 |
| 09. | Pre-operating Expenses | 0 | 615 | 615 |
| 10. | Contingency | 0 | 445 | 445 |
| 11. | Interest during construction period | 0 | 1661 | 1661 |
| | Total Fixed Cost | 14840 | 43103 | 57943 |
| 12. | Working capital | 0 | 193 | 193 |
| | Total cost of the project | 14840 | 43296 | 58136 |

3.1 Production Capacity

The annual filling capacity of the project, on the basis of 20 hours operation per day and 360 working days in a year is as follows:

Table 3.2 Capacity of the station

| I t e m s | | Yearly filling at rated capacity |
|-----------|------------------------|----------------------------------|
| a) | CNG fueling =530 m3/hr | 3816000 m3 |

3.2 Servicing Process

The servicing process for business model is very simple which is well known technology in our country.

The detailed servicing process /flow-chart is shown as under (Figure 3.1):

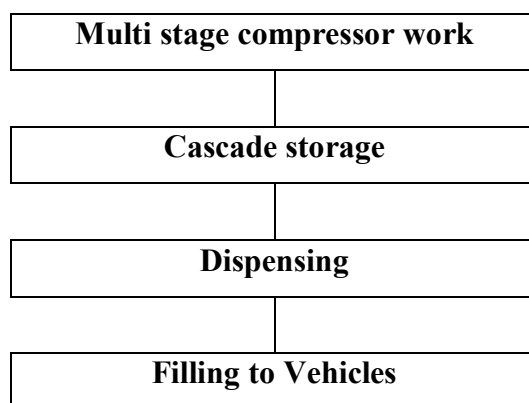


Figure 3.1 Servicing flow-chart

3.3 Technical Know-how and Technical Assistance

The technology involved in CNG business model is already available in the country. The sponsors themselves are experienced in operating CNG fuel and filling station and will recruit necessary technical personnel for smooth operation of the unit.

3.4 Land and Location

The project has been proposed to be located at a place beside highway. The project land measures 33 decimals and for the entrance and exit of the vehicles, the front land of the project has been taken on lease from Roads and High ways department for 15 years on renewal basis. The rent of the land per month has been determined at the rate Tk. 1000.00. The sponsor has already paid an amount of Tk. 0.12 lac. The value of 33 decimals of land has been considered at Taka 120.00 lac, Tk. 20.40 lac for registration and transfer and for the development of the project land Tk. 10.00 lac has been estimated (shown in Annexure-I). All required infrastructural facilities like gas, power, communication etc. are available at project site.

3.5 Building and other civil works

The civil construction of the project will comprise office building, sales center, rest room, compressor room, RMS room, cascade storage, sub-station room, generator room, toilet, prayer room, meter room, fast food shop and other civil works. The total cost of the civil works has been estimated at Tk. 88.36 lac (details shown in Annexure-II).

3.6 Machinery and equipment

(a) Imported Machinery

The project will be equipped with brand new machineries and equipment. Machineries and equipments for CNG refueling will be imported from abroad. The complete range of imported machineries include new brand compressor, automatic dispensers with direct line, recommended spare parts, air compressor for pneumatic system, high pressure gas piping and electrical cables. The total price of the machineries and equipment to be imported has been estimated at US\$ 2,12,000.00 equivalent to Tk.148.40 lac (@1 US\$ = Tk. 70.00) and other duties 4.5% equivalent to Tk.6.66 lac totaling Tk.155.06 lac (details shown in Annexure-III).

(b) Local Machinery

In addition to the imported machinery, the project will require some local machineries and equipment which are sub-station equipment, Tube, fittings, Generator, tube well etc. cost of which has been estimated at Tk. 111.50 lac (details shown in Annexure-IV).

3.7 Erection, Installation and Security

Erection, installation, test operation and commissioning will be carried out by local erectors under the overall guidance and supervision of experts to be deputed by the supplier of machinery. The supplier shall send design, construction team and technical service team for this purpose. An amount of Tk. 39.28 lac (Table 3.1) has been estimated for the purpose of erection, installation and security (details shown in Annexure-I).

3.8 Raw Materials

The requirement of raw materials at attainable capacity based on 20 hours per day and 360 days in a year is shown as under

Table 3.3 Raw materials quantity

| Sl.No. | Items | Unit | Yearly quantity m3 | Source |
|--------|--------------|------|--------------------|--------|
| a. | Natural gas: | m3 | 3816000 | Local |

3.9 Utilities

(i) Power

The maximum requirement of power for the project has been estimated at 125 KW, The connected load will be 150 KW. For emergency supply of power a generator has been considered for the project, cost of which is included in local machinery. On the other hand, a substation equipment has been considered for the project, cost of which has been included in local machinery.

(ii) Water

The entire requirement of water will be met by project's own tube-well to be sunk in the premises of the project. The project will also require one underground water reservoir. The cost of this item has been considered in the civil cost of the project.

(iii) Fuel and Lubricant

The project will require the following items annually

Table 3.4 Quantity of fuel and lubricant

| Item | Yearly quantity |
|-----------------|-----------------|
| Grease | 100 Kg |
| Lubricating Oil | 350 ltr. |

3.10 Repair and maintenance

Repair and maintenance cost has been estimated 0.50%, 1.00%, 1.50% & 2.0% of machinery cost during the first 4 years of operation. The repair and maintenance cost of building has been estimated at 0.5% of building cost per annum. The requirement of store spares has been estimated at 0.50% and 1% of machinery cost for 3rd and 4th year of operation.

3.11 Safety Provision

Adequate safety will be ensured through training and putting cautionary notice at appropriate places. The project will have adequate provision to fight fire hazards for which fire-fighting equipment will be purchased locally. Provision will also be made for procuring first aid medical boxes. In this connection, an amount of Tk. 1.00 lac has been estimated.

3.12 Pollution Problem

The Project will not pose any pollution or waste problem.

3.13 Personnel and Labors

The total manpower requirement for the project during commercial operation has been estimated and category wise personnel requirement have been shown below which will be recruited locally:

A: Technical:

| Designation | Number |
|--------------------|------------------|
| Station Manager | 1 |
| Engineer | 2 |
| Dispenser operator | 8 |
| Mechanics | 2 |
| Electrician | 2 |
| Sub Total : | <u>15</u> |

B: Administrative :

| | |
|------------------------|------------------|
| Store Keeper | 2 |
| Cashier Cum Accountant | 3 |
| Computer Operator | 2 |
| Office Assistant | 2 |
| Security guard | 6 |
| Peon | 1 |
| Sweeper | 1 |
| Sub Total : | <u>17</u> |
| Total : (A+B) : | <u>32</u> |

3.14 Schedule of construction

The project will start commercial operation within 6 (six) months from the date of starting civil works

3.15 Cost of the project

The total cost of the project has been estimated at Taka 581.36 lac including working capital at Taka 1.93 lac. Details of the cost estimates with break-up under different heads are shown in Annexure-I enclosed.

3.16 Means of finance

The breakdown (Bangladesh Shilpa Bank Journal April, 2008) of different financial sources is shown in Table 3.5.

Table 3.5 The afore-said cost is proposed to be financed as under (Tk. in 000)

| Sl.No. | Items | Total |
|--------|---------------------------------------|----------------|
| a) | Term Loans | |
| | - Loans | 33221 |
| | - Interest during construction period | 1661 |
| | Total: | 34882 |
| b) | Equity : | |
| | Sponsor's investment | 23254 |
| | | |
| | Total loans and equity | 58136 |
| | Debt equity ratio : | 60 : 40 |

3.17 Capital structure

The authorized capital of the company will be Tk. 581.00 lac and the paid up capital will be Tk. 232.54 lac.

3.18 Financial evaluation

Profitability potential of the project has been estimated for four years of operation to assess the financial viability of the project. The financial projections include estimation of sales, operating cost, administrative and selling expenses and financial overheads. The statement showing earning forecast is shown in Annexure-VII. The main assumptions of earning forecast are as follows:

- (i) The CNG station project will operate for 360 days in a year and 20 hours per day;

- ii) The capacity build-up has been assumed to be achieved gradually at rate of 75%, 80%, 85%, 90% and 90% in the 1st, 2nd , 3rd, 4th and 5th year of operation and onwards;
- iii) Increment @ 5% per annum has been considered in the calculation of wages and salaries and the amount of bonus is considered to be equal to two months pay;
- iv) Depreciation has been charged on straight line method on the following rates;

| | |
|--------------|-----|
| Building | 5% |
| Machinery | 10% |
| Other assets | 20% |
- v) Economic life of the project has been assumed to be 10 (ten) years without any major replacement.

3.19 The profitability forecast

Details of profitability forecast shown in Annexure VII and its summary is shown in Table 3.6.

Table 3.6 Profitability forecast

| (Taka in '000') | | | | | |
|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Items | 1 st yr. | 2 nd yr. | 3 rd yr. | 4 th yr. | 5 th yr. |
| Capacity utilization | 75% | 80% | 85% | 90% | 90% |
| Sales revenue | 19404 | 20698 | 21992 | 23285 | 23285 |
| Operating profit | 7102 | 8341 | 9519 | 10693 | 12389 |
| Net profit | 4971 | 5839 | 6663 | 7485 | 8672 |

| <u>Ratio:</u> | | | | | |
|---------------------------|-----|-----|-----|-----|-----|
| Gross to sales | 27% | 27% | 28% | 28% | 28% |
| Operating profit to sales | 23% | 23% | 23% | 23% | 23% |
| Net profit to sales | 10% | 11% | 12% | 13% | 15% |

3.20 Debt Service Coverage Ratios (DSCR)

The different cash inflows given in Table 3.7 are shown in Annexure VII, XII and XIV.

Table 3.7 Debt-service coverage ratio worked out (Taka in '000')

| Cash in flow : | 1 st yr. | 2 nd yr. | 3 rd yr. | 4 th yr. | 5 th yr. |
|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Operating profit | 7102 | 8341 | 9519 | 10693 | 12389 |
| Depreciation and write-off | 3371 | 3371 | 3371 | 3371 | 3371 |
| Interest on Term Loan | 3945 | 3604 | 3205 | 2806 | 1104 |
| Total: | 14418 | 15316 | 16095 | 16870 | 16864 |

| Liabilities | 1 st yr. | 2 nd yr. | 3 rd yr. | 4 th yr. | 5 th yr. |
|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Installment on term loan | 1662 | 3324 | 3324 | 3324 | 3324 |
| Interest on Term Loan | 3945 | 3604 | 3205 | 2806 | 1104 |
| Total: | 5607 | 6928 | 6529 | 6130 | 4428 |

| | | | | | |
|-------------|------|------|------|------|------|
| DSCR | 2.57 | 2.21 | 2.46 | 2.75 | 3.81 |
|-------------|------|------|------|------|------|

DSCR = Income available for meeting liabilities / Installment of bank loan

Where income available includes net operating profit, depreciation and interest of term loan and liabilities indicate installment of bank loan.

3.21 Break-even analysis

The project is expected to break-even at 47% of the assumed capacity utilization and 42% of the rated capacity at a sales value of Taka 270.11 lac. Details are shown in Annexure-XVI.

3.22 Cash flow statement

Cash flow statement based on profitability estimate has been worked out. The project is expected to have comfortable cash position which will enable the unit to repay the dues in time. Details are shown in Annexure -XVII.

3.23 Projected Balance Sheet

The projected balance sheet of the proposed company is enclosed in Annexure -XVII which shows a healthy financial position.

3.24 Financial Rate of Return

The financial rate of return computed following discounted cash flow technique works out at 19.25%. Details are shown in Annexure-XVIII

3.25 Summary of the project

In our study we have taken some basis of calculation and thereby tried to find out total cost of 1 m³ of CNG and found net profit from 1 m³ of CNG sale.

The calculation basis are as follows:

Operational hour per day is 20 hours.

Cost of 1 m³ of feed gas for CNG is Tk. 9.97

Sale value of 1 m³ of CNG is Tk. 16.75

Cost of 1 m³ of feed gas for gas generator/compressor is Tk. 4.18

Cost of 1 KWH in peak hour is Tk. 7.12

Cost of 1 KWH in off peak hour is Tk. 3.43

No of KWH = Difference in meter reading* 80.17

In our study in the first year of operation of the project 75% utilization of the rated capacity is considered and total CNG volume sale = $530 \times 20 \times 30 \times 12 \times .75$
= 2862000 m³.

Total sales revenue = $2862000 \times (16.75 - 9.97)$ = Tk. 19404360.

Total operational cost = Tk. 6411000. (details are shown in Annexure-XII)

Administrative and marketing expenses = Tk. 1947000. (details are shown in Annexure-XIII).

Financial expenses = Tk. 3945000. (details are shown in Annexure-XV).

Income tax (30%) = Tk. 2131000.

Dividend @ 10% on paid up capital = Tk. 2325000

Retained earnings =

$Tk. 19404360 - (6411000 + 1947000 + 3945000 + 2131000 + 2325000)$

= Tk. 2646000

So profit per m³ of CNG = $Tk. 2646000 / 2862000$ = Tk. 0.92 with 75% utilization.

3.26 Sensitivity of the project

Details of sensitivity analysis are shown in Annexure VIII, IX and X. Break-even point of our project in usual condition is 47% utilization of the rated capacity (Annex-XVI) and if it is achieved then CNG volume sale per day is $(530 \times 20 \times .47)$ 4982 m³. If we consider that a car can take 15 m³ of CNG then 332 cars will be needed to sell CNG of 47% utilization of the rated capacity. Again, if we consider that a bus can take 70 m³ of CNG then number of buses will be 71. On the other hand, if we consider that a truck can take 90 m³ of CNG then number of trucks will be 55. Again, it can be a combination of all the three or any two of the vehicles. If we consider 20 buses and 10 trucks then number of cars will be 180. Again it can be 40 buses and 146 cars. In case of 10% increase in production cost, 10% decrease in sales; and 5% increase in production cost and 5% decrease in sales the break even points are 68%, 53% and 67% respectively (Annex-XVI) and in these cases number of vehicles will differ accordingly.

In case of our project, it is seen that IRR is 19.25 % (Section 3.29) and for 47% of the rated capacity utilization the project will be viable (Annex-XVI).

3.27 Case study

A number of CNG business are failing and the main reason for that is the large number of stations being built in the same area. Because of that each station is not getting enough vehicles to fill in. Two areas have been selected for the viability of a new station- Bogra and Comilla.

Bogra: The amount of feed gas used from January, 2010 to April 2010 by a CNG station in Bogra with a compressor of capacity 600 m³ per hour is given bellow:

| | |
|---------------|-------------------------------------|
| January 2010 | 192475 m ³ |
| February 2010 | 190300 m ³ |
| March 2010 | 189500 m ³ |
| April 2010 | 191200 m ³ (source PGCL) |

The average monthly feed gas used is 190868.75 m³ and capacity utilization is 54%. So in Bogra 1-2 new CNG stations may be set up but the business risk still remains high.

Comill: Again The amount of feed gas used from January, 2010 to April 2010 by a CNG station in Comilla with a compressor of capacity 250 m³per hour is given bellow

| | |
|---------------|-------------------------------------|
| January 2010 | 75600 m ³ |
| February 2010 | 72980 m ³ |
| March 2010 | 74620 m ³ |
| April 2010 | 73500 m ³ (source BGFCL) |

The average monthly feed gas used is 74175 m³ and capacity utilization is 48.45%. So in Comilla no new CNG station will be viable.

3.28 Net present value

The net present values (NPV) of the project at different conditions are shown in Table 3.8, 3.9, 3.10 and 3.11

Table 3.8 NPV at usual condition

| Year | Total out flow(Tk. In '000') | Net Cash in flow(Tk. In '000') | Net cash flow | | | | | | |
|------|-------------------------------|--------------------------------|---------------|----------------------|---------------|----------------------|---------------|----------------------|---------------|
| | | | | 15% | | 20% | | 25% | |
| | | | | Present worth factor | Present value | Present worth factor | Present value | Present worth factor | Present value |
| 0 | -57943.00 | 0.00 | 57,943.00 | 1 | 57,943.00 | 1 | 57943.00 | 1 | 57,943.00 |
| 1 | -12302.00 | 19,404.00 | 7,102.00 | 0.86957 | 6,175.65 | 0.833333 | 5918.33 | 0.8 | 5,681.60 |
| 2 | -12548.04 | 20,374.20 | 7,826.16 | 0.75614 | 5,917.70 | 0.694444 | 5434.83 | 0.64 | 5,008.74 |
| 3 | -12799.00 | 21,392.91 | 8,593.91 | 0.65752 | 5,650.63 | 0.578704 | 4973.33 | 0.512 | 4,400.08 |
| 4 | -13054.98 | 22,462.56 | 9,407.57 | 0.57175 | 5,378.81 | 0.482253 | 4536.83 | 0.4096 | 3,853.34 |
| 5 | -13316.08 | 23,585.68 | 10,269.60 | 0.49718 | 5,105.81 | 0.401878 | 4127.12 | 0.3277 | 3,365.14 |
| 6 | -13582.40 | 24,764.97 | 11,182.57 | 0.43233 | 4,834.53 | 0.334898 | 3745.02 | 0.2621 | 2,931.44 |
| 7 | -13854.05 | 26,003.22 | 12,149.17 | 0.37594 | 4,567.32 | 0.279082 | 3390.61 | 0.2097 | 2,547.86 |
| 8 | -14131.13 | 27,303.38 | 13,172.25 | 0.3269 | 4,306.03 | 0.232568 | 3063.44 | 0.1678 | 2,209.94 |
| 9 | -14413.75 | 28,668.55 | 14,254.79 | 0.28426 | 4,052.10 | 0.193807 | 2762.67 | 0.1342 | 1,913.25 |
| 10 | -14702.03 | 30,101.97 | 15,399.94 | 0.24718 | 3,806.63 | 0.161506 | 2487.18 | 0.1074 | 1,653.56 |
| 11 | -14996.07 | 31,607.07 | 16,611.00 | 0.21494 | 3,570.42 | 0.134588 | 2235.64 | 0.0859 | 1,426.87 |
| 12 | -15295.99 | 33,187.42 | 17,891.43 | 0.18691 | 3,344.04 | 0.112157 | 2006.64 | 0.0687 | 1,229.49 |
| 13 | -15601.91 | 34,846.80 | 19,244.89 | 0.16253 | 3,127.83 | 0.093464 | 1798.70 | 0.055 | 1,058.00 |
| 14 | -15913.95 | 36,589.14 | 20,675.19 | 0.14133 | 2,922.00 | 0.077887 | 1610.32 | 0.044 | 909.30 |
| 15 | -16232.23 | 38,418.59 | 22,186.37 | 0.12289 | 2,726.58 | 0.064905 | 1440.02 | 0.0352 | 780.61 |
| 16 | -16556.87 | 40,339.52 | 23,782.65 | 0.10686 | 2,541.53 | 0.054088 | 1286.35 | 0.0281 | 669.42 |
| 17 | -16888.01 | 42,356.50 | 25,468.49 | 0.09293 | 2,366.68 | 0.045073 | 1147.95 | 0.0225 | 573.50 |
| 18 | -17225.77 | 44,474.32 | 27,248.55 | 0.08081 | 2,201.82 | 0.037561 | 1023.48 | 0.018 | 490.87 |
| 19 | -17570.29 | 46,698.04 | 29,127.75 | 0.07027 | 2,046.67 | 0.031301 | 911.72 | 0.0144 | 419.78 |
| 20 | -17921.69 | 49,032.94 | 31,111.25 | 0.0611 | 1,900.91 | 0.026084 | 811.51 | 0.0115 | 358.69 |
| | | NPV | | | 18,600.70 | | -3231.29 | | 19,754.38 |

Table 3.9 NPV at 10% increase in production cost

| Year | Total out flow(Tk. In '000') | Net Cash in flow(Tk. In '000') | Net cash flow | | | | | | |
|------|-------------------------------|--------------------------------|---------------|----------------------|------------------|----------------------|-----------------|----------------------|------------------|
| | | | | 10% | | 15% | | 20% | |
| | | | | Present worth factor | Present value | Present worth factor | Present value | Present worth factor | Present value |
| 0 | -57943.00 | 0.00 | 57,943.00 | 1 | 57,943.00 | 1 | 57943.00 | 1 | 57,943.00 |
| 1 | -15796.00 | 19,404.00 | 3,608.00 | 0.9090909 | 3,280.00 | 0.8695652 | 3137.39 | 0.8333333 | 3,006.67 |
| 2 | -16111.92 | 20,374.20 | 4,262.28 | 0.8264463 | 3,522.55 | 0.7561437 | 3222.90 | 0.6944444 | 2,959.92 |
| 3 | -16434.16 | 21,392.91 | 4,958.75 | 0.7513148 | 3,725.58 | 0.6575162 | 3260.46 | 0.5787037 | 2,869.65 |
| 4 | -16762.84 | 22,462.56 | 5,699.71 | 0.6830135 | 3,892.98 | 0.5717532 | 3258.83 | 0.4822531 | 2,748.70 |
| 5 | -17098.10 | 23,585.68 | 6,487.58 | 0.6209213 | 4,028.28 | 0.4971767 | 3225.48 | 0.4018776 | 2,607.21 |
| 6 | -17440.06 | 24,764.97 | 7,324.91 | 0.5644739 | 4,134.72 | 0.4323276 | 3166.76 | 0.334898 | 2,453.10 |
| 7 | -17788.86 | 26,003.22 | 8,214.35 | 0.5131581 | 4,215.26 | 0.375937 | 3088.08 | 0.2790816 | 2,292.48 |
| 8 | -18144.64 | 27,303.38 | 9,158.74 | 0.4665074 | 4,272.62 | 0.3269018 | 2994.01 | 0.232568 | 2,130.03 |
| 9 | -18507.53 | 28,668.55 | 10,161.01 | 0.4240976 | 4,309.26 | 0.2842624 | 2888.39 | 0.1938067 | 1,969.27 |
| 10 | -18877.68 | 30,101.97 | 11,224.29 | 0.3855433 | 4,327.45 | 0.2471847 | 2774.47 | 0.1615056 | 1,812.79 |
| 11 | -19255.24 | 31,607.07 | 12,351.84 | 0.3504939 | 4,329.24 | 0.2149432 | 2654.94 | 0.134588 | 1,662.41 |
| 12 | -19640.34 | 33,187.42 | 13,547.08 | 0.3186308 | 4,316.52 | 0.1869072 | 2532.05 | 0.1121567 | 1,519.40 |
| 13 | -20033.15 | 34,846.80 | 14,813.65 | 0.2896644 | 4,290.99 | 0.162528 | 2407.63 | 0.0934639 | 1,384.54 |
| 14 | -20433.81 | 36,589.14 | 16,155.33 | 0.2633313 | 4,254.20 | 0.1413287 | 2283.21 | 0.0778866 | 1,258.28 |
| 15 | -20842.49 | 38,418.59 | 17,576.11 | 0.239392 | 4,207.58 | 0.1228945 | 2160.01 | 0.0649055 | 1,140.79 |
| 16 | -21259.34 | 40,339.52 | 19,080.19 | 0.2176291 | 4,152.40 | 0.1068648 | 2039.00 | 0.0540879 | 1,032.01 |
| 17 | -21684.52 | 42,356.50 | 20,671.98 | 0.1978447 | 4,089.84 | 0.0929259 | 1920.96 | 0.0450732 | 931.75 |
| 18 | -22118.21 | 44,474.32 | 22,356.11 | 0.1798588 | 4,020.94 | 0.0808051 | 1806.49 | 0.037561 | 839.72 |
| 19 | -22560.58 | 46,698.04 | 24,137.46 | 0.163508 | 3,946.67 | 0.0702653 | 1696.03 | 0.0313009 | 755.52 |
| 20 | -23011.79 | 49,032.94 | 26,021.15 | 0.1486436 | 3,867.88 | 0.0611003 | 1589.90 | 0.0260841 | 678.74 |
| | | NPV | | | 23,241.97 | | -5836.02 | | 27,268.56 |

Table 3.10 NPV at 10% decrease in sales

| Year | Total out flow(Tk. In '000') | Net Cash in flow(Tk. In '000') | Net cash flow | | | | | | |
|------|-------------------------------|--------------------------------|---------------|----------------------|-----------------|----------------------|------------------|----------------------|------------------|
| | | | | 10% | | 15% | | 20% | |
| | | | | Present worth factor | Present value | Present worth factor | Present value | Present worth factor | Present value |
| 0 | -57943.00 | 0.00 | 57,943.00 | 1 | 57,943.00 | 1 | -57943.00 | 1 | 57,943.00 |
| 1 | -15156.00 | 17,464.00 | 2,308.00 | 0.9090909 | 2,098.18 | 0.8695652 | 2006.96 | 0.8333333 | 1,923.33 |
| 2 | -15459.12 | 18,337.20 | 2,878.08 | 0.8264463 | 2,378.58 | 0.7561437 | 2176.24 | 0.6944444 | 1,998.67 |
| 3 | -15768.30 | 19,254.06 | 3,485.76 | 0.7513148 | 2,618.90 | 0.6575162 | 2291.94 | 0.5787037 | 2,017.22 |
| 4 | -16083.67 | 20,216.76 | 4,133.09 | 0.6830135 | 2,822.96 | 0.5717532 | 2363.11 | 0.4822531 | 1,993.20 |
| 5 | -16405.34 | 21,227.60 | 4,822.26 | 0.6209213 | 2,994.24 | 0.4971767 | 2397.52 | 0.4018776 | 1,937.96 |
| 6 | -16733.45 | 22,288.98 | 5,555.53 | 0.5644739 | 3,135.95 | 0.4323276 | 2401.81 | 0.334898 | 1,860.54 |
| 7 | -17068.12 | 23,403.43 | 6,335.31 | 0.5131581 | 3,251.02 | 0.375937 | 2381.68 | 0.2790816 | 1,768.07 |
| 8 | -17409.48 | 24,573.60 | 7,164.12 | 0.4665074 | 3,342.12 | 0.3269018 | 2341.96 | 0.232568 | 1,666.15 |
| 9 | -17757.67 | 25,802.28 | 8,044.61 | 0.4240976 | 3,411.70 | 0.2842624 | 2286.78 | 0.1938067 | 1,559.10 |
| 10 | -18112.82 | 27,092.40 | 8,979.57 | 0.3855433 | 3,462.01 | 0.2471847 | 2219.61 | 0.1615056 | 1,450.25 |
| 11 | -18475.08 | 28,447.02 | 9,971.94 | 0.3504939 | 3,495.10 | 0.2149432 | 2143.40 | 0.134588 | 1,342.10 |
| 12 | -18844.58 | 29,869.37 | 11,024.79 | 0.3186308 | 3,512.84 | 0.1869072 | 2060.61 | 0.1121567 | 1,236.50 |
| 13 | -19221.47 | 31,362.83 | 12,141.36 | 0.2896644 | 3,516.92 | 0.162528 | 1973.31 | 0.0934639 | 1,134.78 |
| 14 | -19605.90 | 32,930.98 | 13,325.07 | 0.2633313 | 3,508.91 | 0.1413287 | 1883.21 | 0.0778866 | 1,037.84 |
| 15 | -19998.02 | 34,577.53 | 14,579.51 | 0.239392 | 3,490.22 | 0.1228945 | 1791.74 | 0.0649055 | 946.29 |
| 16 | -20397.98 | 36,306.40 | 15,908.42 | 0.2176291 | 3,462.14 | 0.1068648 | 1700.05 | 0.0540879 | 860.45 |
| 17 | -20805.94 | 38,121.72 | 17,315.78 | 0.1978447 | 3,425.84 | 0.0929259 | 1609.08 | 0.0450732 | 780.48 |
| 18 | -21222.06 | 40,027.81 | 18,805.75 | 0.1798588 | 3,382.38 | 0.0808051 | 1519.60 | 0.037561 | 706.36 |
| 19 | -21646.50 | 42,029.20 | 20,382.70 | 0.163508 | 3,332.73 | 0.0702653 | 1432.20 | 0.0313009 | 638.00 |
| 20 | -22079.43 | 44,130.66 | 22,051.23 | 0.1486436 | 3,277.77 | 0.0611003 | 1347.34 | 0.0260841 | 575.19 |
| | | NPV | | | 5,977.51 | | -17614.84 | | 35,017.29 |

Table 3.11 NPV at 5% increase in production cost and 5% decrease in sales

| Year | Total out flow(Tk. In '000') | Net Cash in flow(Tk. In '000') | Net cash flow | 10% | | 15% | | 20% | |
|------|-------------------------------|--------------------------------|---------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|
| | | | | Present worth factor | Present value | Present worth factor | Present value | Present worth factor | Present value |
| | | | | 0 | -57943.00 | 0.00 | 57,943.00 | 1 | 57,943.00 |
| 1 | -14049.00 | 17,007.00 | 2,958.00 | 0.9090909 | 2,689.09 | 0.8695652 | 2572.17 | 0.8333333 | 2,465.00 |
| 2 | -14329.98 | 17,857.35 | 3,527.37 | 0.8264463 | 2,915.18 | 0.7561437 | 2667.20 | 0.6944444 | 2,449.56 |
| 3 | -14616.58 | 18,750.22 | 4,133.64 | 0.7513148 | 3,105.66 | 0.6575162 | 2717.93 | 0.5787037 | 2,392.15 |
| 4 | -14908.91 | 19,687.73 | 4,778.82 | 0.6830135 | 3,264.00 | 0.5717532 | 2732.30 | 0.4822531 | 2,304.60 |
| 5 | -15207.09 | 20,672.11 | 5,465.03 | 0.6209213 | 3,393.35 | 0.4971767 | 2717.08 | 0.4018776 | 2,196.27 |
| 6 | -15511.23 | 21,705.72 | 6,194.49 | 0.5644739 | 3,496.63 | 0.4323276 | 2678.05 | 0.334898 | 2,074.52 |
| 7 | -15821.46 | 22,791.01 | 6,969.55 | 0.5131581 | 3,576.48 | 0.375937 | 2620.11 | 0.2790816 | 1,945.07 |
| 8 | -16137.88 | 23,930.56 | 7,792.67 | 0.4665074 | 3,635.34 | 0.3269018 | 2547.44 | 0.232568 | 1,812.33 |
| 9 | -16460.64 | 25,127.08 | 8,666.44 | 0.4240976 | 3,675.42 | 0.2842624 | 2463.54 | 0.1938067 | 1,679.61 |
| 10 | -16789.86 | 26,383.44 | 9,593.58 | 0.3855433 | 3,698.74 | 0.2471847 | 2371.39 | 0.1615056 | 1,549.42 |
| 11 | -17125.65 | 27,702.61 | 10,576.96 | 0.3504939 | 3,707.16 | 0.2149432 | 2273.45 | 0.134588 | 1,423.53 |
| 12 | -17468.17 | 29,087.74 | 11,619.58 | 0.3186308 | 3,702.35 | 0.1869072 | 2171.78 | 0.1121567 | 1,303.21 |
| 13 | -17817.53 | 30,542.13 | 12,724.60 | 0.2896644 | 3,685.86 | 0.162528 | 2068.10 | 0.0934639 | 1,189.29 |
| 14 | -18173.88 | 32,069.23 | 13,895.36 | 0.2633313 | 3,659.08 | 0.1413287 | 1963.81 | 0.0778866 | 1,082.26 |
| 15 | -18537.36 | 33,672.70 | 15,135.34 | 0.239392 | 3,623.28 | 0.1228945 | 1860.05 | 0.0649055 | 982.37 |
| 16 | -18908.10 | 35,356.33 | 16,448.23 | 0.2176291 | 3,579.61 | 0.1068648 | 1757.74 | 0.0540879 | 889.65 |
| 17 | -19286.27 | 37,124.15 | 17,837.88 | 0.1978447 | 3,529.13 | 0.0929259 | 1657.60 | 0.0450732 | 804.01 |
| 18 | -19671.99 | 38,980.36 | 19,308.36 | 0.1798588 | 3,472.78 | 0.0808051 | 1560.21 | 0.037561 | 725.24 |
| 19 | -20065.43 | 40,929.37 | 20,863.94 | 0.163508 | 3,411.42 | 0.0702653 | 1466.01 | 0.0313009 | 653.06 |
| 20 | -20466.74 | 42,975.84 | 22,509.10 | 0.1486436 | 3,345.83 | 0.0611003 | 1375.31 | 0.0260841 | 587.13 |
| | | NPV | | | 11,223.41 | | -13701.71 | | 32,076.17 |

3.29 Calculation of IRR

IRR is calculated as follows :

$$\frac{r_b - r^*}{r_b - r_a} = \frac{NPV_b}{NPV_b - NPV_a}$$

NPV_a = positive NPV at the lower discount rate of 15% (r_a)

= 18600.7 (Tk. in -0000)

NPV_b = Negative NPV at the higher discount rate of 20% (r_b)

= 3231.29 (Tk. in -0000)

$$r^* = IRR = r_a + (r_b - r_a) \times \frac{NPV_a}{NPV_a - NPV_b}$$

$$= 0.15 + (0.2 - 0.15) \times \frac{18600.70}{21831.99}$$

$$= 0.1925 = 19.25\%$$

$$IRR = 19.25\%$$

In our IRR calculation the values of NPV are taken from Table 3.8

A summary of the economic output under different operating conditions as shown in Annexure VII, VIII, IX and X are given in Table 3.12

Table 3.12 summary of economic parameters

| Sales for break even point | Sales price per m3 of CNG (Tk.) | Amount of CNG sale per day (m3) | Number of cars refills required | IRR | NPV |
|----------------------------|---------------------------------|---------------------------------|---------------------------------|--------|-----|
| 47% | 16.75 | 4982 | 332 | 19.25% | 0 |
| 53% | 16.75 | 5618 | 374 | 13.99% | 0 |
| 67% | 16.75 | 7102 | 473 | 11.27% | 0 |
| 68% | 16.75 | 7208 | 480 | 12.25% | 0 |

CHAPTER -4

CONCLUSION AND RECOMMENDATION

4.1 Conclusion

In view of the above, it is found that the project is technically feasible, financially rewarding, economically and commercially viable with minimum 47% utilization of the project capacity. Therefore, the project may be considered for required bank financing. Break-even point of our project in usual condition is at 47% utilization of the rated capacity (Annex-XVI) and if it is achieved then CNG volume sale per day is $(530 \times 20 \times .47)$ 4982 m³. If we consider that a car can take 15 m³ of CNG then 332 cars will be needed to sell CNG of 47% utilization of the rated capacity. Again, if we consider that a bus can take 70 m³ of CNG then number of buses will be 71. On the other hand, if we consider that a truck can take 90 m³ of CNG then number of trucks will be 55. Again, it can be a combination of all the three or any two of the vehicles. If we consider 20 buses and 10 trucks then number of cars will be 180. Again it can be 40 buses and 146 cars. But incase of 10% increase in production cost, 10% decrease in sales; 5% increase in production cost and 5% decrease in sales break even points are 68%, 53% and 67% respectively (Annex-XVI) and in these cases number of vehicles will differ accordingly.

4.2 Recommendation

In conclusion it is recommended that proposed project can be established as early as possible ensuring at least 47% CNG volume sale of the total capacity of the station. To implement, the project may be sanctioned a long term loan limit of Tk. 348.82lac including IDCP Tk. 16.61 lac on usual terms and conditions by Bankø/ financial institutions. At present the work of gas pipe lines is running in Rajshahi and for the future it will start in Jessore, Khulna and Barisal. CNG station business model can save a lot of foreign currency and prevent air pollution unlike liquid fuel. So, on the basis of the demand, number of CNG station business model can be setup in Khulna, Jessore, Barisal and Rajshahi after completing the construction work of gas pipeline. In other parts of the country CNG business may not be financially feasible. Before starting a CNG business the investor must ensure minimum percentage of utilization (47%) of the rated capacity of the station and the number of vehicles of different combination to take the CNG to be sold for minimum percentage of utilization.

Reference

Bangladesh Shilpa Bank Journal April, 2008

BERC Annual report, 2009

BRTC Annual report, 2008

Minutes of the CNG committee meeting held on August, 2008

NAVANA CNG Limited Annual report, 2008

RPGCL AGM, 2009

RPGCL Monthly report, Feb, 2010

Annexure I-Fixed Cost of the Project

(Tk. 000)

| Item | Cost in F/C | Eqvt. Tk. | Cost in L/C | Total Cost |
|---|-------------|--------------|--------------|--------------|
| 01. Land : | | | | |
| Cost of 33 decimals land | 0 | 0 | 12000 | 12000 |
| RHD approach lease for 15 year (10 decimal) | | | 12 | 12 |
| Registration and transfer cost | | | 2040 | 2040 |
| Land Development | | | 1000 | 1000 |
| Sub-Total : | 0 | 0 | 15052 | 15052 |
| 02. Building and other civil works : | | | | |
| Office Building, boundary wall and Other civil works Details as per Annexure - II | 0 | 0 | 8836 | 8836 |
| Sub-Total : | 0 | 0 | 8836 | 8836 |
| 3. Imported Machinery and Equipment : | | | | |
| Main machinery '(as per Annex-III) | \$ 212000 | 14840 | | 14840 |
| Pre-Shipment Inspection (1% of CFR) | | 0 | 148 | 148 |
| Insurance cost (1% of CFR) | 0 | 0 | 148 | 148 |
| Clearing forwarding charges (1% of CFR) | 0 | 0 | 148 | 148 |
| L.C. Commission (1% of CFR) | 0 | 0 | 148 | 148 |
| Inland carrying (0.50%) of CFR) | 0 | 0 | 74 | 74 |
| Sub-Total : | 0 | 14840 | 666 | 15506 |
| 04. Local Machinery : | | | | |
| As per Annexure IV | 0 | 0 | 11150 | 11150 |
| Sub-Total : | 0 | 0 | 11150 | 11150 |
| 05 Cost of Installation : | | | | |
| Civil Mechanical and Electrical Installation | 0 | 0 | 200 | 200 |
| Gas line drawing and connection cost | | | 1500 | 1500 |
| Security deposit for gas | | | 1078 | 1078 |
| Electrification line constructing (PDB) | | | 800 | 800 |
| Security deposit for Electricity | 0 | 0 | 350 | 350 |
| Sub-Total : | 0 | 0 | 3928 | 3928 |

Annex-I(Contd..)

06. Safety Equipment :

| | | | | |
|---|---|---|-----|-----|
| Fire fighting equipment and first Aid box | 0 | 0 | 100 | 100 |
|---|---|---|-----|-----|

| | | | | | |
|-------------|--|---|---|-----|-----|
| Sub-Total : | | 0 | 0 | 100 | 100 |
|-------------|--|---|---|-----|-----|

07. Office Equipment/Other Assets :

| | | | | |
|----------------------------------|---|---|-----|-----|
| Office furniture, office machine | 0 | 0 | 450 | 450 |
|----------------------------------|---|---|-----|-----|

| | | | | | |
|-------------|--|---|---|-----|-----|
| Sub-Total : | | 0 | 0 | 450 | 450 |
|-------------|--|---|---|-----|-----|

08. Consultant's Fees :

| | | | | |
|---|---|---|-----|-----|
| Engineering and supervision Survey, plan and drawing etc. | 0 | 0 | 200 | 200 |
|---|---|---|-----|-----|

| | | | | | |
|-------------|--|---|---|-----|-----|
| Sub-Total : | | 0 | 0 | 200 | 200 |
|-------------|--|---|---|-----|-----|

09. Pre-operating Expenses :

| | | | | |
|--|---|---|-----|-----|
| Promotional and legal, permission, NOC etc | 0 | 0 | 500 | 500 |
| Evaluation Fees and VAT | | | 115 | 115 |

| | | | | | |
|-------------|--|---|---|-----|-----|
| Sub-Total : | | 0 | 0 | 615 | 615 |
|-------------|--|---|---|-----|-----|

10. Contingency

| | | | | |
|---------------------------------------|--|--|-----|-----|
| 3% of CFR value of Imported machinery | | | 445 | 445 |
|---------------------------------------|--|--|-----|-----|

| | | | | | |
|-------------|--|---|---|-----|-----|
| Sub-Total : | | 0 | 0 | 445 | 445 |
|-------------|--|---|---|-----|-----|

11. Interest During Construction Period :

On Tk. 332.21lac Int. @ 12%

per annum for a period of 5 months

| | | | | |
|--|---|---|------|------|
| | 0 | 0 | 1661 | 1661 |
|--|---|---|------|------|

| | | | | | |
|-------------|--|---|---|------|------|
| Sub-Total : | | 0 | 0 | 1661 | 1661 |
|-------------|--|---|---|------|------|

Total Fixed Cost of the project :

| | | | | |
|--|-----------|-------|-------|-------|
| | \$ 212000 | 14840 | 43103 | 57943 |
|--|-----------|-------|-------|-------|

Exchange Rate = 1 US\$=Tk.70.00

* Security Deposit for Gas: 530 m³ x 16 hours x 60 days x 0.85 x Tk. 9.97 = Tk. 43.12lac.
Cash 1/3= Tk. 14.37 lac and Bank Guarantee 2/3 = Tk. 28.75lac

Annexure II-Building and other Civil Works

| SI No | Item of building and other civil works | Specification | Covered area in Sft | Rate Taka | Total Cost (Taka in '000') |
|-------|--|-----------------------|---------------------|-----------|----------------------------|
| 1. | Administrative Building, office Accounts, Sales center, Mgr. Room, Rest Room, two storied building | Rcc construction | 3000 | 1200 | 3600 |
| 2. | Canopy Roof | Rcc Column, Rcc roof, | 1000 | 1000 | 1000 |
| 3. | Compressor Room | Rcc construction | 700 | 1000 | 700 |
| 4. | Cascade Storage | Rcc construction | 400 | 1000 | 400 |
| 5. | Sub-Station room | Rcc construction | 400 | 1000 | 400 |
| 6. | Generator Room | Rcc construction | 500 | 1000 | 500 |
| 7. | RMS room | Rcc construction | 300 | 1000 | 300 |
| 8. | Toilet (Male) | Rcc construction | 132 | 1000 | 132 |
| 9. | Toilet (Female) | Rcc construction | 84 | 1000 | 84 |
| 10. | Prayer room | Rcc construction | 200 | 1000 | 200 |
| 11. | Meter Room | | 100 | 1000 | 100 |
| 12. | Fast Food | | 100 | 1200 | 120 |
| 13. | Electrification & sanitation | | L.S. | | 800 |
| 14. | Brick Soling | | L.S. | | 500 |
| | | | Total : | | 8836 |

Annexure III- List of Machinery to be imported

| Sl. No | Description of machinery | Qty set | Unit price | Total price in US\$ |
|--------|---|---------|------------|---------------------|
| | Compressor Model SW132F1-EM Compressor capacity : 530 m3/h | | | 212000 |
| | | | Total US\$ | 212000 |
| | Exchange Rate: 1 US\$ = Tk. 70.00 | | | |
| | Equivalent. Tk. | | | 148.40 lac |

Annexure IV- List of local machinery and equipment

(Tk. in 000)

| Sl. No. | Specification | Quantity | Total Price |
|---------|---|----------|-------------|
| 1. | 300 KVA Sub-station including installation, HT cable, LT cable and others | Lot | 1500 |
| 2. | Inverter and Other accessories for cable, change over switch etc | Lot | 1500 |
| 3. | Tools | Lot | 200 |
| 4. | Gas Generator 300 KVA | Lot | 7500 |
| 5. | Auto Load Transfer panel | Lot | 250 |
| 6. | Tube well with pump and motor | | 200 |
| | | Total : | 11150 |

Annexure V- List of furniture and fixture

(Tk. in ₹000ø)

| Sl. No. | Description | Qty. | Unit price in Tk. | Total price in Tk.ø000ø |
|---------|-----------------------|---------|-------------------|-------------------------|
| 1. | Table | 3 Nos | 10000 | 30 |
| 2 | Chair | 10 Nos. | 5000 | 50 |
| 3. | Ceiling fan | 10 Nos | 2000 | 20 |
| 4. | GFC fan | 2 Nos | 5000 | 10 |
| 5. | Almirah | 2 Nos | 10000 | 20 |
| 6. | Mobile and others | L.S. | | 50 |
| 7. | Bill board/Sign Board | | L.S. | 100 |
| 8. | Freeze | | L.S. | 50 |
| 9. | Computer with printer | 2 No. | 60000 | 120 |
| | | | Total: | 450 |

**Annexure VI- Projected construction time
(Estimated in months)**

| | | |
|----|---------------------------------------|-----------------------|
| 1. | Land Acquisition | Acquired |
| 2. | Starting of Civil Works | 1 st month |
| 3. | Opening of L/C for Imported machinery | 3 rd month |
| 4. | Completion of CNG Building | 3 rd month |
| 5. | Arrival of machinery at site | 5 th month |
| 6. | Installation of machinery | 5 th month |
| 7. | Electric and Gas line connection | 5 th month |
| 8. | Operation Started | 6 th month |

Annexure VII-Forecast of Earnings

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|---------------------------------------|----------|----------|----------|----------|----------|
| | ----- | ----- | ----- | ----- | ----- |
| Sales Revenue | 19404 | 20698 | 21992 | 23285 | 23285 |
| Cost of operation | 6411 | 6644 | 7012 | 7381 | 7387 |
| Gross Profit | 12994 | 14052 | 14979 | 15904 | 15898 |
| Administrative and Marketing Expenses | 1947 | 2107 | 2255 | 2405 | 2405 |
| Profit before Tax & Interest | 11047 | 11945 | 12724 | 13499 | 13493 |
| Financial Expenses | 3945 | 3604 | 3205 | 2806 | 1104 |
| Net operating profit | 7102 | 8341 | 9519 | 10693 | 12389 |
| Income tax (30%) | 2131 | 2502 | 2856 | 3208 | 3717 |
| Net Profit after Tax | 4971 | 5839 | 6663 | 7485 | 8672 |
| Dividend @ 10% on paid up capital | 2325 | 2325 | 2325 | 2325 | 2325 |
| Retained earnings | 2646 | 3514 | 4337 | 5159 | 6347 |
| Cummulative retained earnings | 2646 | 6160 | 10497 | 15656 | 22003 |
| Ratios : | | | | | |
| | ----- | | | | |
| Net Operating profit to sales | 10% | 11% | 12% | 13% | 15% |
| Debt Service Coverage Ratio | 2.57 | 2.21 | 2.46 | 2.75 | 3.81 |

Annexure VIII-Sensitivity Analysis

Based on 10% increase in Production Cost

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|-------------------------------------|----------|----------|----------|----------|----------|
| Sales revenue | 19404 | 20698 | 21992 | 23285 | 23285 |
| Cost of operation | 7052 | 7308 | 7713 | 8119 | 8126 |
| Gross Profit | 12352 | 13390 | 14279 | 15166 | 15159 |
| Administrative & Marketing Expenses | 1947 | 2107 | 2255 | 2405 | 2405 |
| Profit before Tax & Interest | 7553 | 8237 | 8789 | 9337 | 9331 |
| Financial Expenses | 3945 | 3604 | 3205 | 2806 | 1104 |
| Net operating profit before tax | 3608 | 4633 | 5584 | 6531 | 8227 |
| Income tax (30%) | 1082 | 1390 | 1675 | 1959 | 2468 |
| Net Profit after tax | 2526 | 3243 | 3909 | 4572 | 5759 |
| Debt Service Coverage Ratio | 1.84 | 1.60 | 1.77 | 1.97 | 2.67 |

Annexure IX-Sensitivity Analysis

Based on 10% decrease in Sales

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|-------------------------------------|----------|----------|----------|----------|----------|
| Sales revenue | 17464 | 18628 | 19793 | 20956 | 20956 |
| Cost of operation | 7052 | 7308 | 7713 | 8119 | 8126 |
| Gross Profit | 10412 | 11320 | 12080 | 12837 | 12830 |
| Administrative & Marketing Expenses | 1947 | 2107 | 2255 | 2405 | 2405 |
| Profit before Tax & Interest | 6253 | 6832 | 7291 | 7746 | 7740 |
| Financial Expenses | 3945 | 3604 | 3205 | 2806 | 1104 |
| Net operating profit before tax | 2308 | 3228 | 4086 | 4940 | 6636 |
| Income tax (30%) | 693 | 968 | 1226 | 1482 | 1991 |
| Net Profit after tax | 1615 | 2260 | 2860 | 3458 | 4645 |
| Debt Service Coverage Ratio | 1.62 | 1.41 | 1.55 | 1.72 | 2.33 |

Annexure X-Sensitivity Analysis

Based on 5% increase in Production Cost and 5% decrease in Sales price

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|---------------------------------------|----------|----------|----------|----------|----------|
| Sales revenue | 17007 | 18141 | 19275 | 20409 | 20409 |
| Cost of operation | 6732 | 6976 | 7363 | 7750 | 7750 |
| Gross Profit | 10275 | 11165 | 11912 | 12669 | 12653 |
| Administrative and Marketing Expenses | 1947 | 2107 | 2255 | 2405 | 2405 |
| Profit before Tax and Interest | 6903 | 7534 | 8041 | 8542 | 8536 |
| Financial Expenses | 3945 | 3604 | 3205 | 2806 | 1104 |
| Net operating profit | 2958 | 3930 | 4835 | 5736 | 7432 |
| Income tax (30%) | 887 | 1179 | 1451 | 1721 | 2230 |
| Net Profit after income tax | 2071 | 2751 | 3384 | 4015 | 5202 |
| Debt Service Coverage Ratio | 1.73 | 1.50 | 1.66 | 1.84 | 2.50 |

Annexure XI-Revenue Estimate

| Item | (Tk. in '000') | | | | |
|---------------------------|----------------|----------|----------|----------|----------|
| | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
| Revenue at rated capacity | 25872 | 25872 | 25872 | 25872 | 25872 |
| Capacity Utilization | 75% | 80% | 85% | 90% | 90% |
| Total revenue | 19404 | 20698 | 21992 | 23285 | 23285 |

Assumptions :

01. Operation time : 20 hours per day 360 working days in a year

02. Production Period: 360 days

03. Sales Revenue :

| Item | Unit | Quantity | Unit Price in Tk. | Total Tk. in '000' |
|-------------|-------------|----------|----------------------|-----------------------|
| CNG fueling | Cubic meter | 3816000 | 6.78 | 63918 |
| Total : | | | | 63918 |

Annexure XII-Operational Cost of CNG Sold

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|
| Wages and Salaries | 924 | 971 | 1016 | 1063 | 1070 |
| Stores and Spares | 0 | 0 | 134 | 269 | 269 |
| Repair and Maintenance | 179 | 314 | 448 | 582 | 581 |
| Depreciation | 3138 | 3138 | 3138 | 3138 | 3138 |
| Power, Gas, Fuel and Lubricant | 1441 | 1494 | 1547 | 1600 | 1600 |
| Rent, Tax and Insurance | 579 | 579 | 579 | 579 | 579 |
| Other Expenses | 150 | 150 | 150 | 150 | 150 |
| Total cost of operation: | 6411 | 6646 | 7012 | 7381 | 7387 |

Annexure XIII-Assumptions

1 Requirement of Local Raw materials

| Item | Unit | Quantity | Unit Price in Tk. | Total Tk. in '000' |
|-------------------------------|-----------|----------|----------------------|-----------------------|
| Filling station: Natural gas: | Cum meter | 3816000 | 9.97 | 38046 |
| Total : | | | | 38046 |

| Raw Materials | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|--------------------------|----------|----------|----------|----------|----------|
| Requirements of Local RM | 28534 | 30436 | 32339 | 34241 | 34241 |

3 Wages and Salaries

| Technical : | | Tk. in '000' | | |
|---------------------|-------------|----------------|--------------------|--|
| Name of the Post | No. of Post | Monthly Salary | Total Tk. in '000' | |
| Station Manager | 1 | 8000 | 96 | |
| Engineer | 2 | 6000 | 144 | |
| Compressor operator | 8 | 4000 | 384 | |
| Mechanics | 2 | 4000 | 96 | |
| Electrician | 2 | 3000 | 72 | |
| | 15 | | 792 | |

| | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|----------------------|----------|----------|----------|----------|----------|
| Salaries | 792 | 792 | 792 | 792 | 792 |
| Increment 5% | 0 | 40 | 79 | 119 | 125 |
| Total | 792 | 832 | 871 | 911 | 917 |
| Bonus 2 months basic | 132 | 139 | 145 | 152 | 153 |
| Total Salary | 924 | 971 | 1016 | 1063 | 1070 |

3 Water, Power and Fuel Requirements

Water :

Sources of Water : Own Deep tube well
 Power : Gas generator

Source: PDB / REB
 Maximum Demand : 125 KW
 Connected load : 150 KW
 Operation Hour (Average) : 4 Hour
 Cost per KWH in peak hour : 7.12
 Cost per KWH in off peak hour : 3.43
 Vat : 6.50%
 Demand charge per month in Tk. : 360.00
 Service Charge per month in Tk. : 60.00

Tk. in '000'

Cost of Power : 918
 Vat 6.75% : 60
Total Cost of Power
: **978**
 Demand Charge : 648
 Service Charge : 1

Fuel Lubricants and Gas:

| Item | Unit | Quantity | Unit Price in Tk. | Total Tk. in '000' |
|-----------------|-------|----------|----------------------|-----------------------|
| | ----- | ----- | ----- | ----- |
| Grease | Lbs | 100 | 120.00 | 12 |
| Lubricating Oil | Lbs | 350 | 190.00 | 67 |
| | | | | ----- |
| | | | | 79 |
| | | | | ----- |

| Requirements | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|---|-------------|-------------|-------------|-------------|-------------|
| Power | 978 | 978 | 978 | 978 | 978 |
| Grease and lubricant | 79 | 79 | 79 | 79 | 79 |
| Capacity Utilization | 75% | 80% | 85% | 90% | 90% |
| Requirements at attainable capacity | 792 | 845 | 898 | 951 | 951 |
| Total Power, Fuel, Lubricants and Gas: | 1441 | 1494 | 1547 | 1600 | 1600 |
| Stores and Spares : | | | | | |
| On Machinery cost (1.5%, 2%) | 0 | 0 | 134 | 269 | 269 |

**Repairs and
5 Maintenance :**

| | | | | | |
|-------------------|-----|-----|-----|-----|-----|
| On Building Cost | 45 | 45 | 45 | 45 | 44 |
| On Machinery Cost | 134 | 269 | 403 | 537 | 537 |
| | 179 | 314 | 448 | 582 | 581 |

**Rent, Tax and Insurance
6:**

--

| | | | | | |
|-------------------------------------|-----|-----|-----|-----|-----|
| 1% of the Fixed Cost of the Project | 579 | 579 | 579 | 579 | 579 |
|-------------------------------------|-----|-----|-----|-----|-----|

7 Depreciation :

| Item | Amount | Depreciation Rate | Depreciated Amount |
|-------------------------------------|--------|-------------------|--------------------|
| Building (Including Consultant fee) | 9036 | 5.00% | 452 |
| Machinery (Including Erection) | 26856 | 10.00% | 2686 |
| | | | 3138 |

Annexure XIV- General, Administrative and Selling Expenses

Annex -XIV

(Tk. in '000')

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|----------------------------|-------------|-------------|-------------|-------------|-------------|
| Directors Remuneration | 360 | 360 | 360 | 360 | 360 |
| Salary (Administration) | 784 | 824 | 862 | 902 | 902 |
| Courier service | 100 | 120 | 140 | 160 | 160 |
| Stationery and Printing | 150 | 200 | 250 | 300 | 300 |
| Travelling and Conveyance | 100 | 120 | 140 | 160 | 160 |
| Depreciation and Write off | 233 | 233 | 233 | 233 | 233 |
| Advertisement | 100 | 120 | 130 | 140 | 140 |
| Audit Fee | 50 | 50 | 50 | 50 | 50 |
| Miscellaneous Expenses | 70 | 80 | 90 | 100 | 100 |
| Total | 1947 | 2107 | 2255 | 2405 | 2405 |

Assumptions**(Salary and Allowances)**

| Name of the Post | No. of Post | Monthly Salary | Total (Tk. in '000') |
|------------------------|-------------|----------------|----------------------|
| Store Keeper | 2 | 4000 | 96 |
| Cashier Cum Accountant | 3 | 3500 | 126 |
| Computer Operator | 2 | 3500 | 84 |
| Office Assistant | 2 | 3500 | 84 |
| Security guard | 6 | 3000 | 216 |
| Peon | 1 | 3000 | 36 |
| Sweeper | 1 | 2500 | 30 |
| | 17 | | 672 |

| Item | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|----------------------|----------|----------|----------|----------|----------|
| ----- | ----- | ----- | ----- | ----- | ----- |
| Salaries | 672 | 672 | 672 | 672 | 672 |
| Increment 5% | 0 | 34 | 67 | 101 | 101 |
| ----- | ----- | ----- | ----- | ----- | ----- |
| Total | 672 | 706 | 739 | 773 | 773 |
| ----- | ----- | ----- | ----- | ----- | ----- |
| Bonus 2 months basic | 112 | 118 | 123 | 129 | 129 |
| ----- | ----- | ----- | ----- | ----- | ----- |
| Total Salary | 784 | 824 | 862 | 902 | 902 |
| ----- | ----- | ----- | ----- | ----- | ----- |

2 Depreciation and Write Off

| | Amount | Depreciation Rate | Depreciated Amount |
|------------------------|--------|----------------------|-----------------------|
| | ----- | ----- | ----- |
| Other Assets | 450 | 20.00% | 90 |
| Pre-operating Expenses | 615 | 20.00% | 123 |
| Safety equipment | 100 | 20.00% | 20 |
| | | | ----- |
| | | Total : | 233 |
| | | | ----- |

Annexure XV-Estimate of financial Expenses and Repayment schedule

(Tk. in '000')

| | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|-----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Interest on Term Loan | 3945 | 3604 | 3205 | 2806 | 1104 |
| | 3945 | 3604 | 3205 | 2806 | 1104 |

| Interest on Term Loan : | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Principal | 34882 | 33220 | 29896 | 26572 | 23248 |
| Installment | 1662 | 3324 | 3324 | 3324 | 3324 |
| Balance | 33220 | 29896 | 26572 | 23248 | 19924 |
| Interest @12% p.a. | 3945 | 3604 | 3205 | 2806 | 1104 |

Interest During Construction Period :

| | | | | | |
|-------------|------|------|-----|-----|-----|
| Principal | 1661 | 1329 | 997 | 665 | 333 |
| Installment | 332 | 332 | 332 | 332 | 336 |
| Balance | 1329 | 997 | 665 | 333 | -3 |

Assumption:

| | |
|-------------------------------------|---|
| 01. Amount of loan (Tk. In 000) | 33221 |
| 01. IDCP (Tk. In 000) | 1661 |
| 02. Capitalized loan (Tk. In '000') | 34882 |
| 03. Period of loan | 10 years |
| 04. Rate of interest | 12% |
| 05. Mode of repayment | Capitalized loan will be repaid in monthly installment. |

Annexure XV-Amortization Schedule of Term loan

Annexure- XV(Contd..)

(Tk. in 000)

| Installment No | Installment Size | Principal Installment | Interest Installment | Principal paid |
|-----------------------|-------------------------|------------------------------|-----------------------------|-----------------------|
| 1 | 775.93 | 427.11 | 348.82 | 427.11 |
| 2 | 775.93 | 431.38 | 344.55 | 858.49 |
| 3 | 775.93 | 435.69 | 340.24 | 1294.18 |
| 4 | 775.93 | 440.05 | 335.88 | 1734.23 |
| 5 | 775.93 | 444.45 | 331.48 | 2178.68 |
| 6 | 775.93 | 448.90 | 327.03 | 2632.06 |
| 7 | 775.93 | 453.39 | 322.50 | 3085.49 |
| 8 | 775.93 | 457.96 | 317.96 | 3828.88 |
| 9 | 775.93 | 462.54 | 313.39 | 4005.99 |
| 10 | 775.93 | 467.17 | 308.76 | 4473.16 |
| 11 | 775.93 | 471.84 | 304.09 | 4945.00 |
| 12 | 775.93 | 476.56 | 299.37 | 5421.56 |
| 13 | 775.93 | 481.33 | 294.60 | 5902.89 |
| 14 | 775.93 | 486.14 | 289.79 | 6389.03 |
| 15 | 775.93 | 491.00 | 284.93 | 6880.03 |
| 16 | 775.93 | 495.91 | 280.02 | 7375.94 |
| 17 | 775.93 | 500.87 | 275.06 | 7876.81 |
| 18 | 775.93 | 505.88 | 270.05 | 8382.69 |
| 19 | 775.93 | 510.94 | 264.99 | 8893.63 |
| 20 | 775.93 | 516.05 | 259.88 | 9409.67 |
| 21 | 775.93 | 521.11 | 254.72 | 9930.88 |
| 22 | 775.93 | 526.42 | 249.51 | 10457.30 |
| 23 | 775.93 | 531.68 | 244.25 | 10988.98 |
| 24 | 775.93 | 537.00 | 238.93 | 11525.98 |
| 25 | 775.93 | 542.37 | 233.56 | 12068.35 |
| 26 | 775.93 | 547.79 | 228.14 | 12616.14 |
| 27 | 775.93 | 553.27 | 222.66 | 13169.41 |
| 28 | 775.93 | 558.80 | 217.13 | 13728.21 |
| 29 | 775.93 | 564.39 | 211.54 | 14292.60 |
| 30 | 775.93 | 570.04 | 205.89 | 14862.64 |
| 31 | 775.93 | 575.74 | 200.19 | 15438.38 |

**Annexure XV-Amortization Schedule of Term
loan**

Annexure- XV (Contd..)

(Tk. in 000)

| Installment No | Installment Size | Principal Installment | Interest Installment | Principal paid |
|---------------------------|-----------------------------|----------------------------------|---------------------------------|---------------------------|
| 32 | 775.93 | 581.49 | 194.44 | 16019.87 |
| 33 | 775.93 | 587.31 | 188.62 | 16607.18 |
| 34 | 775.93 | 593.18 | 182.75 | 17200.36 |
| 35 | 775.93 | 599.11 | 176.82 | 17799.47 |
| 36 | 775.93 | 605.10 | 170.83 | 18404.57 |
| 37 | 775.93 | 611.16 | 164.77 | 19015.73 |
| 38 | 775.93 | 617.27 | 158.66 | 19633.00 |
| 39 | 775.93 | 623.44 | 152.49 | 20256.44 |
| 40 | 775.93 | 629.67 | 146.26 | 20886.11 |
| 41 | 775.93 | 635.97 | 139.96 | 21522.08 |
| 42 | 775.93 | 642.33 | 133.60 | 22164.41 |
| 43 | 775.93 | 648.75 | 127.18 | 22813.16 |
| 44 | 775.93 | 655.24 | 120.69 | 23468.40 |
| 45 | 775.93 | 661.79 | 114.14 | 24130.19 |
| 46 | 775.93 | 668.41 | 107.52 | 24798.60 |
| 47 | 775.93 | 675.10 | 100.83 | 25473.70 |
| 48 | 775.93 | 681.85 | 94.08 | 26155.55 |
| 49 | 775.93 | 688.66 | 87.26 | 26884.21 |
| 50 | 775.93 | 695.55 | 80.38 | 27579.76 |
| 51 | 775.93 | 702.91 | 73.02 | 28282.67 |
| 52 | 775.93 | 709.94 | 65.99 | 28992.61 |
| 53 | 775.93 | 717.04 | 58.89 | 29709.65 |
| 54 | 775.93 | 724.21 | 51.72 | 30433.86 |
| 55 | 775.93 | 731.45 | 44.48 | 31165.31 |
| 56 | 775.93 | 738.76 | 37.17 | 31904.07 |
| 57 | 775.93 | 746.15 | 29.78 | 32650.22 |
| 58 | 775.93 | 753.61 | 22.32 | 33403.83 |
| 59 | 775.93 | 761.15 | 14.78 | 34164.98 |
| 60 | 775.93 | 768.76 | 7.17 | 34882.00 |

Annexure XVI-Break Even Analysis

(Tk. in '000')

| | |
|--|-------|
| 01. Sales and Service revenue at 90% capacity (4th year) | 23285 |
| 02. Total Cost : Operational, Administrative and Financial | 12232 |

| Item | Total Cost | Fixed Cost | Variable Cost |
|----------------------------------|---------------|---------------|------------------|
| | ----- | ----- | ----- |
| | - | ----- | ----- |
| Wages and Salaries | 1063 | 532 | 532 |
| Stores and Spares | 269 | 135 | 135 |
| Repairs and Maintenance | 582 | 349 | 233 |
| Depreciation and Write Off | 3371 | 3371 | 0 |
| Water, Power and Fuel | 1600 | 640 | 960 |
| Rent, Tax and Insurance | 579 | 579 | 0 |
| Other Expenses | 150 | 60 | 90 |
| Salary (Administration) | 902 | 902 | 0 |
| Postage, telephone and telegraph | 160 | 80 | 80 |
| Stationery and Printing | 300 | 150 | 150 |
| Advertisement | 140 | | 140 |
| Travelling and Conveyance | 160 | 80 | 80 |
| Audit Fee | 50 | 50 | 0 |
| Miscellaneous Expenses | 100 | 50 | 50 |
| Financial Expenses | 2806 | 2806 | 0 |
| | ----- | ----- | ----- |
| Total : | 12232 | 9784 | 2449 |
| | ----- | ----- | ----- |
| | - | ----- | ----- |

P/V Ration : Sales-Variable cost/ Sales 0.8948

Break Even Point (Sales) = Fixed Cost/P/V Ratio 10934 47% of capacity utilization
42% of rated capacity

Break Even Point (cash) = 8249 35.43% of capacity utilization
31.88% of rated capacity

Similarly from Annexure VIII, IX and X it is found that Break Even points are at 68.28%, 53% and 67% of capacity utilization respectively.

Annexure XVII-Projected Fund Flow Statement

(Tk. in '000৳)

| Sources of Fund | Constr. | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|----------------------------------|---------|----------|----------|----------|----------|----------|
| | Year | | | | | |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Paid-up Capital | 23254 | - | - | - | - | - |
| Net Profit before Tax & Interest | - | 11047 | 11945 | 12724 | 13499 | 13493 |
| Depreciation & Write off | - | 3371 | 3371 | 3371 | 3371 | 3371 |
| Bank's term loan | 33221 | - | - | - | - | - |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Total | 58136 | 14418 | 15316 | 16095 | 16870 | 16864 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| <u>Utilization of Fund</u> | | | | | | |
| Capital Expenditure | 57328 | - | - | - | - | - |
| Preliminary Expenses | 615 | - | - | - | - | - |
| Increase in current assets | - | 193 | 16 | 50 | 49 | 0 |
| Repayment of term loan | - | 1662 | 3324 | 3324 | 3324 | 3324 |
| Repayment of Interest | - | 3945 | 3604 | 3205 | 2806 | 1104 |
| Dividend | - | 2325 | 2325 | 2325 | 2325 | 2325 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Total | 57943 | 8457 | 9602 | 9237 | 8838 | 7091 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Cash Surplus/deficit | 193 | 5961 | 5714 | 6859 | 8032 | 9774 |
| Opening Balance of Cash | 0 | 193 | 6154 | 11868 | 18727 | 26759 |
| Closing Balance of Cash | 193 | 6154 | 11868 | 18727 | 26759 | 36533 |

Projected Balance Sheet

Annex - XVII(Contd..)

(Tk. in '000')

| Properties and Assets | Constr. Year | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year |
|--|-----------------|--------------|--------------|--------------|--------------|--------------|
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Current Assets : | | | | | | |
| ----- | | | | | | |
| Cash and Bank Balance | 193 | 6154 | 11868 | 18727 | 26759 | 36533 |
| Other Current Assets | - | 193 | 209 | 259 | 308 | 308 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| | 193 | 6347 | 12078 | 18986 | 27067 | 36841 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Fixed Assets : | | | | | | |
| ----- | | | | | | |
| Preliminary and Pre-operating expenses | 615 | 492 | 369 | 246 | 123 | 0 |
| Fixed Assets (net) | 57328 | 54080 | 50832 | 47584 | 44337 | 41090 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| | 57943 | 54572 | 51201 | 47830 | 44460 | 41090 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Total Assets | 58136 | 60919 | 63279 | 66816 | 71528 | 77931 |
| | ===== | ===== | ===== | ===== | ===== | ===== |
| Liabilities : | | | | | | |
| ----- | | | | | | |
| Short term liability : | | | | | | |
| Term Loan : | | | | | | |
| ----- | | | | | | |
| Bank's term loan | 33221 | 31559 | 28235 | 24911 | 21587 | 18263 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| | 34882 | 32888 | 29232 | 25576 | 21920 | 18260 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| <u>Owner's Equity :</u> | | | | | | |
| Paid-up capital | 23254 | 23254 | 23254 | 23254 | 23254 | 23254 |
| Income tax | - | 2131 | 4633 | 7489 | 10697 | 14414 |
| Retained earnings | - | 2646 | 6160 | 10497 | 15656 | 22003 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| | 23254 | 28031 | 34047 | 41240 | 49608 | 59672 |
| | ----- | ----- | ----- | ----- | ----- | ----- |
| Total Capital and Liabilities | 58136 | 60919 | 63279 | 66816 | 71528 | 77931 |
| | ===== | ===== | ===== | ===== | ===== | ===== |

Annexure XVIII-Financial Rate of Return

(Tk. in '000')

| Year | Investment | Benefit | Net Cash Flow |
|-------|------------|---------|---------------|
| ----- | ----- | ----- | ----- |
| 0 | 57943 | 0 | -57943 |
| 1 | 0 | 14418 | 14418 |
| 2 | 0 | 15316 | 15316 |
| 3 | 0 | 16095 | 16061 |
| 4 | 0 | 16870 | 16837 |
| 5 | 0 | 16870 | 16870 |
| 6 | 0 | 16870 | 16870 |
| 7 | 0 | 16870 | 16870 |
| 8 | 0 | 16870 | 16870 |
| 9 | 0 | 16870 | 16870 |
| 10 | 0 | 17335 | 17335 |

Financial Rate of Return = 19.25%

Assumptions :

01. The economic life of the project has been estimated to be 10 years without any major replacement.
02. The fixed cost of the project has been estimated at Tk. 566.44lac including IDCP.
03. Benefit of the project has been estimated as appended :

| Operating Year | Net Profit | Depreciation/write off | Total |
|----------------|------------|------------------------|-------|
| ----- | ----- | ----- | ----- |
| 1 | 11047 | 3371 | 14418 |
| 2 | 11945 | 3371 | 15316 |
| 3 | 12724 | 3371 | 16095 |
| 4 | 13499 | 3371 | 16870 |
| 5 | 13499 | 3371 | 16870 |
| 6 | 13499 | 3371 | 16870 |
| 7 | 13499 | 3371 | 16870 |
| 8 | 13499 | 3371 | 16870 |
| 9 | 13499 | 3371 | 16870 |
| 10 | 13499 | 3371 | 16870 |

04. Recovery of capital i.e. salvage value of the project at the 10th year

| Item | Cost | Recovery Percent | Total |
|-------------|-------|---------------------|-------|
| Land | 15052 | 100% | 15052 |
| Building | 8836 | 10% | 884 |
| Machinery | 26656 | 5% | 1333 |
| Inventories | 67 | 100% | 67 |
| | | | 17335 |