“Power & Energy Crisis impact on IPS & Battery Market"

Internship Report on Baraka Power Limited

Topic: “Power & Energy Crisis impact on IPS & Battery Market”

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Letter of Transmittal

Date: 28-09-2022

Dr. Syed Mizanur Rahman
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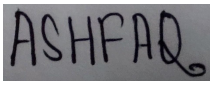
Subject: Submission of the internship report on "Power & Energy Crisis impact on IPS & Battery Market"

Dear Sir,

With due respect, I state that it's a matter of pleasure to me that I am going to submit the report on ''Power & Energy Crisis impact on IPS & Battery Market'' which was observed by you.

I tried my best to follow your rules and guidelines when preparing the report. I tried to collect and collect important information to make the report more specific and valuable. I want to thank you for your help with this report. I will be very grateful if you accept my relationship. Your support in this regard will be greatly appreciated.

Sincerely Yours,



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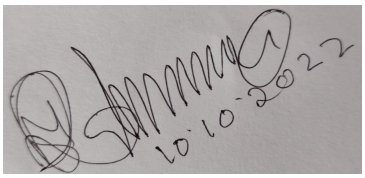
Certificate of Approval

This is to notify you that, Ashfaq Bhuiyan ID: 183-11-6004, has prepared this internship report entitled "Power & Energy Crisis impact on IPS & Battery Market" under my guidance, I hereby approve this internship report. This is for the partial fulfillment of an BBA degree in major HRM under the Department of Business Administration of Daffodil International University.

I wish him every moral success in life.



Dr. Syed Mizanur Rahman

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Acknowledgement

With Immense request, I am Ashfaq Bhuiyan presented the internship at “Baraka Power Limited” as part of the requirements for completing the course. I want to say thank you to everyone who has given me so much support.

First, I would like to express my gratitude to Allah Almighty for giving me the ability and strength to complete this relationship.

Completing this recipe makes me grateful to many people. I would like to thank my leader and teacher Dr. Syed Mizanur Rahman, Associate professor, Faculty of Business & Entrepreneurship, Daffodil International University, helped me improve my relationship by providing the necessary guidance and information. His support and encouragement made this relationship known in real-time.

I would also like to thank the entire family of Baraka Group for their assistance and support in strengthening my skills and providing them with important information related to the paper published here.

Executive Summary

The public corporation Baraka Power Limited (BPL) supplies energy to the northern areas of Dhaka city and the town of Tongi in the Gazipur District. In order to improve the quality of the electricity distribution system as part of the ongoing renovation/reconstruction efforts of Bangladesh's most significant power sector, the corporations Act 1994 authorized the formation of Baraka Power Limited in November 1996.

Grid operation and protection, Sub-station operation and maintenance, commercial operation and system operation of the S & D division of Uttarkhan, Meter Testing lab activities, and Transformer workshop activities of Baraka Power Limited are all covered in this report from the Training and Development Division. During my brief internship of only one month, I focused mostly on learning as much as possible about the company's culture, working environment, and other procedures.

Abstract

The best way to get hands-on experience with topics like power distribution and power substations is via a field attachment. In this study, we've summarized the whole process including power distribution, substation operation, regulation, and numerous protective systems. How to keep the substation running well is discussed here as well. The term "technical department" is used to describe the division of an organization whose employees and/or manpower are responsible for tasks such as operating and maintaining the grid, the distribution substation, the control room, the feeder room, the switching room, installing and removing consumer transformers, maintaining distribution lines, assessing and designing new distribution networks, planning for the future in light of current load assessments, connecting and disconnecting consumer lines, measuring consumption, and constructing new infrastructure. During my internship, I'll be expected to learn about topics including line upkeep, power factor, load control, and sub-station operation. Other processes like metering, billing, collection, load sanctioning, load retention, disconnection, and commercial complaint resolution were also observed.

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Chapter 1: Introduction

The globe is today the culmination of business, financial, and commercial achievements. It will take some time until there is a positive exchange rate everywhere. The marketing and marketing strategy to the reporting firm goes on to discuss the advantages of the exchange rate. They provide a range of courses to educate a successful business career step by step. I work at Baraka Power Limited as an intern. I am appreciative of my co-working community, Baraka Power, for letting me join in, work there, socialize, and broaden my business perspectives. All management duties must be carried out with everything nearby in order to draw clients to the Baraka Power. The main driver of client attraction is physical certification. The pursuit of customer happiness via physical certification is my major focus in this paper.

1.1 Background of the Study

I was given the task of working on Baraka Power Limited for a specific time period of 90 business days from 2 May 2022, as a one-time operation, in accordance with the requirements of the Bachelor of Business Administration (BBA) as a lecturer at the Department of Business Administration and Business Administration at Daffodil International University (DIU). I was employed by Baraka Power Limited at the time and worked in the Battery and IPS Unit. Understanding the distinctions between the Battery, IPS Unit, and Electrical crises at Baraka Power Limited is the primary objective of my vocational training. The knowledge acquired from this study is reflected in this report.

1.2 Scope of the Study

The performance and operation of Baraka Power Limited in combination with the battery and the IPS Unit were the subject of this investigation. Methods and rules have been devised in certain locations close to rural regions to determine if the organization's planning and measuring of cooperation are adequate. The report also examines the programs run by Baraka Power Limited during the IPS and Battery crises.

1.3 The objective of the Study

The report's purpose may be seen from two angles:

General Purpose: This internship report was mainly created to fulfill a requirement for Daffodil International University's bachelor of business administration (BBA) program in the college of business and entrepreneurship (DIU)

Specific Goal: The goals for this report are as follows:

- To understand the fundamentals of IPS and battery
- To analyze Baraka Power Limited's IPS and battery.
- The rationale behind IPS and Battery introduction
- To discover the institution's management's perspective on IPS and Battery

1.4 Methodology of the Study

Many of the approaches used to accomplish the study will affect its goal. In order to give this study its right context, I incorporated both practical and flexible data. Two key sources comprise the whole of the data included in this research. These are:

Primary Sources

- Personal interviews with Baraka Power Limited staff
- Having a conversation with my fellow graduates
- Practical job experience at Baraka Power Limited

Secondary Sources

- A few national and international magazines on IPS and battery
- The study released by Power & Energy Crisis
- Quarterly Power & Energy Crisis reporting on IPS and batteries

1.5 Limitation of the Study

Almost all research projects must deal with certain limitations in order to be completed. Issues that, when broken down, might be gradually helpful for the research are considered obstacles. This internship report is also not without limitations. I had to deal with a few requirements in order to gather information for my report, which are listed below:

1. Lack of knowledge: I have no prior expertise in the gathering, processing, analysis, integration, or presentation of data. Therefore, it might be challenging to find reliable information.
2. Time constraints: There wasn't much time available. Therefore, the time constraint had an impact on the report's final result.

3. A small sample size: The study's scope is constrained by the sample size. Due to the incredibly tiny sample size, there aren't many differences across the samples.
4. Customer readiness: Businesspeople and workers make up the majority of the clientele. They were unable to offer me enough time to complete a questionnaire as a result. Additionally, they are neither hesitant or unwilling to provide relevant information.
5. Lack of Experience: Some relevant knowledge is necessary to prepare a valid internship report. I've done my best to minimize any data bias or data bending that may have crept into this report.

Chapter 2: Overview of the company

2.1 Brief History

Formerly known as Barakatullah Electro Dynamics Limited (BEDL), Baraka Power Limited (BPL) was established on June 26, 2007, and it began doing business on October 24, 2009. It is a joint venture of local and non-resident Bangladeshi businesspeople. Setting of power plants for the production and delivery of energy is the company's main operation. Located in Fenchugonj, Sylhet, it is a 51 MW natural gas-powered power producing firm. On June 22, 2008, the Company and Jalalabad Gas Transmission and Distribution System Ltd. signed a 15-year deal for the purchase of natural gas. A 51% owned subsidiary of Baraka Power Limited is Baraka Patenga Power Ltd. (BPPL). The Company has submitted an application to the BSEC for the book-building technique of floating primary shares of BPPL. BPPL and BPDB entered into a power purchase agreement (PPA) for BPPL to produce and deliver 50 MW of HFO (heavy fuel oil)-fired electricity on a BOO (build, own, and operate) basis for 15 years. On May 4, 2014, BPPL began commercial operation. Karnaphuli Power Limited (KPL) and Baraka Shikalbaha Power Limited (BSPL), two IPP (Independent Power Producer) power plants that are both 51% owned by BPPL, are both HFO-fired power plants. 51% of KPL and 46% of BSPL are collectively owned by Baraka Power. On August 20 of 2019, KPL began using its 110MW HFO-fired power plant for commercial purposes. On May 24, 2019, BSPL's 105MW HFO-fired IPP power plant began operating commercially. Another 51%-owned subsidiary of Baraka Power Limited, Baraka Fashions Limited (BFL), was bought in May 2017. BFL is a 10-line (woven tops) ready-made-garment facility in Tongi, Gazipur, that is entirely focused on exports.

2.2 Mission

To build additional power plants around the nation in order to grow into the biggest power generation firm in the private sector.

2.3 Vision

To supply the great majority of the nation with inexpensive, dependable power for personal, social, and economic growth.

2.4 Slogan

“Lighting Bangladesh, We Promise….”

2.5 Objectives of Baraka Power

- Create and continuously give our clients with power at a fair price.
- Efficient use of resources including money, equipment, materials, and people
- Constant enhancement of resource management and customer satisfaction

2.6 Advantages of Investing

From August 20, 2019, for a period of 15 years from the Commercial Operation Date, Karnaphuli Power Limited (KPL) has begun commercial operation of its 110 MW HFO-fired power plant located in Patiya, Chattogram (COD). Baraka Power Limited has purchased 25% of KPL's stock. Baraka Power Limited has a combined 51.01% of KPL shares via cross holding (with Baraka Patenga Power's 51% ownership). Karnaphuli Power made a 7.40 billion BDT investment with 70% loan finance (Annual report 2019). KPL generated BDT 1,230 million in income from July through March of 2019–20.

- On May 24, 2019, the 105 MW HFO-fired power plant at Shikalbaha, Chattogram, which is owned by Baraka Shikalbaha Power Limited (BSPL), a 51% subsidiary of Baraka Patenga Power Limited and in which Baraka Power Limited has a direct equity investment of 20% and a combined ownership interest of 46.01% through cross holding, began operating commercially. Seventy percent of the BDT 7.50 billion that the company invested came from debt finance (Annual report 2019). BSPL gave BDT 91.63 million to Baraka Power between July and March of 2019–20.
- The first nine months of 2019–20 have shown an improvement in the overall net profit margin. As of July through March of 2019–20, it grew to 15.4%, up from 11.6% over the same time period in 2018. Due to the two newly built HFO-fired power plants' increased energy production and cheaper cost of sales, the gross profit margin increased. BPL collectively owns 46% of Baraka Shikalbaha Power Limited, which generated BDT 92 million in earnings from July through March of 2019–20.

Chapter 3: Industry Overview of Baraka Power limited

The most crucial industry for the growth of the economy is the fuel and electricity sector. In Bangladesh, like in other emerging nations, there is a rising need for power. The Power System Master Plan (PSMP) predicts that during the next five years, demand would increase by an average of about 11%.

One of the fastest-growing electricity sectors in South Asia is in Bangladesh. According to the World Bank and the Bangladesh Power Development Board, the rise in terms of capacity addition has been extraordinary, rising from 5% to 28% between 2012 and 2018.

As capacity has expanded, so has use of electricity. The main sources of the nation's electricity demand are the domestic and industrial sectors. With an increase of 12.06% in FY17, the industrial sector has had tremendous development during the previous six to seven years. The nation's RMG manufacturing, infrastructure construction, and pharmaceutical sectors are major growth drivers.

19,000 megawatts are the total power generating capacity of 137 public-private power plants (MW). An official with the electricity division claims that 80 of them have 9,000 MW of generating capacity. Additional 28 private power plants are being built, while 12 more are awaiting clearance. Additionally, 18 public sector power plants with an 8,900 MW output capacity are now under development. As of January 2020, the nation's installed power generating capacity was 19,580 MW, with its peak power generation occurring on May 29, 2019, at 12,893 MW. The contribution of the public and private sectors to the nation's total electricity production as of December 2019 is 50%–50%. By 2021, the administration wants to have energy available across the whole nation. In order to supply power to everyone, the government intends to increase electricity output to 24,000 MW by 2021 and to 40,000 MW by 2030.

In Bangladesh at now, natural gas is the main fuel source. According to statistics from the Bangladesh Power Development Board (BPDB), as of November 2019, 56.34% of power plants rely on natural gas, 26.69% on furnace oil, 7.00% on diesel fuel, 2.68% on coal, 1.18% on hydropower, and 5.93% on imported fuel.

The following table shows the nation's installed generating capacity (MW) as of December 2019:

Particulars	Installed Generation Capacity (MW)	% of Total
Public Sector		
BPDB	5,613	28.68%
APSCL	1,444	7.38%
EGCB	957	4.89%
NWPGCL	1,395	7.13%
RPCL-BPDB JV	331	1.69%
Sub Total	**9,740**	**49.77%**
Private Sector		
IPPs	6,916	35.34%
SIPPs (BPDB)	99	0.51%
SIPPs (REB)	251	1.28%
15 Yr Rental	169	0.86%
3/5 Yr Rental	1,235	6.31%
Power Import	1,160	5.93%
Sub Total	**9,830**	**50.23%**
Total	**19,570**	**100%**

APSCL: Ashuganj Power Station Company Ltd. (Bangladesh); **EGCB:** Electricity Generation Company of Bangladesh; **NWPGCL:** North West Power Generation Company Ltd.; **RPCL:** Rural Power Company Limited (Dhaka, Bangladesh); **IPPs:** Independent Power Producer; **REB:** Rural Electrification Board;

The government's revenue authority extended the private power production businesses' tax exemption facility by three and a half years, until December 31, 2019, in August of 2016. For private power plants that meet the requirements of Bangladesh's private sector power generating policy, the country's Income Tax Ordinance of 1984 provides a tax exemption on profits made from the sale of electricity.

Several incentives are provided by the government to private power companies and foreign lenders in this sector. These include a 15-year tax holiday for businesses, the elimination of customs duties, value-added taxes, and other surcharges on imported plans and equipment

worth up to 10 percent of the project's original value for a period of 12 years, and the unrestricted repatriation of equity and dividends.

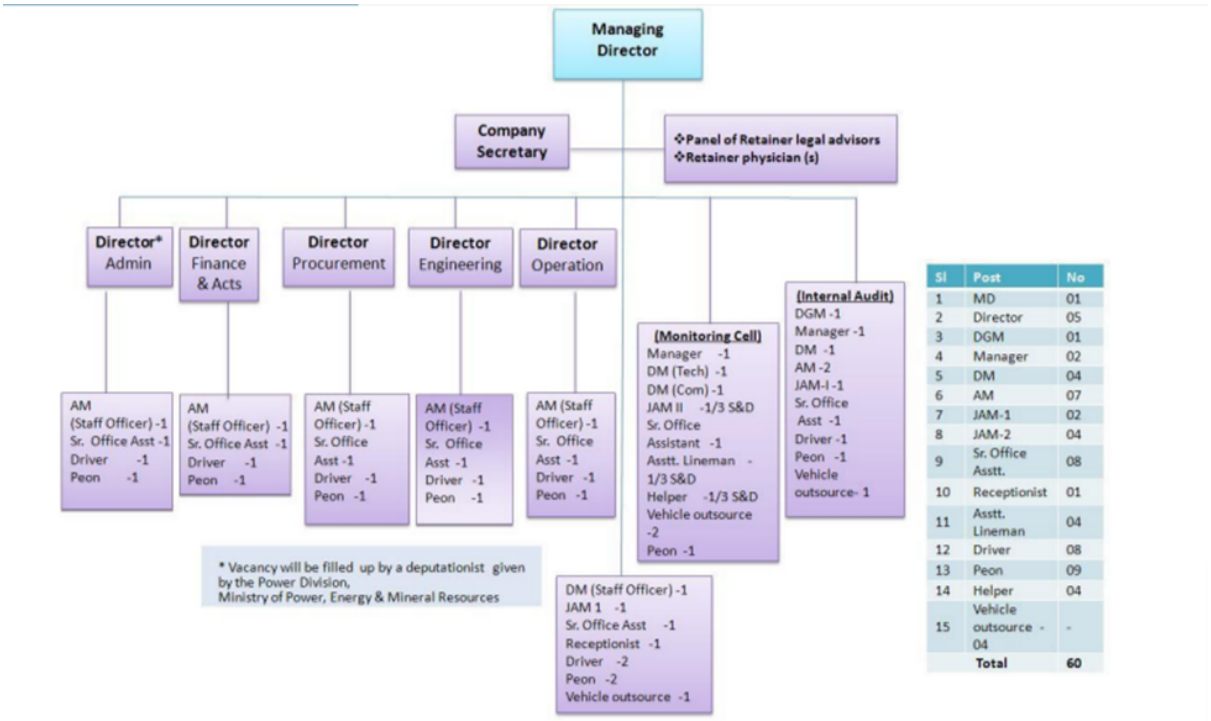
The government has given private power plants greater tax breaks in the hopes of making their electricity more competitively priced. In 2020, the National Board of Revenue eased the terms of the tax break for all private power generators except those operating coal-based power plants. Businesses in the private sector of electricity generating will benefit from a variety of tax breaks until 2034. The power plant's international workers will be exempt from taxes for three years if they work there. Additionally, the business will not have to pay taxes on its foreign loan interest, royalties, fees for technical know-how or support, or fees for technical help.

Several obstacles stand in the way of progress in Bangladesh's electricity industry. The primary obstacles to achieving the aim include the poor financial condition of power-producing firms, a lack of natural gas, power plant inefficiency and a low plant load factor, an inaccurate demand-supply analysis, a lack of renewable energy potential, and a lack of competence.

Chapter 4: Systems of Baraka Power Limited

4.1 Baraka Power Limited HQ

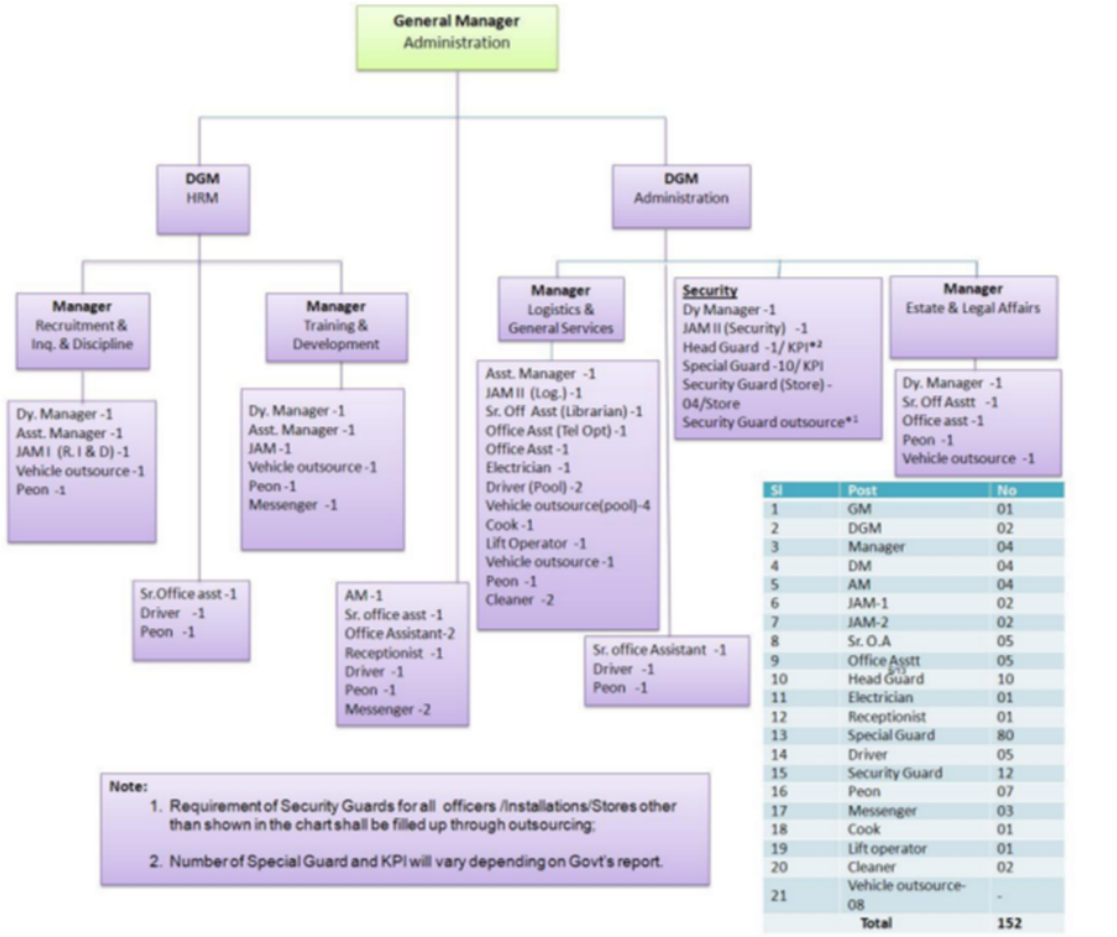
Within Baraka Power Limited, you'll find the following divisions: Administration, Engineering, Finance and Accounts, Procurement, and Operations. Everything that has to be done to keep a huge firm running smoothly is handled at headquarters.



Sl	Post	No
1	MD	01
2	Director	05
3	DGM	01
4	Manager	02
5	DM	04
6	AM	07
7	JAM-1	02
8	JAM-2	04
9	Sr. Office Asstt.	08
10	Receptionist	01
11	Asstt. Lineman	04
12	Driver	08
13	Peon	09
14	Helper	04
15	Vehicle outsource - 04	-
	Total	60

The following are the places that were included in the Baraka Power Limited office tour:
Administration Department
The Administration Division is also responsible for training and development.

- At the outset of the technical attachment, the author visited Baraka Power Limited's Training Center to get an overview of the company. The author was briefed on the internship's protocol, guidelines, and restrictions.
- Division of Administration: The author was given a quick overview of administrative processes to follow.



Sl	Post	No
1	GM	01
2	DGM	02
3	Manager	04
4	DM	04
5	AM	04
6	JAM-1	02
7	JAM-2	02
8	Sr. O.A	05
9	Office Asstt	05
10	Head Guard	10
11	Electrician	01
12	Receptionist	01
13	Special Guard	80
14	Driver	05
15	Security Guard	12
16	Peon	07
17	Messenger	03
18	Cook	01
19	Lift operator	01
20	Cleaner	02
21	Vehicle outsource-08	-
	Total	152

4.2 Finance and Accounts Division

The divisions of Finance and Accounts work together to oversee the company's financial operations as a whole for Baraka Power Limited. The Information and Communications Technology Department (ICT) is part of the Finance and Accounts Division that is responsible for creating and monitoring customer invoices. Here's a quick rundown of how these two departments interact with one another:

Monthly operational data is used to generate customer bills (handled by ICT).

- Financial institution billing funds are collected and deposited into a centralized account.
- Taking care of the money.
- Creating a spending plan.
- Budget breakdown for Baraka Power Limited's several departments, including wages.

Chapter 5: Energy crisis in Bangladesh

The majority of Bangladesh's population still resides in the countryside, making it one of the most populous nations with a mostly rural population. Bangladesh, whose economy is mostly dependent on agriculture, has had yearly growth rates of around 5% in recent years (ADB, 2001). Rice and jute are the two most important crops. We, the people of Bangladesh, are suffering from a severe energy shortage. It's a shame that after 39 years of independence, we still haven't found a solution to this issue as a country. No matter which governments are in power, this problem never seems to go away. As a rule of thumb, when we talk about a "energy crisis," we're talking about a lack of available electricity. In this talk, we'll attempt to think about some potential answers that may help us.

5.1 As It Is Right Now

A much of Bangladesh's energy infrastructure is outdated, undersized, and poorly maintained. Bangladesh has one of the world's lowest per capita energy usage rates, at about 136 kilowatt hours (kWH). It is estimated that more than half of the nation's energy consumption comes from noncommercial sources including wood, animal wastes, and agricultural leftovers. Although the country's oil and coal reserves are relatively modest, the country's natural gas resources are enormous. Natural gas accounts for around 66% of commercial energy usage, followed by oil, hydropower, and coal. Most of the country's economic operations rely heavily on electricity. In 2009, Bangladesh had an installed electric generating capacity of 4.7 GW, although only around three-quarters of that capacity was actually usable. Per capita electricity production is 136 kWh per year, however only 40% of the population has access to it. Inconsistent power supply, electricity theft, blackouts, and a lack of funds for power plant maintenance are just some of the issues plaguing Bangladesh's electric power sector. Other issues include corruption in administration, high system losses, delays in completion of new plants, low plant efficiencies, and high system losses. Over the last decade, the nation's power plants have fallen short of system demand.

Insufficient load management in energy generation and distribution causes widespread power outages, which in turn severely disrupts manufacturing and other economic activity.

According to a recent assessment, power interruptions cost Bangladesh's economy $1 billion per year in lost industrial production, or approximately half a percentage point of GDP growth. The inefficiency of the distribution system is a significant barrier to providing electricity to customers. In Bangladesh, it is projected that one-third of the value of the annual generation is lost due to transmission and distribution costs, amounting to $247 million. The country's current power shortfall of 1500 MW has disrupted many aspects of life, including agricultural and industrial output. Due to delays in completing the three years' worth of rental power projects, the ministry has had trouble completing its other mid-term projects on time. These include the Sirajgonj-150 and Khulna-150 MW power plants funded by the Asian Development Bank, the Shiddhirganj-360 MW power plant funded by the World Bank, and the Haripur 360 MW power plant funded by the Japan Bank for International Cooperation. Since the most recent bids for three separate power plants had to be abandoned due to bidder demands, the Power Development Board (PDB) is having a difficult time finishing the steps necessary to build two public sector power plants.

5.2 The Causes of Insufficient Energy Independence

Bangladesh is experiencing a severe energy crisis as a result of bad policymaking, bureaucracy-dominated energy sector governance, poorly organized energy sector management, and corruption. There is a sizable, untapped gas reserve both onshore and offshore. Incorrect politics and a lack of long-term vision have prevented the massive resource of high-quality coal at a mineable shallow depth from being exploited. Government policy officials, confused by the severity of the situation and misled by the energy mafia syndicate's pursuit of profit, have launched an unrealistic and unlikely proposal to import coal and LNG to address the current and future energy crises. Over the past decade, the energy situation in many countries has worsened for the following reasons.

- There has been extensive politicization of energy policymaking.
- Lack of competence among energy bureaucrats.
- Lack of depth perception and poor decision making.
- The weak state-owned firms and the poor energy price.
- The system has a high loss and the accounts receivable are quite large.
- A portion of society's intransigence towards open borders for foreign direct investment in the energy industry.

- When it comes to state-owned energy companies, corruption and poor management are rampant.
- Massive corruption at the highest levels and a lack of punishment for corrupt Syndicates.

Donor assistance via lenient lending windows was crucial to the growth of Bangladesh's energy sector. Reforms were constantly recommended by donors as a means to cut down on waste and graft. Donors consistently ignored the terms of the initial loan agreements once a project was completed. As a consequence, state-owned businesses have become essentially ineffective and are unable to generate sufficient profits to reinvest in the growth of their networks or the exploration and exploitation of their own natural resources. Energy costs are still far more than they should be, and the system loss is enormous. The politics of revenge are not conducive to cross-party dialogue and compromise on energy policy at the national level. The major players all put the blame on each other.

5.3 Emerging Strategies

In order to bring load shedding down to a manageable level during the next four and a half years of the current government's tenure, the Ministry of Power and Energy has been mobilizing Tk 40,000 crore ($5.88 billion) to create 5,000 MW of power. In order to end load shedding before the end of the year, the Power Development Board (PDB) proposed increasing gas-fired power production by 500 MW between July and December 2009. It was planned that between January and June of 2010, the PDB will contract with the private sector to rent 1,000MW of energy generated from furnace oil. The government plans to build a new 800 MW power plant using furnace oil in 2011. In 2012, the government plans to employ an additional diesel or furnace oil based power plant with a 700 MW capacity to keep load shedding to a minimum. The government is also considering a public-private partnership (PPP) to build four coal-fired based power plants in the Rajshahi and Chittagong area, each with a capacity of generating 500 MW of energy. The first goal the government set for itself was to raise Tk 6,000 crore ($1 billion). The Power Sector has made efforts to use the Tk. 2000 Crore allocated by the government for PPP. PDB chairman ASM Alamgir Kabir stated the New Nation on June 29, 2009 that "if we can build the fund of Tk. 6,000 crore, it would also be viable to raise Tk 40,000 crore through ppp to produce 5,000 MW of energy within four and a half years."

5.4 What Should be done

Importing LNG or coal or electricity from India will not address the problem. We need to take decisive action to discover and use our own coal and gas and to build our transmission infrastructures; we need to rationalize energy pricing; and we need to establish incentives in energy firms so that competent people may contribute without excessive political influence. A widespread uprising is possible if the government does not quickly alter its failing policy. The gas industry has botched its duty of competent management. They are not held responsible, however, since the people at the forefront have such strong political loyalty. Some progress was achieved in the power industry. As a result of its inability to function without a steady supply of gas and coal, it is mostly irrelevant. Power plants cannot continue to rely on imported fuel indefinitely. Massive private sector investment is required immediately in the power and energy industry throughout the whole energy value chain. However, BERC is still in its early stages and lacks the functionality necessary to inspire investor trust. It has not succeeded in providing a fair playing field on which all investors may thrive. Even with the help of parasitic political parties, known agitators are still protesting in the streets against FDI. It is suggested that you do the following steps:

- Corporationization of Petrobangla and PDB in full
- Energy and power systems need comprehensive changes and reorganization.
- Reduce the role of the Ministry of Energy and Power to policymaking and business facilitation, and bring BERC online.
- It is imperative that electricity and energy corporations be given complete independence.
- Whether you agree with the government's coal policy or not, you may legally start coal mining by following the relevant laws and regulations.
- Eliminate the Energy Indemnity Act and encourage development through the ICB.
- Let the BERC handle the oversight of the Energy Business on its own.
- After making the necessary changes to the Draft PSC, a new round of offshore and onshore block bidding for petroleum may begin.
- Put qualified people in positions of authority and management inside the energy industry.
- Parliamentary debate on energy policy concerns and oversight of the sector's top executives are encouraged.

We may also employ other strategies to boost power output in our nation. To increase hydroelectricity production, we may be flexible. In light of the fact that natural gas is now the primary fuel source for power generation, it is imperative that significant effort be made into the discovery and administration of new gas resources. More than anything else, though, we have to begin using sustainable energy sources like biomass, solar, and wind.

5.5 The backing of policy

Bangladesh's "National Energy Policy (NEP), 1995" has regulations for RETech. Along with BPDB, the government has established the "Private Power Production Policy, 1996" to encourage private sector engagement in the energy generation sector of the country. As a result, a number of Independent Power Producers (IPPs) are now delivering power to the national grid. In addition, the "Small Power Producing Policy, 1998" was enacted to promote private-sector power generation facilities with a capacity of up to 10 MW around the nation. The Power Cell of MEMR has presented a "Draft Renewable Energy Policy" to the Government of Bangladesh, although it has not yet been approved (GOB). Renewable energy sources such as solar insolation and biomass are abundant in Bangladesh. Considering that rural people would likely not have access to traditional energy supply in the near future, harnessing these resources seems like a potential alternative for enhancing the quality of life in these communities.

Though only some areas of Bangladesh have access to reliable energy, the government is making concerted efforts to rectify this. There has been a disruption in the supply of energy due to rising demand, which has been assisted by poor planning and questionable decision-making. Furthermore, the general public's unconscious usage contributes to the issue. There is hope that this vexing issue may soon be resolved, thanks to the government's efforts to boost power output, provided that we all work together to make efficient use of electricity. Let us pool our resources and keep our fingers crossed.

Chapter 6: An overview of IPS and Battery manufacturers

The Navana Group (formerly known as the Islam Group) founded its flagship company, Navana Limited, in 1964. In order to manufacture various types of vehicle batteries (from tiny cars to large lorries) and promote them in the nation, Aftab Automobiles Ltd., a Navana Group company, created a Battery Manufacturing unit in January 2002. The production plant of this business employs 82 people, and the sales and service center employs 20 people (both Dhaka and Chittagong). White Products and Electronics Limited (WP&EL) was established on July 17th, 1996, with a firm commitment to bringing in cutting edge technology and manufacturing high-quality goods. Rangs Power Batteries are produced in-house under the rigorous supervision of highly qualified engineers and a solid quality assurance department. For use in automobiles, commercial vehicles, rickshaws and three-wheelers, IPS, solar systems, and industrial applications, it stores rated power and guarantees continuous operation throughout its lifespan. After-sale service facilities are evenly located around the nation and employ skilled engineers and technicians. earned the certifications ISO 9001, ISO 14000, and OHSAS for their quality management, environmental protection, and health safety standards. With the goal of dominating the accumulator market, HAMKO Group set out on its adventure in 1979. HAMKO is currently Bangladesh's top producer of lead acid batteries after three decades in business. HAMKO is a pioneering manufacturer of battery components and chemicals that supports and serves other battery enterprises across the nation. As a provider of solar batteries, solar panels, and other associated accessories to the rural electrification project by various NGOs and System integrators domestically and internationally, HAMKO Group is also assisting in the growth of renewable power generation. In its future endeavors, HAMKO Group will be very focused on developing the Energy Technology industry and fostering the growth of all of its partners and stakeholders. The Panna Group (PG) set off on its voyage in 1980.

Panna Group sought to create a significant manufacturing company with a base in Bangladesh through acquisitions and other ways from a raw materials dealer. In 1978, Panna Group unveiled Panna Battery Ltd., a reputable company that has been approved as a manufacturing and export operation by the government of Bangladesh. Additionally, it has certifications for ISO 9001-2008, ISO 14001-2004, and BSTI. The International Battery Council, USA, has them as a permanent member. More than 17 nations around the world, including Asia, Africa, Latin America, the Middle East, North America, and Europe, have longstanding relationships with and a strong following for their high-quality products. 95 million dollars in turnover per year. Numerous honors have been bestowed to the group, including the Engineering Export Award and the National Export Award. The largest lead-acid battery producer in Bangladesh is Rahimafrooz Batteries Ltd. (RBL). The corporation is a key participant in the region, dominating the domestic market and pursuing international expansion in more than 44 nations. In its factories in West Panisail, Zirani Bazaar, and Gazipur, it produces about 200 different types of batteries for automobile, motorbike, IPS, and other uses. The business upholds excellent operational standards that are recognized by certification in both the ISO 9001 and ISO 14001 standards. The business has also adopted the OSHAS 18001 standard's occupational health and safety management system in order to safeguard the health and safety of its employees while at work.

6.1 Primary Market Trends

The market will be dominated by SLI Batteries (Starting, Lighting, and Ignition).

- Automobiles are the target market for SLI batteries. As a result, they are permanently attached to the charging system of the car, enabling a continuous cycle of battery charge and discharge while the vehicle is in operation.
- The demand for SLI batteries to start internal combustion engines, power lights, motors, and other devices is the main driver of the SLI battery market's expansion in Bangladesh. These batteries are cost-effective, high-performing, and long-lasting. Additionally, the industry is expanding significantly as a result of an increase in mobile towers.

- Additionally, lead-acid batteries are the preferred technology for all SLI battery uses in traditional combustion engine vehicles, like cars and trucks, globally. The market for lead-acid batteries has grown as the number of three-wheelers on the road has increased. Except for 2020, Bangladesh has had a consistent increase in automobile sales over the past few years. But in the upcoming years, sales are probably going to accelerate.
- Although the demand for conventional internal combustion engines is anticipated to decline in Bangladesh over the next 30–40 years due to the rise of electric vehicles, the demand for SLI batties is anticipated to rise during this time due to the rise in the country's adoption of conventional internal combustion engines.

As a result of these reasons, SLI batteries are anticipated to rule the lead-acid battery market in Bangladesh over the course of the forecast.

6.2 The market's demand is being driven by an increase in uninterruptible power supply systems

- The battery is charged and discharged by the IPS system using an inverter that transforms AC to DC and vice versa. Because it is affordable and has a large storage capacity, this system uses a lead-acid battery in conjunction with an inverter as its power supply.
- Bangladesh experiences inconsistent power supply as a result of supply-demand imbalances, transmission losses, inefficient plants, and electricity theft, which makes IPS systems profitable.
- Bangladesh's economy expanded significantly between 2010 and 2020. As a result, in 2020, the nation's gross national income per capita climbed to 5,310 dollars at PPP. Due to this consideration, people can now afford higher living standards and accommodate IPSs to deal with the unstable power supply.
- Additionally, over the past ten years, the nation has seen an increase in the number of cellular customers. It increased from 67.92 million in 2010 to 170.14 million in 2020, necessitating the construction of new capacity in the form of telecom towers that need IPS systems. The market for lead-acid batteries and IPS systems is predicted to benefit from the expected growth in cellular subscribers during the timeframe of the projection.

- The demand for lead-acid batteries is anticipated to increase in Bangladesh over the forecast period as a result of the aforementioned causes.

6.3 Financial analysis of Navana and Rahimafrooz (Battery Unit)

Particulars	Rahimafrooz Batteries Ltd.	Percent (%) On the basis of Sales	Navana Batteries Ltd.	Percent (%) On the basis of Sales
Sales Revenue	2,605,227,370	100.000%	498,689,132	100.000%
Cost of goods sold:	2,104,277,839	80.771%	355,322,803	71.251%
Gross profit	**500,949,531**	**19.229%**	**143,366,329**	**28.749%**
Less: Operating Expenses:				
Administrative Expenses	298,264,314	11.449%	8,887,858	1.782%
Marketing and Selling Expenses	57,566,380	2.210%	32,554,197	6.528%
Operating Profit	**145,118,837**	**5.570%**	**101,924,274**	**20.438%**
Less: Financial Expenses	51,881,470	1.991%	15,381,235	3.084%
Add: Non-Operating Income	27,002,246	1.036%		0.000%
Net profit before contribution to WPPF and WF	120,239,613	4.615%	86,543,039	17.354%
Less: Contribution to WPPF and WF	5,725,696	0.220%	4,121,097	0.826%
Net profit before tax	**114,513,917**	**4.396%**	**82,421,942**	**16.528%**
less: Provision for current tax	-52,557,752	-2.017%	-26,037,250	-5.221%
Less: Provision for deferred tax	-42,791,417	-1.643%		0.000%
Net Profit After tax	**19,164,748**	**0.736%**	**56,384,692**	**11.307%**

6.3.1 Interpretation

Sales and Gross Profit

Rahimafrooz has higher sales and gross profits in absolute terms than Navana Batteries Limited. But compared to Navana Batteries Limited (28.404%), the ratio of gross profit to sales is somewhat low (19.229%).

The cost of sales

In comparison to Navana Batteries (71.596%), Rahimafrooz Batteries Limited has a comparatively high cost of sales as a percentage of sales (80.771%). Rahimafrooz, on the other hand, has a dismal profitability rate of 19.229% compared to Navana Batteries' 28.404%.

Operating Expenses(Administrative, Marketing & Selling, Finance expenses) and Contribution to WPPF and WF with considering Nonoperating Income:

On the other hand, Navana Batteries has operational expenses as a proportion of sales (12.221%), while Rahimafrooz's operating costs and contribution to WPPF and WF are both 15.869% of sales. Due to the low gross profit margin (19.229%) compared to sales, it is insufficient to meet operational costs and WPPF and WF contributions. Because of this, Navana Batteries' net profit before taxes is 11.307% whereas its net profit before taxes is 4.396% of sales.

Net profit:

Rahimafrooz's net profit is higher in absolute terms (Tk. 19,164,748) than Navana Batteries' (Tk. 19,117,020). In contrast, Navana Batteries (7.778%) has a much higher net profit as a percentage of sales (0.736%).

Chapter 7: Finding and analysis

To combat the energy problem and meet the rising demand for electricity, Bangladesh must take considerable initiatives toward energy independence. As will become clearer later, these steps need a variety of different kinds of efforts and activities.

Because of its reliance on fossil fuels (natural gas, coal, and oil), Bangladesh must prioritize the development of renewable energy. If no new source is discovered, indigenous gas will run out in the next decade to ten years. Industrial, commercial, and residential gas waste in the current pipeline gas distribution network must be reduced by increased onshore and offshore gas and oil exploration, grid extension, the use of net metering, and the advancement of smart grid technology. Coal is expected to account for around 35% of Bangladesh's total energy output by 2041 (PSMP, 2016), hence the country has to conclude its comprehensive coal strategy by addressing regulatory hurdles and environmental concerns. It is also important to set up an efficient line of contact with prospective coal-importing nations like India, Indonesia, China, and Australia.

Second, renewable energy is another option, and it should be Bangladesh's ultimate goal in the long run. Recent data show that renewable sources of energy might soon be the primary source of power production (Hosenuzzaman et al., 2015; Saidur, 2010). Alternative energy sources, such as renewable energy, are still believed to be too costly for widespread use. The government of Bangladesh has set goals to produce 15% of total power from renewable sources by 2041, in light of the country's promising renewable energy possibilities. However, renewable energy penetration in Bangladesh is still very low and will fall well short of the power sector's 2041 goal. Biomass and biogas are also often regarded as promising technologies with room for improvement. If the right laws, initiatives, and technological advancements are put in place, wind may be incorporated as a substantial contributor to renewable energies to help address the energy issue (Islam et al., 2008; Biswas et al., 2011; Khan and Khan, 2011). According to a recent assessment by the Department of Energy's National Renewable Energy Laboratory, coastal areas of the United States have the ability to produce 30,000 MW of power from wind at 120 m height (Mark et al., 2018). As a result, the

government should provide incentives to both domestic and international investors in order to encourage them to put money into renewable energy.

In addition to renewable and conventional energy sources, nuclear power is an inescapable consideration for a nation like Bangladesh that has a serious energy deficit. Financially, nuclear power has potential in the long run (Rubbia, 2005). Investment, safety, security, proliferation, waste management, and skilled expertise are all obstacles that must be overcome in order to introduce nuclear power in underdeveloped nations. When completed, the first NPPs at the Rooppur site would account for 10% of the country's total energy output and produce 1,200 MW by 2023 and another 1,200 MW by 2024. However, given the current demand, a great deal more nuclear power will have to be created. Adding additional units to the Rooppur NPP plant makes financial sense. More nuclear power might be generated if other southern locations (Khulna, Patuakhali) were chosen (Karim et al.,2018).

A strong regulatory framework for energy efficiency and conservation programs is the fourth point to consider (EE&CP). Potential energy savings in the industrial, commercial, and residential sectors are predicted to be 21%, 10%, and 28.8%, respectively (EE&CMP, 2016). An effective energy management program may be the key to reaching this goal of reduced energy use. Bangladesh's government has established an EE&CMP through 2030 with the goal of cutting energy consumption significantly and increasing energy efficiency relative to GDP by 15% by 2020 and 20% by 2030. (EE&CMP, 2016; ADB, 2014). However, it is unclear if the current structure and actions will be sufficient to reach the 2030 goal. This means that EE&CP must be included into sector master plans, energy strategies, and regulatory frameworks. Equipment that is more efficient in terms of energy use, energy audits, cogeneration, frequent monitoring, evaluating the success of the EE&CMP, and awareness-raising via education, information, and communication campaigns should all be part of the regulatory framework.

Fifthly, energy auditing should be done routinely as part of the energy efficiency and conservation program to monitor the accounting system for energy supply, consumption, and evaluation of energy conservation initiatives (Krarti, 2016; Khare et al., 2012; Zhu, 2006; Anderson and R.G, 2004). By analyzing energy consumption records, auditors may determine where and how power is being wasted across all facilities, operations, and

appliances (Fischer, 2008). The auditor's job is to take a look at how much power the company is currently using and provide suggestions for making it more efficient via better management that cuts down on unnecessary consumption. Conventional mechanical methods, inefficient electric motors, and a general lack of awareness all contribute to significant energy waste (Saidur, 2010). Cogeneration systems and encouraging energy audits are two more ways in which businesses may reduce their energy use (Khan, 2014; Dobes,2013; Abdelaziz et al., 2011; Benelmir and Feidt, 1998). By conducting energy audits on a regular basis, businesses and factories may find places where they can improve their technology adoption and energy efficiency. Whether an industry uses wires or not, there is a great potential for energy savings when machinery and equipment are monitored online.

Sixthly, an energy culture may be created via the program of energy efficiency and conservation by altering people's perceptions and values (Hards, 2013; Gadenne et al., 2011; Oikonomou et al., 2009; Poortinga et al., 2003). To effectively reduce energy use, it is crucial to have a model based on theory, analysis, and statistics that represents the energy culture of a country (Sweeney et al., 2013). A significant quantity of energy may be saved from wasted sources in both business and homes by encouraging a culture of energy among its citizens (Lawson and Williams, 2012; Stephenson et al., 2015; Ke et al., 2012; Lee and Harrison, 2000). Organizational and individual energy culture should be tied to energy efficiency and conservation initiatives.

Last but not least, energy security may also be guaranteed by regional collaboration. As with many other nations in the region, Bangladesh belongs to the South Asian Association for Regional Cooperation. Focusing on the South Asian energy market for rapid economic growth, a number of regional and regional cooperation initiatives were introduced, including the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), Bangladesh, China, India, and Myanmar (BCIM), Bangladesh, China, India, and Myanmar-Economic Corridor (BCIM-EC), Bangladesh, Bhutan, India, and Nepal (BBIN), and Bangladesh, Myanmar, India (BMI) (Shahi, 2015; Hossain, 2012, 2015). Energy investment, commerce, technology transfer, and knowledge between countries should be a top priority for Bangladesh under subregional and bilateral agreements. Foreign direct investment will increase as a result of cross-border cooperation in the energy sector, which will aid in the effective use of resources, the expansion of regional markets, the development

of multilateral energy infrastructure, and the creation of new investment prospects. The cross-border connection with India has allowed Bangladesh to increase its power capacity by 1160 MW. The expansion of the South Asian electrical market has been greatly facilitated by these networks. It is possible to fulfill projected increases in energy consumption via bilateral, regional, or international power trade with South Asian nations (Rodrigo, 2015; Hossain, 2012; CIA, 2011). In order to solve Bangladesh's energy issue by 2041, this research presents a framework/roadmap for doing so, which is shown in Fig. It focuses on four major areas: energy independence policy and planning, capacity development, funding, and implementation methodologies. In light of this, the government of Bangladesh should allocate a larger portion of public expenditures and manage foreign money supplied by donor organizations to the energy and power industry. The following are some concrete suggestions for resolving Bangladesh's energy problem and overcoming the difficulties facing the country's power industry that was uncovered in the course of this research:

The inability to reliably estimate future energy and power demand due to a lack of regulatory measures, strong governance, and local energy specialists in the industry is a result of the current draft energy and power regulations that are in place. Experts and practitioners in the energy sector should develop preventative policies and decision-making mechanisms to avoid this.

I. Address obstacles in the creation of renewable energy resources and alternative power sources via improved policy and increased cooperation.
II. Promote energy-efficient electrical appliances, engines, buildings, etc. by enacting and developing a variety of policies, laws, regulations, and recommendations relevant to energy conservation and efficiency.
III. Maximize the potential of energy and power research and development companies by providing them with the resources they need to thrive, including the most talented and hard-working members of the workforce.
IV. Create well-funded energy engineering programs at public and private colleges so that students may learn everything there is to know about energy policy, system planning, diplomacy, finance, exploration, trading, management, efficiency, conservation, etc.

V. Put technical professionals, not bureaucrats, in charge of the energy and electricity industry, since this would improve governance (point (vi)). They will be equipped with the knowledge necessary to keep an eye on energy and power projects, make sure they run smoothly, and prevent wasteful practices like corruption from occurring.

VI. Make use of South Asian energy resources to their full potential by enforcing and enhancing regional and sub-regional cooperation agreements.

Chapter 8: Conclusion and recommendation

8.1 Conclusion

This internship program at Baraka Power Limited was an amazing experience. One of the top training facilities in our nation for electrical and electronic engineers is Baraka Power Limited. The author has to mention that Baraka Power Limited put the ideas she acquired at my university into practice. I consider myself very fortunate to be participating in an internship program with Baraka Power Limited, a reputable power distribution firm. I was able to put my academic knowledge into practice thanks to it. The following are my accomplishments at Baraka Power Limited:

- My practical knowledge has improved because of the industrial training I received from Baraka Power Limited.
- My ability to think practically about how the various pieces of equipment whave has increased as a result.
- My confidence level has risen in preparation for upcoming job interviews.
- I had the opportunity to see the substation's equipment thanks to Baraka Power Limited.
- The welcoming atmosphere of Baraka Power Limited inspired me to work with others.

8.2 Recommendation

The author already has some understanding of the actual functioning of Baraka Power Limited. But trying to learn everything in a short amount of time was a pretty challenging effort. I was unable to reach every location or take enough photos due to various privacy issues. It was really challenging to visit and learn about Agargaon and Basundhara Substation due to mechanical or technical issues. I was exposed to various mechanical equipment during my internship. However, I ran into several issues when observing this equipment as a BBA student.

Modern energy management and the national economy rely heavily on switchgear, protection, and network automation. National and regional grid control as well as voltage, frequency, power, and waveform control under varying load conditions are all made possible through the coordinated efforts of a computer-controlled network called Automation by Load Control Centre, power station control rooms, substation control rooms, and communication channels. The responsibility of overseeing the transmission and distribution of electricity has been given to Baraka Power Limited. In my training, I was taught how to regulate and operate breakers, isolators, recognize alarms, and observe signals. Testing the dielectric strength of oil in a transformer, measuring the insulation between wires, etc., are all examples of the sorts of upkeep I've been exposed to. I believe Internship programs like the one offered by Baraka Power Limited should be maintained. To those who are nearing the end of their engineering degree, this is a terrific resource.

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