Draft

The Power and Energy Sector of Bangladesh: *Challenges of Moving beyond the Transition Stage*

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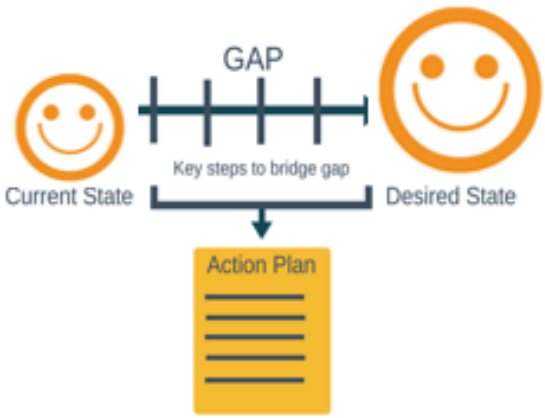
1. Background and Objectives of the Study

The power and energy sector is one of the success cases of the present government during its earlier regimes. This has happened because of undertaking targeted initiatives over the last one decade with a view to come out from the crisis of electricity in the country. The sector is moving towards attaining long term goals for ensuring energy sustainability: 27,400 MW (in 2030), and 51,000 MW (in 2041) (PSMP, 2016). It is the appropriate time to revisit the achievements till date.

The main objective of this paper is to analyse the performance of the power and energy sector over the last one decade with a view to identify the areas of weaknesses and challenges and to put forward a set of recommendations on long term sustainability. From methodological point of view, present exercise is a gap analysis on the sector with a view to identify the weaknesses (Fig. 1). Most of the data has been ccollected from the secondary sources such as Bangladesh Power Development Board (BPDB), Petrobangla, Rural Electrification Board (REB), Bangladesh Economic Review and World Bank. Besides, various newspaper reports (national and abroad) have been used as references. The structure of the document is to highlight the key issues of concerns and to raise questions which need to be answered. However, one of the limitations of the study is that some of the information collected from the newspaper reports which have been used in the report as references need cross-checking.

Fig 1: Gap Analysis



Source: Based on web-based documents

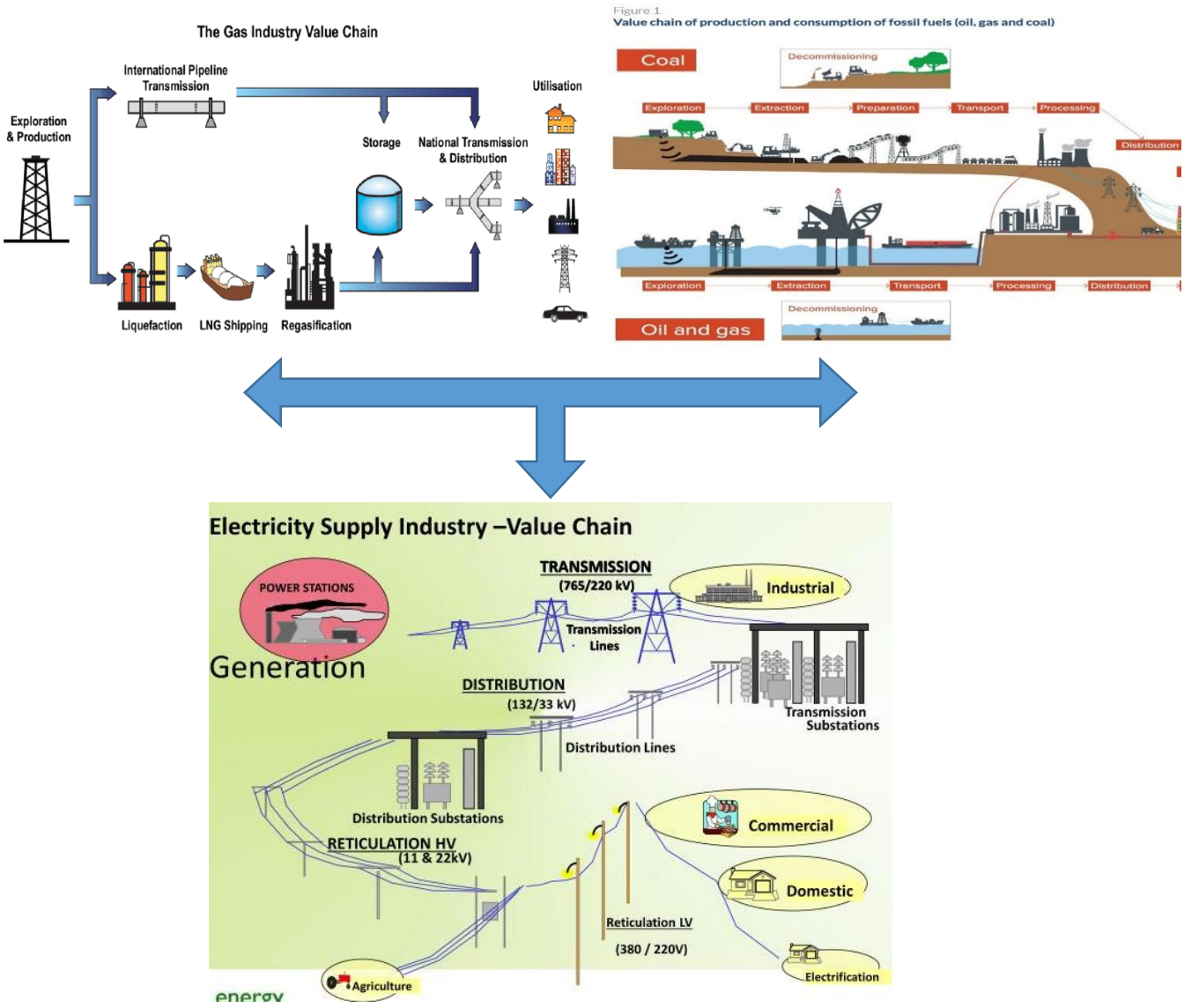
The paper highlights fifteen different issues related to the power and energy sector value chain. These include condition of energy and power sector value chains, access and quality of demand for electricity, power sector Master Plan and power generation, concerns on selected power plant projects, efficiency in power generation, situation of country's gas reserve, challenges in gas exploration, direction of the energy mix, import of LNG in the country, regulating LPG market, administered energy tariff and beyond, growing concerns in the governance system which include lack of transparency, corruptions and irregularities and concluding remarks.

2. Energy and Power Sector Value Chains: Missing a Balanced Outlook!

The value chains in the power and energy sectors are overtly guided by that of the power sector. This is mainly because of the crisis in the power sector particularly before 2010 which created over-demand of electricity. Figure 2 shows the interlinkages of different value chains related to the power and energy sector. The success of sector afterwards is largely driven by the power sector. Consequently,

the primary energy sector which include gas (LNG), coal, petroleum and renewable did not get proper attention. The primary energy sector might got neglected and individual value chains rather missed a balanced outlook.

Figure 2: Interlinkages of Power and Energy Sector Value Chains



Source: Compiled from different websites

3. Demand for Electricity: How to Meet the Quality?

The power sector has experienced considerable progress in meeting the demand for electricity (Table 1). Access, coverage, and level of consumption have significantly increased over the years. Daily load shedding has significantly dropped: from 1107 MKWH in 2009 to 32 MKWH in 2018. However, Bangladesh's coverage and access are still behind regional standards (Bangladesh vs. South Asia average: 76 per cent vs. 85.6 per cent in 2016). Besides, energy use efficiency has been improving. According to the SREDA, energy use per GDP (kg OE/1000 US$) has reduced from 307 kg OE in 2007 to 218 kg OE in 2014 (Fig. 3). This is happened owing to strong economic growth backed by the

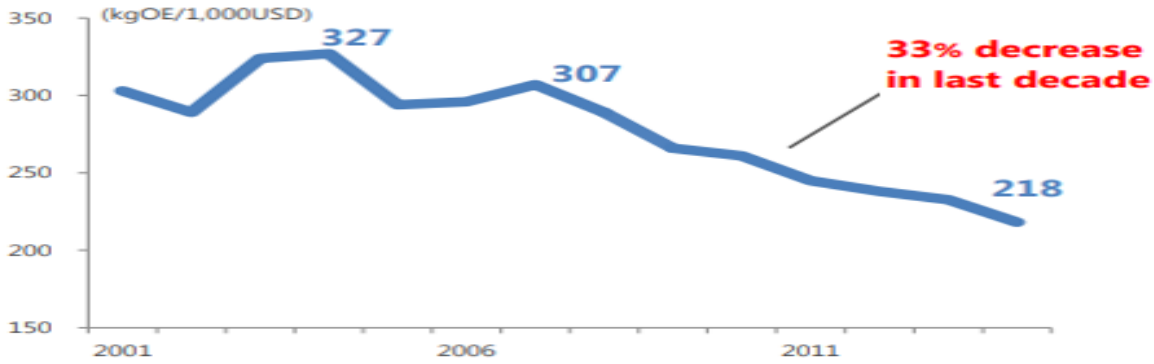
expansion of less-energy-intensive export industries, such as RMG sector. The power sector has been able to come out from the period of crisis (SREDA, 2016).

Table 1: Demand side of the Electricity

	2008	2013	2015	2018	% change between 2008 and 2018
Access to electricity (% of total population)	47	62	74	90	91.5
Per capita generation (KWh)	220	321	371	464	110.9
Total number of consumers (million)	11	14	18	30	178.0
Number of villages electrified	-	-	54,000	74,400	
Number of irrigation connection	233,906	307,640	361,000	364,000	55.6
Maximum Demand (MW)***	5,569	8,349	10,283	14,014	151.6
Maximum Peak Generation (MW)	4,130	6,434	7,817	10,958	165.3
Projection for 2021, 2025, 2030 and 2041	2021			2041	
Demand for electricity	14500			5100	
Per capita demand for electricity					
Access to electricity (% of total population)	47	62	74	90	43
Efficiency in electricity demand					

Source: Power Division, Bangladesh

Figure 3: Trends of Energy Use per GDP (kgOE / 1,000 USD)



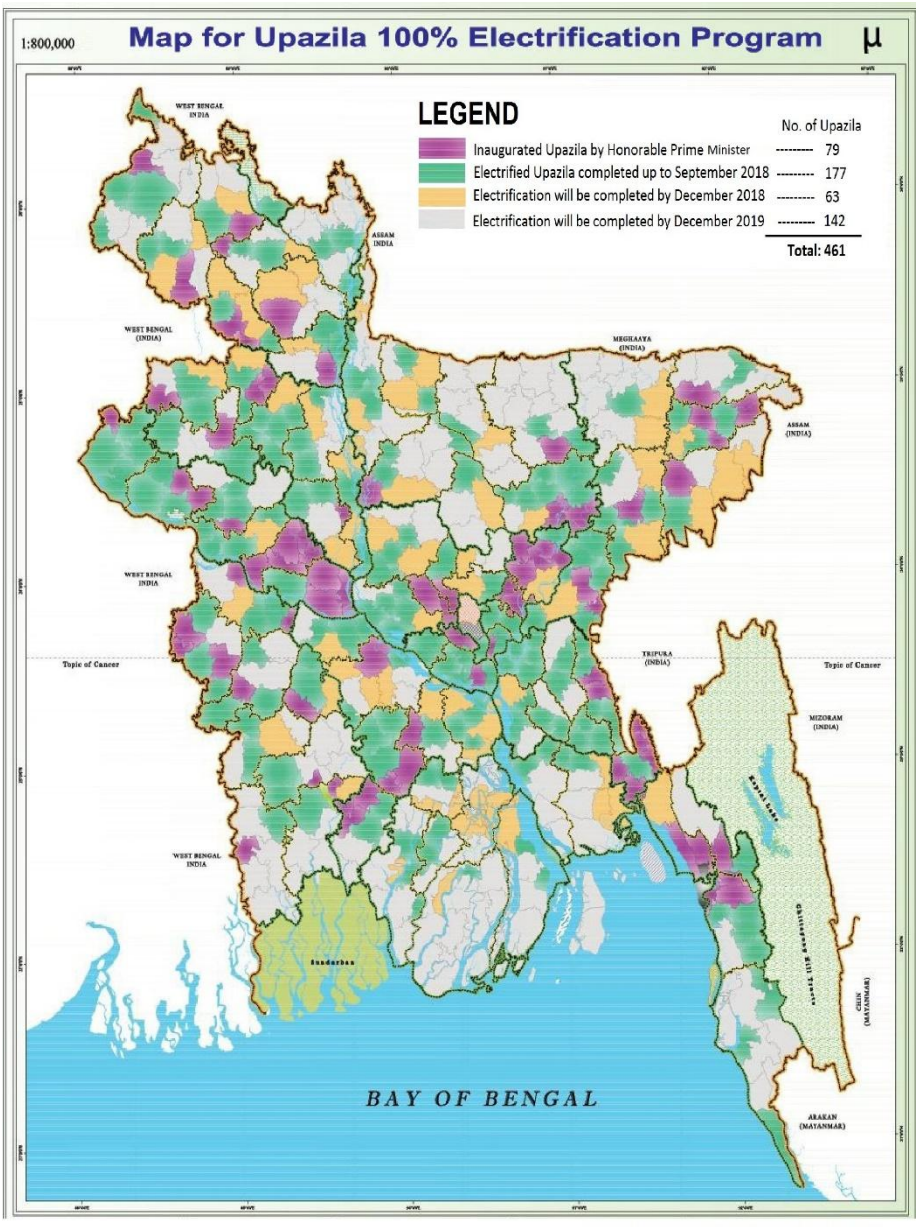
Source: SREDA

The equity aspects of demand for power is still a major concern. Government has undertaken 'Upazilla 100% Electrification Program' under which 256 upazillas have been electrified by September, 2018 (Fig: 4). Another 63 upazillas were targeted to be electrified by December, 2018 and the rest 142 upzillas to be covered by December, 2019. Poor quality of electricity supply affects the economic activities of different parts of the country. According to the newspaper report, frequent outages of electricity outside major cities severely affect economic activities in districts such as Rangpur, Barisal, Bhola, Rajshahi, Noakhali, Narail, Natore, Bagerhaat, Naogan, Rajbari, Sylhet and Bogra. The quality of electricity supply is measured by standard power factor. Due to poor power factor, the distribution companies were penalized. For example, the Dhaka Power Distribution Company Limited (DPDC) were faced power factor charges (PFC) (fine) by about Tk.841 crore during 2013-17 due to failure to maintain the standard. According to the anecdotal information, foreign investors who invested in electricity-intensive manufacturing industries expressed their concerns about poor quality of electricity.

Based on the above discussion, a number of queries could be raised to the concerned ministry

- Would it be possible to ensure electrification to 100% upazillas by the end of 2019?
- What is the plan to reduce frequent electricity outages outside major cities?

Figure 4: Map of Upazilla 100% Electrification Programme



Source: REB

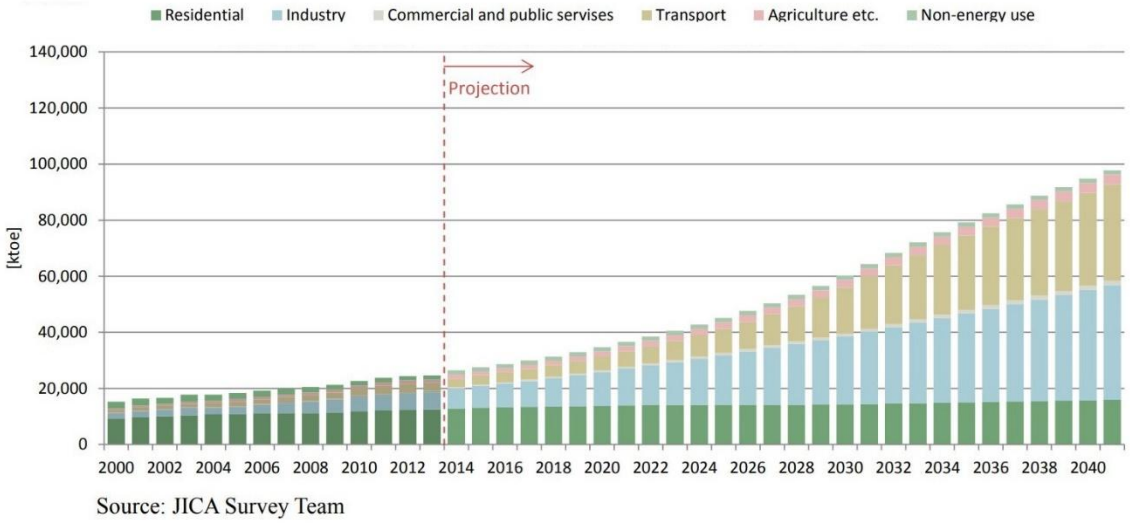
The future demand for electricity in the country will be changed. According to the Power Sector Master plan (PSMP) 2016, the structure and composition of electricity demand will be changed with the changes in economic activities (Fig 5). There is significant rise in demand in industry and commercial and public services (e.g. special economic zones; metro rails and other services). The projected peak electricity demand in coming years (base case) would be 14,500 MW (in 2021), 27,400 MW (in 2030), and 51,000 MW (in 2041) respectively (PSMP, 2016). According to the Power Sector

Efficiency Master Plan, government has set the target to improve energy intensity by 20 per cent by 2030 compared to the 2013 level (SREDAA, 2016). Overall, addressing the future demand will need a shift in the demand management. More focus is needed to put on quality of electricity and is required to put emphasis on improvement of users' efficiency.

Based on the above discussion, it is important to examine:

- How the power division is working on long term improvement of quality of electricity and users' efficiency?

Figure 5: Projection of Final Energy Consumption



Source: JICA Survey Team

4. Power Generation: Why Deviation from the PSMPs?

According to Table 5, the electricity grid capacity and its highest generation have significantly increased since 2008 - by 279 per cent and 235 per cent respectively. However, over 40 per cent of grid capacity is remained unutilized. The expansion of transmission line as per grid capacity (MW/km) remains at low level - this has moderately increased in recent years. According to the analysis of ADP of FY2018-19, a considerable number of transmission line related projects have been undertaken by the government along with those related with generation and distribution.[1]. On the other hand, the system loss has decreased but it is still at double digit level.

The predominance of the public sector in electricity generation has been gradually eased. According to Table 2, the share of total electricity generation capacity by the public sector power plants is about 59 per cent while the rest 41 per cent is generated by the private sector including those of the IPPs

[1] The selected transmission line related projects under ADP FY2018-19 include capacity increase and rehabilitation of Uttara and Bashundhara 132/33/11KV sub-station by DESCO; transformation, capacity increment and establishment of existing 33KV overhead line into underground cable in DESCO area (01.07.2016-30.06.2019); Construction of new 132/33KV and 33/11KV sub-station under DPDC (01.07.2013-30.06.2019); Matarbari ultra super critical coal fired power project(2) PGCB part: Matarbari-Madunaghat 400KV transmission line (01.07.2017-31.12.2020); Power grid network strengthening project under PGCB (01.10.2016-30.06.2021); Construction of Patuakhali-Payra 230KV transmission line project (01.01.2017-30.06.2019); Aminbazar-Mawa-Mongla 400KV transmission line (01.07.2016-30.06.2020); construction project of Patuakhali (Payra) Gopalganj 400KV transmission line and Gopalganj 400KV grid sub-station (01.01.2017-31.12.2019)

and QRRs. In other words, private sector is gradually becoming the major player in power generation. Within the power sector, the number of small scale IPPs has been growing with average generation capacity of 67 MW. There are as many as 20 quick rental power plants are in operation with a generation capacity of about 1745 MW. This implies that quick rental power plants are still contributing a significant portion of electricity generation (12%) in the country. According to the newspaper reports, few more new QRRs are being commissioned.

Based on the above discussion, following questions can be raised:

- Why large scale power plants under the public sector could not be commissioned much?
- Why QRRs are still continuing their operations?
- Why some new QRRs are commissioned?

Table 2: Electricity Generation: 2008 - 2018

Items	**2008**	**2013**	**2015**	**2018**	**% change**
Grid Capacity (MW)	4,942	10,264	11,534	18,753	279.5
Highest Generation (MW)	3,268	6,675	7,817	10,958	235.3
% of grid capacity electricity generated	66.1	65.0	67.8	58.4	
Transmission Line (Ckt Km)	7,991	9,003	9,695	11,122	39.2
Grid capacity/transmission line (MW/km)	0.62	1.14	1.18	1.69	
Distribution Line (Km)	260,369	299,852	326,000	457,000	75.5
Grid sub-station capacity (MVA)	16,238	18,777	24,670	36,045	121.9
Electricity Generation from Renewable Sources				288	
System Loss (%)	18.85	14.36	13.55	11.87	

Source: Power Division, Bangladesh

Table 3: Source wise Electricity Generation: 2018

	No. of plants	Installed capacity (MW), 2018	Share of total capacity (%)	Plant wise capacity (MW/plant)
Government	48	8845	59	184
Rental	20	1745	12	87
IPP	66	4452	30	67
Total	**134**	**15042**	**100**	**112**

Source: Power Division, Bangladesh

According to the PSMPs, a major share of primary energy had been planned to be supplied from coal and renewables, and lesser use of gas and petroleum. There are differences in PSMPs and generation of electricity in number of accounts in terms of sources, fuel use and technology use. In fact, the energy mix has been changing but not that level as stipulated in the PSMPs. Natural gas is still playing a major role as primary energy; followed by HFO and HSD (Table 4). No major breakthrough in the use of coal. Renewable energy is still playing an insignificant role. Besides, there are changes in the use of

technology in electricity generation. According to the analysis of data, use of gas and steam turbine in power plants are less while use of combined cycle power plants are growing (Table 5).

Based on the above discussion, the relevant question is:

- How much deviation from the PSMP 2016 is being expected with regard to sources of primary energy, fuel use and technology use?

Table 4: Fuel-mix in Power Generation: 2013-Jan., 2019

Fuel based Capacity of Electricity Generation (%)	2013	2015	2018	Jan-19
Hydro	2.25	1.99	1.44	1.29
Gas	64.5	62.77	60.89	57.5
F. Oil	19.22	20.44	21.58	22.73
Diesel	6.69	8.29	8.65	8.87
Coal	2.45	2.17	3.28	2.95
Renewable			0.02	0.13
Import	4.9	4.34	4.14	6.53
Total Generation Capacity (MW)	10213	11534	15953	17764

Source: Power Division, Bangladesh

Table 5: Technology based electricity generation: 2013-Jan., 2019

Technology Based Electricity Generation (%)	2013	2015	2018	Jan-19
Gas Turbine	14.95	16.63	8	7.44
Reciprocating engine	33.06	34.72	35	35.99
Steam Turbine	25.83	23.24	15	13.53
Combined Cycle	19.01	19.08	36	35.08
Hydro	2.25	1.99	2	1.29
Import	4.9	4.34	4	6.53
Solar				0.13
Total Generation Capacity (MW)	10213	11534	15953	17764

Source: Power Division, Bangladesh

5. Power Generation: How to Address the Concerns of Selected Power Plant Projects?

5.1 Quick Rental Power Plants

At present, 20 QRRs are in operation with generation capacity of 1745 MW. Most of the QRRs got extension for about 3-5 years after their first retirement phase in 2014-2017. New tariff lines for QRRs have been fixed at slightly lower level (tariff reduced to less than 1%). According to media report, BPDB paid Tk.6000 crore extra as capacity charge to the QRRs during the original contract period. After the extension of contract of 15 QRRs, the additional accumulation would be Tk.2000 crore during the extended period. According to the media report, QRRs will continue their operations till 2024. According to the media report, the rise in import of petroleum is partly due to extra consumption of

energy by retired QRRs. BPC borrowed US$1.0 billion from ITFC to accommodate the additional fuel import bill.

Based on the above discussion, a number of questions can be raised regarding QRRs:

- Despite significant underutilization of grid capacity, what is the relevance for extending the timeline of QRRs?
- Were there scopes for further negotiation to reduce the tariff of QRRs (considering the zero fixed cost)?
- Is there scope not to give extension to HSD based QRR plants (Tk.23.64 to Tk.31.66)?
- Can the capacity charges be better negotiated in order to reduce the cost?
- What is the exit plan of the costly QRRs? and
- Is the government encouraging setting up new QRRs?

5.2 Rooppur Nuclear Power Plants

A 2400 MW (2*1200) plant is being set up at a cost of US$12.65 billion by 2024. Major part of this cost will be credit from the Russian government. The credit from the Russian government will be US$11.38 billion which carries 1.75 per cent interest plus LIBOR — London Interbank Offered Rate—with a 30-year repayment period including 10 years' grace period. Bangladesh will have to repay around $20 billion against its loan (at LIBOR 0.9%, Bangladesh has to give back $18.23 billion). After the concern raised by the Bangladesh side, Russia has agreed to remove the spent fuel from reactors and take back highly radioactive rods at the end of their life-cycle from Rooppur nuclear power plant. For the first Nuclear Power Plant in Rooppur the government of Bangladesh has exempted all taxes and duties which include regulatory duty, advanced VAT import duty, VAT and supplementary duty on all imported goods, parts and machinery. The inter-governmental agreement (IGA) which is drafted by the two sides needs to be approved from the respective sides. The draft of the inter-governmental agreement (IGA) needs to be approved at the Russian parliament, whereas, the Bangladeshi counterpart will place it to a cabinet body for approval. Both parties will sign the IGA after approval of their respective governments.

Based on the above discussion, following question can be raised:

- Whether the existing cost for Rooppur Nuclear Power Plant is justifiable?
- Will the cost escalate further? What would be the final cost?
- Will the permanent transfer of spent fuel from Bangladesh be ensured under the IGA?

5.3 Rampal Power Plant

A 1320 MW (2*660) power plants are currently being set up in the southwest region of Bangladesh, near to the Sundarbans. Bangladesh and India have been jointly construct this power plant. The $2 billion cost of building the Rampal power plant will rise to $5 billion after river dredging and for subsiding coal. The cost will also be influenced by the price of coal. In 2010, a total of 930 acres of land were acquired to implement the project at Rampal of Bagerhat - some 14 kilometers away from the Sundarbans, a World Heritage site declared by the UNESCO. The environmental concerns have been raised by right-based groups both nationally and abroad. The 1,320MW coal-based power plant is likely to have diverse impact on the environment. UNESCO's chief of Asia Pacific unit of World Heritage Centre mentioned that the world heritage committee requested the Bangladesh government to ensure that no development project including Rampal be implemented before the Strategic environmental Assessment (SEA) survey. According to the government adequate safety measures will

be undertaken with regard to transportation of coal and monitoring the pollution (e.g. levels of nitrogen oxide and sulphur dioxide).

Based on the above discussion, the relevant questions are:

- Did the government undertake SEA survey as part of the suggestion of the UNESCO?
- Despite having so much concerns, why the coal fired power plant is being set up in such a sensitive area?

5.4 Growing Public Unrest on Power Projects

A number of incidences of public unrest observed against construction of Rampal Power plant and other power plants. For example, a protest against a $2.4-billion Chinese-backed power plant caused killing of four persons and injury to about a dozen in 2013. This was a joint venture project of Bangladesh's S Alam Group, and China's SEPCO-3 Electric Power Constitution Corporation and HTG Group. This thermal power plant will have a net capacity of 1,224MW. Agitation in the Gondamara ward against a very large (imported) coal fired power plant results in several villagers being killed in April 2016 and again in February 2017.

Based on the discussion, several concerns have been raised:

- Did the new power plants set up after taking clearance from the environment authority?
- Given the scarcity of land, how to avoid land disputes for setting up power plant?
- Can the new plants adequately ensure health and environment safety concerns of the locality?

6. Efficiency in Power Generation: How Much the Concerns Addressed?

The power generation has yet to ensure the efficiency in full. According to Table 6, the level of efficiency of existing power plants has been found within the range of 31.7% to 41.9%. On the other hand, the huge gap between power generation costs between QRRs and other powerplants have reduced in recent years. Despite that, generation cost in QRRs is still higher than that of other power plants (Figure 6). Relatively high efficiency in costly HFO led power plants instead of low cost HSD plants indicate weakness in managing power generation costs. Purchase of electricity from QRRs at higher cost by less using low cost other plants indicates an operational inefficiency. At the same time, providing huge amount of capacity charges is another type of inefficiency.

Based on the above discussion following question can be raised:

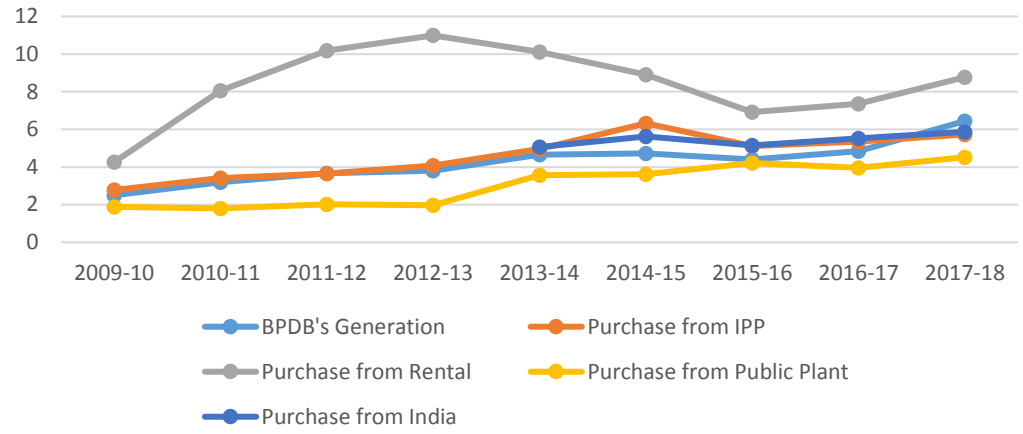
- What is the strategy to reduce inefficiency in power generation at present?
- How to address the issue in the future?

Table 6: Level of efficiency in Different Types of Power Plants

Type of Fuel	No of plants by IPP	Installed Capacity (As of June) (MW)	Net Energy Generation (GWh)	Efficiency (%) (Net)
Gas	34	7943	43145	39.97
HSD	10	1923	3695	31.69
F Oil	18	1667	4795	41.91
HFO	37	2917	9908	39.89

Source: BPDB

Figure 6: Cost for Electricity Generation (Tk/kwh)



Source: BPDB

7. Primary Energy: How Much is Country's Gas Reserve?

There is no major change in natural gas use over the years. Major share of gas is used for power generation, followed by industry, captive power plants and domestic use. Future use of natural gas would be concentrated on power generation and industry. Unless proven gas reserve increases, the current reserve will be finished by 2028-2041. Tariff of gas is administered by the government. Given the unchanged demand for gas, a limited gas reserve would create unwanted pressure to the consumers without tariff adjustment.

Based on the above discussion, following questions can be raised:

- Why did no major initiative for gas exploration take place?
- What is the possible reserve of gas of the country considering the newly got right in the 200 mile exclusive economic zone in the Bay of Bengal?

Table 7: Gas Sector: Basic Information

Gas Reserve	**1st July, 2018 (in TCF)**
No. of Field	27
Total Gas Initially in Place (GIIP)	39.8
Proved (1P)	20.9
Proved + Probable (2P)	27.81
Proved + Probable + Possible (3P)	30.82
Cumulative production	15.94
Remaining Reserve (1st July, 2018)	11.92

Source: Reservoir and Data Management Division, Petrobangla.

8. Primary Energy: Why Gas Exploration has Facing Challenges?

Gas exploration was in disarray due to faulty planning and operations. Of the 48 blocks, there are 22 onshore blocks and 26 offshore blocks. Of the offshore blocks, 11 are shallow sea blocks while remaining 15 are deep sea blocks. Gazprom, A Russian State Owned Company, has been contacted to construct ten production wells under Titas (4 wells), Rashidpur, Semutang, Begumganj, srikail and

Shahbazpur (two wells) with depts. Of 3 to 4 thousand meters. However, completed those works by contracted out to the sub-contractors.

- The question is: Wouldn't the Ministry contracted out to an interested party at a better deal if it did not intend to contract out to BAPEX?

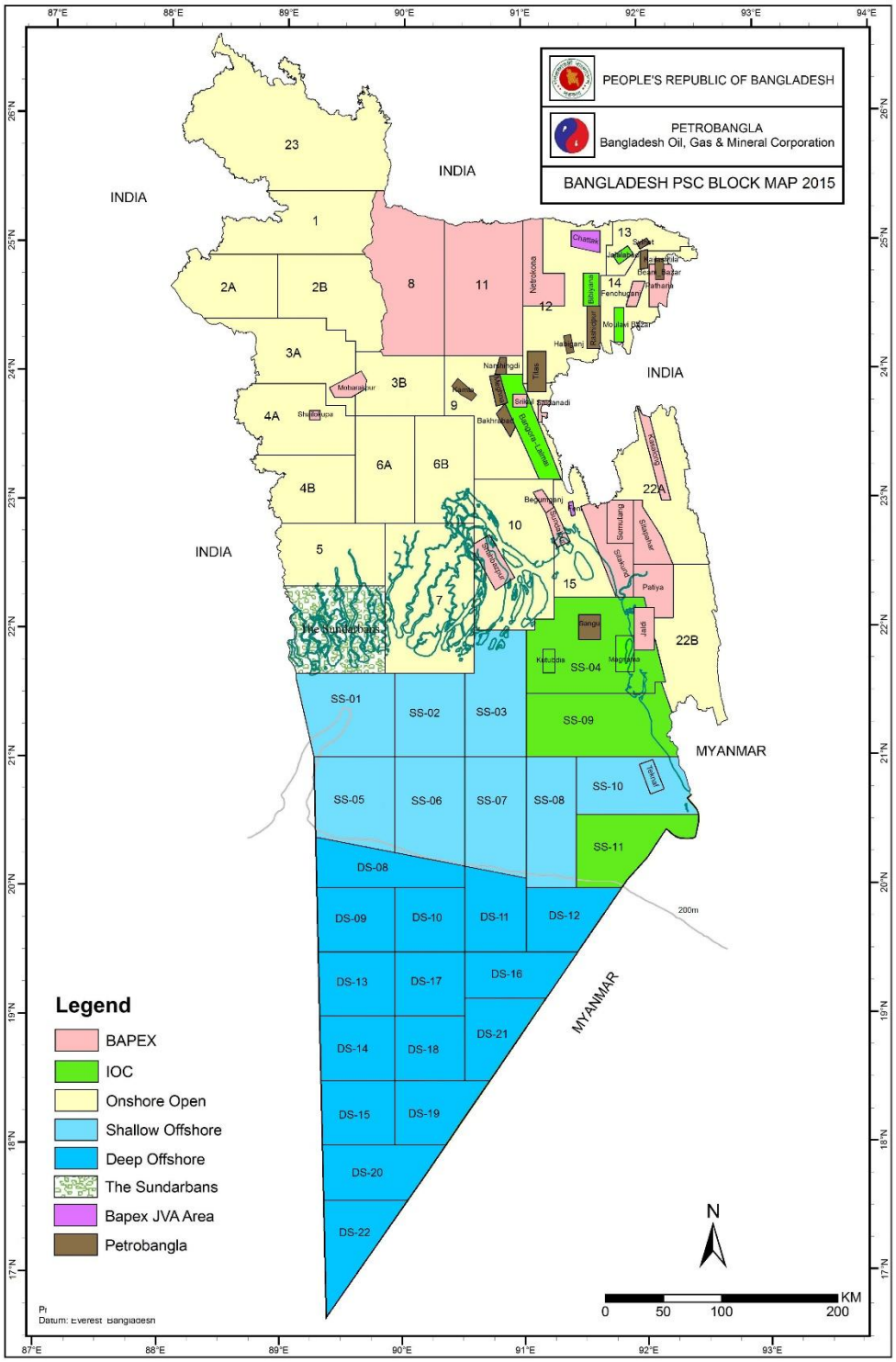
In September, 2015, two supplementary agreements for construction of five wells were signed with the Gazprom (one well at Srikail and one well at Bakhrabad fields). According to the newspaper report, two contacts for Shahbazapur and Bhola costs in excess of Tk.115 crore depriving BAPEX with its lowest bids. BAPEX detected the above-mentioned gas fields through seismic surveys but was not awarded the contacts. Why? BAPEX carried out a 600-KML 3D seismic survey across Bhola region and got some positive signs of gas with the final report of the survey. After the completion, Bapex designed two wells—at Shahbazpur East 1 and Bhola (North)—with a budget of Tk 156 crore. BAPEX was hopeful as they were planning to drill the location, which has bright prospects. Gazprom got the unsolicited contract of the drilling of the Shahbazpur East-1 and Bhola (North) wells. It has given waiver even if it is responsible for any damage to the gas reserves due to any blowout or other accidents while drilling wells in different gas fields. The state-run companies will have to pay the cost of new drilling equipment if those are damaged in any accident while Gazprom drills gas wells. In the first two lots, Gazprom drilled a total of 15 wells at different gas fields at a cost of $19 million per well which is more than double the cost at which BAPEX itself could do the same job. The outcome of the 15 wells drilled by Gazprom was poor which put the policymakers in a tight corner in managing supply of primary energy in the country.

The cost of drilling the two wells at Bhola was reduced to $33.2 million which was much less than previous contracts with Gazprom. But the cost was still more than 80 per cent higher than the cost BAPEX would take for doing the same job. According to a newspaper report, BAPEX plans to form a joint venture company with Gazprom to conduct both onshore and offshore oil and gas exploration activities as part of becoming an international standard company to explore both at home and abroad.

But so far, Bangladesh has made no major breakthrough in offshore gas exploration after settlement of maritime boundary disputes with Myanmar in March 2012 and with India in July 2014. In the four awarded offshore blocks, the shallow blocks SS-11, SS-04, SS-09 were awarded in 2014 bidding round while the only deep sea block DS-12 was awarded in 2017 under a special initiative. Indian joint venture company ONGC Videsh-Oil India obtained the shallow blocks SS-04 and SS-09 while Santos-Kris Energy JV got the block SS-11. The only deep sea block was awarded to South Korean Posco-Daewoo Corporation in 2017 through inviting expression of interest (EOI).

The Energy Division took its first move for conducting the multi-client seismic survey about four years back. In 2015, the Petrobangla planned to conduct 8,300 square kilometres 2D and 3D seismic surveys by 2018 in order to confirm more oil and gas reserve in the land. Five international companies submitted tender documents for conducting a 2D multi-client seismic survey to hunt for offshore hydrocarbon reserves of Bangladesh`s areas. Five companies are: Norway-US joint venture TGS-NOPEC and Schlumberger, Chinese company BGP, Russian Dalmorneftegeophysica (DMNG) and Marine Arctic Geological Expedition (MAGE) and UK Based Spec Partners Ltd. During the first bidding, a government evaluation committee recommended the Energy and Mineral Resources Division to sign a deal with a Norway-US joint venture company TGS-NOPEC and Schlumberger to conduct the survey. Again the energy ministry took a fresh move for the multi-client seismic survey. Subsequently, Petrobangla selected an international firm to assess hydrocarbon potentials in the country's offshore gas blocks. But after selection of the international firm through tender process, the process has been discontinued from the directives above.

Figure 7: Onshore and Offshore Gas Blocks of Bangladesh



Source: Petro Bangla

Based on the above discussion, following questions can be raised:

- Why the Petrobangla frequently changed its decision in terms of ensuring long term primary energy supply?
- Why local company did not get the onshore block contact despite offering lowest bid?

The government is updating the Model Production Sharing Contract (Model PSC) to invite a new round of international bidding for oil and gas exploration in the country's offshore blocks in 2019. It is now planning to award the country's offshore seismic survey work to Russian company Gazprom under government to government (G2G) initiative. The survey will be conducted in 22 offshore blocks out of 26 in the Bay of Bengal. The minimum cost for the survey, covering 35,000 line kilometres, will be between US$ 30 million and $35 million.

Based on the above discussion: following questions can be raised:

- Does the indecision, delay and favour to certain company in gas exploration and related activities, indicate the inefficiency of the energy division or influence to favour some companies?
- Why Bangladesh is unsuccessful in exploring gas in the blocks of the Bay of Bengal when Myanmar and India identified gas reserves and explored gas from there?

9. Energy Mix: Is it in the Right Direction?

9.1 Coal

Local demand for coal is met up mainly by local production and partly by imported coal. At present, total coal reserve in the country is amounted to be 7962 million mt (Table 8 and 9). Till date, about 8.88 million mt of coal has been utilized. About two thirds of that coal is used in power plants and the rest is used in other purposes (brick field, households etc.). The coal policy which was prepared long back, did not materialize. There was huge public protest against extraction of coal through open-mine system due its possble huge impact on environment and livelihood in the coal-belt. After a long while, the mining of coal has been started in the discussion at the government highups. BCMC has limited mining capacity; Coal India has initiated talk with BCMC to help explore coal mines. BCMC has signed a contract with US-based John T. Boyd Company together with a local partner for a feasibility study on extension of existing underground mining operation of Barapukuria coal mine towards the southern and the northern side of the basin. Another contract for a feasibility study for development of Dighipara coalfield at Dinajpur has been bagged by a consortium of German firms MIBRAG Consulting International GmbH and FUGRO Consult GmbH, and Germany & Australia-based Runge Pincock Minarco.

Based on the above discussion, following question case be raised:

- What are the terms and conditions of those contracts?

Table 8: Coal Reserve in Bangladesh

Name of the Coal Field	Reserve in Million Mt
Barapukuria, Dinajpur	390
Khalaspir, Rangpur	685
Jamalganj, Joypurhat	5450
Fulbari, Dinajpur	572
Digipara, Dinajpur	865
Total	7962

Source: Mines and Minerals Development Report

Table 9: Reserve and Production of Barapukuria Coal Mine as of 31 march 2017

	Reserve in Million Mt
Coal Initially Place (Proven + Probable)	346.71
Total Reserve of Seam VI	285.41
Recoverable from Seam VI Central part(Proven + Probable)	16.5
Coal Production in March 2017	0.04
Cumulative Production as of March 2017	8.88
Remaining Reserve	7.62

Source: Mines and Minerals Development Report

9.2 Import of Petroleum

Petroleum constitutes a major share of fuel costs for power production and dependence on it has increased overtime. Costs for diesel and HFO have been increased significantly over the years at a rate of 58% and 47.6% respectively between 2010 and 2017. A large number of newly established power plants are based on imported petroleum which caused a huge import bill (Table 10). There is a plan to reduce dependence on petroleum-based power plants. As part of that there is initiative to commission large scale power plants soon. The proposed plan is to build 51 power plants with a total capacity of 13032 MW of which 26 are HSD and HFO based which have a capacity of 3494 MW (of which 2583 MW to be generated by the private sector) (Table 11).

Based on the above discussion, following question case be raised:

- What is the future plan on HFO/HSD based power plants?

Table 10: Import Value of Petroleum Products

	Petroleum Products (in million USD)
2009-10	2021
2010-11	3186
2011-12	3922
2012-13	3642
2013-14	4070
2014-15	2076
2015-16	2275
2016-17*	2898
2017-18**	3652

Note: * Revised ** Provisional

Source: Bangladesh Bank and National Board of Revenue (NBR).

Table 11: Fuel Consumption by Public Sector Power Plants

	Coal (000 Tonne)	Furnace Oil (Million Liter)	HSD, SKO & LDO (Million Liter)
2009-10	480	10	125
2010-11	410	119	138
2011-12	450	183	60
2012-13	592	266	35
2013-14	540	425	173
2014-15	523	378	291
2015-16	489	450	231

2016-17	587	513	348
2017-18	825	632	795

Source: BPDB, Power Division

9.3 Renewable Energy

The contribution of renewable energy is at a very low level (0.01% of total energy generated). Major part is solar energy which are mostly in off-grid (Table 13). The incremental contribution of hydropower, as per plan is rather discouraging (Table 12). A guideline has been prepared by SREDA for on-grid solar energy through net metering system. There is little possibility to generate 10% of total electricity through renewables by 2020 as per PSMP 2016 (2,000MW of solar power by 2021). A private firm set up solar plant for producing 28 megawatts (MW) and will feed 20MW to the local substation during sunlight hours. The government signed a deal to buy power from a joint venture company (a Japanese and a local firm) to purchase 5 MW power from a grid-tied PV solar power plant project to be set up in Gwainghat, Sylhet. The Power Division is now waiting for a positive note from the Asian Development Bank (ADB) about its financing to implement a 50MW floating solar project in the Kaptai Lake.

Table 12: Electricity generation plan from Renewable energy source (MW)

Technology	Achievement up to 2016	2018	2019	2020	2021	Total
Solar	200	350	250	300	250	1470
Wind	2.9	150	350	300	300	1153
Biomas	0	6	6	6	6	30
Biogas	5	0.5	0.5	0.5	0.5	7
Hydro	230	1	1	2	2	236
Total	**437.9**	**507.5**	**607.5**	**608.5**	**558.5**	**2896**

Source: SREDA (Retrieved on 9 March 2019)

Table 13: Renewable Energy Generation Capacity (MW)

Technology			
	Off-Grid	**On-Grid**	**Total**
Solar	291.12	47.53	338.65
Wind	2	0.9	2.9
Hydro	-	230	230
Biogas to Electricity	0.68	-	0.68
Biomass to Electricity	0.4	-	0.4
Total	**294.2**	**278.43**	**572.63**

Source: SREDA (Retrieved on 9 March 2019)

9.4 Wind and Other Energy

1 MW windmill started in 2017 in Kutubdia. A total of 550 consumers have already started getting electricity from the power plant which is outside of national grid network. Bangladesh Power Development Board (BPDB) has constructed the plant at the cost of Tk 24 crore to expand the renewable energy opportunities. This is the third wind-powered plant in the country. A total of 20 turbines, each with 50 watt capacity is installed to produce one MW electricity daily. The other two plants are located in Mohurichar of Feni and Kutubdia of Cox's Bazar.

IDCOL has been implementing biogas program in Bangladesh since 2006 with support from the World Bank, KfW Development Bank and SNV Netherlands Development Organization. Till November 2018,

IDCOL has financed construction of over 48,800 biogas plants all over the country through its 42 partner organisations. IDCOL finances plants with daily gas production capacity ranging from 1.2 m3 to 25.0 m3 thereby meeting demand of both domestic households and mid-sized dairy and poultry farms. IDCOL currently finances two models of plants: brick-cement based plants and fiberglass bio-digester based plants.[2]

Based on the above discussion, following question case be raised:

- What are the future plans on renewables in order to enhance its contribution in the future energy demand of the country?

10. Energy Mix: Will Imported LNG be the Part of the Solution?

Bangladesh currently faces a shortage of 1 billion cubic feet gas a day (bcfd), while the demand is around 3.7 bcfd. Considering the overall situation, the government signed the deal with Qatar to import 2.8 million tons per year of LNG annually for the next 15 years. The price is set at 12.5% of the three-month average of Brent, plus an additional $0.5 per unit (1 MMBTU).

The Floating Storage and Regasification Unit (FSRU), owned by US-based Excelerate Energy Bangladesh Ltd, carried 133,000 cubic meters (CM) of lean LNG, has been set up in 2017. The delivery came in line with a sales and purchase agreement, inked on September 25, 2017. The LNG, after being re-gasified, is injected from the FSRU to the 91km pipeline linked to the national network in Anwara upazila of Chittagong. In a recent development, the government would soon open the import of liquefied natural gas (LNG) to the private sector, enabling them to sell the fuel to clients of their choice. The price of LNG or regasified LNG would be determined by the private importers themselves.

Based on the discussion, several questions can be raised.

- What are ongoing and upcoming plans of the government to be involved in the LNG market?
- If it is allowed, how the operation of the private LNG importers to be monitored?

Table 14: LNG Sales Purchase Agreement

Details	Qatar	Oman
Quantity (million ton)	2.5	1
Price (USD/MMBTU)	12.65% of the three month average of Brent Crude (USD/barrel) + USD 0.5 /MMBTU	11.90% of the three month average of Brent Crude (USD/barrel) + USD 0.4 /MMBTU
Timeframe (Years)	15	10

Source: Khan, M. F. (2018). LNG Tariff: Implication on Trade and Industries. Dhaka: Keystone

[2] The program saves 47,000 tons of firewood ever year worth USD 3.9 million and also reduces the use of 41,500 tons of chemical fertilizer worth USD 9.8 million by producing 290,000 tons of organic fertilizer. The program also reduces 187,000 ton CO2 consumption per annum. IDCOL has a plan to install 100,000 biogas plants in Bangladesh.

The government is planning to scrap building additional floating liquefied natural gas (LNG) import terminals in favour of land-based stations. Adverse weather is making it difficult to operate the country's sole floating storage and regasification unit (FSRU). A second FSRU project, operated by Summit Corp with Japan's Mitsubishi Corp as a partner, is expected to start operations in March next year, doubling the country's import capacity to 7.5 million tonnes a year. Scrapped FSRU projects will include a project by India's Reliance Power and another by a consortium comprising Hongkong Shanghai Manjala Power and Malaysia's Petroliam Nasional Bhd. While upfront capital costs for land-based terminals are more expensive, operating costs for FSRUs are more because of potentially high charter rates for the ships. Rupantarita Prakritik has short-listed five companies for a proposed land-based terminal that can import 7.5 million tonnes per year of LNG. These companies are- Japan's Mitsui, Osaka Gas and JERA, and two other Korean companies. The terminal could be built at Matarbari in Cox's Bazar, though the details are not yet found.
Based on the discussion, a question can be raised.

- Will the cost of LNG supplied from land-based terminal would be higher than that of FSRU?

According to a newspaper report, the government is planning to import 200 mmcfd of liquefied natural gas (LNG) from India through cross-border gas pipeline by 2021. The two countries will bear the cost of gas pipeline installation on their respective sides and the supply line will enter Bangladesh through Satkhira border. Bangladesh has already discussed the financing issue with Asian Development Bank (ADB) for installation of the gas pipeline. PetronetNSE LNG Ltd, India's biggest liquefied natural gas importer, has submitted a firm proposal to set up an LNG import facility in Bangladesh at an investment of about USD 1 billion. Petronet had last year signed a MoU with Petrobangla to set up a 7.5 million tonnes a year project to receive and regasify LNG at Kutubdia in Cox's Bazar and lay a 26-km pipeline to connect it to the consumption markets.

Based on the discussion, a question can be raised.

- Would Bangladesh be able to receive lower price for imported LNG from India compared to that with Qatar? (It is reported that an Italian company proposed to provide lower price LNG than Qatar).

The inclusion of LNG in country’s energy mix would significantly increase the average tariff rates for gas (Table 15). Consequently it would increase the power tariff to be based on imported LNG. According to Professor Khan, the rise in gas tariff would depend on what would be principle for cost adjustment to be used and how the additional costs to be adjusted in the overall energy mix. Under different estimates (without any pass on mechanism) the retail gas tariff would increase from as low as Tk.7.17 per m3 in 2018 (if p=BERC) to as high as Tk.36.12 (if p=MC) in 2018. Considering the possible options of passing on the mechanism (from 25% to 100%) the adjusted tariffs would be as low as Tk.7.54 in 2018 (BERC) to as high as Tk.36.12). Considering the capacity of different categories of consumers, the government needs to consider a viable option in combination of pass on, subsidy and scope for alternate source of primary energy in the energy mix.

Based on the discussion, a question can be raised.

- Will it be possible to provide a long term energy tariff plan by the ministry for necessary preparedness about energy use?

Table 15: Possible Adjustment of Gas Tariff with the Inclusion of Imported LNG in the Country: 2018-2023

	2018	2019	2020	2021	2022	2023
P=MC	36.12	34.78	34.48	34.04	33.66	33.34
P=AC	17.99	19.1	20.47	21.96	23.61	25.45
P=BERC	8.63	9.24	9.92	10.66	11.48	12.37
Existing Tariff	7.17	7.67	8.21	8.78	9.4	10.06
P=Titas	12.95	13.86	14.83	15.86	16.97	18.16

Estimated Gas Tariff (BDT/m3)

	2018	2019	2020	2021	2022	2023
BERC Tariff						
25% pass through	7.54	7.69	7.86	8.04	8.25	8.47
50% pass through	7.9	8.21	8.54	8.91	9.32	9.77
100% pass through	8.63	9.24	9.92	10.66	11.48	12.37
P=AC						
25% pass through	9.88	10.15	10.5	10.87	11.28	11.74
50% pass through	12.58	13.14	13.82	14.57	15.39	16.31
100% pass through	17.99	19.1	20.47	21.96	23.61	25.45
P=MC						
25% pass through	14.41	14.07	14	13.89	13.79	13.71
50% pass through	21.65	20.98	20.82	20.61	20.41	20.26
100% pass through	36.12	34.78	34.48	34.04	33.66	33.34
P=Titas						
Proposed	12.95	13.86	14.83	15.86	16.97	18.16

Source: Khan, M. F., Keystone Estimates (2018)

The imported LNG in the long run is supposed to be conditioned with availability of natural gas from domestic wells, use of domestic coal reserve and price of petroleum etc. It is expected that any estimate of future demand of LNG will properly consider those possibilities. Since cost of LNG is higher than other primary energy, an exaggerated estimate of LNG requirement would cause higher fiscal burden in the long run. According to an international consulting company, Bangladesh would require an import of around 30 million tonnes of LNG per year to meet the growing local demand by 2041. The regasified LNG would be used to feed sectors like industries, power and fertiliser plants. The country's existing gas reserves of around 12 trillion cubic feet will run out by 2038 if no new exploration and discovery takes place. Bangladesh's current natural gas production from domestic fields is hovering around 2,750 mmcfd against the demand of around 4,000 mmcfd, according to Petrobangla. By 2041, the demand for natural gas would be around 8,000 mmcfd, according to the state-run corporation.

Based on the discussion, several questions can be raised.

- What is the possible future mix of primary energy?
- Will it be possible to disclose in a year about possible future mix of energy including local natural gas, imported LNG, local and imported coal and petroleum etc?
- What would be the possible tariff considering different options of using different primary energy?

11. Energy Mix: How to Regulate LPG Market?

There are 13 companies are in operation in the LPG market. Another seven (7) companies are in pipeline with an expected investment of Tk.1500 crore. However, 11 LPG companies are running their businesses without government approval. Total gaz and LAUGFS Gas Bangladesh (formerly known as Petredec Elpiji) are the two foreign players in the field. In total about 60 companies have so far obtained primary approval from the ministry to run LPG businesses. During 2017, total consumption of LPG was 6.84 lakh tonnes. Of the quantity, major portion of gas has been imported and only a marginal part was supplied from different government factories as by-products. As part of G to G initiative, Bangladesh and Dubai-based Emirates National Oil Company (ENOC) agreed to conduct a feasibility study on setting up a liquefied petroleum gas (LPG) terminal in the country.

The main market for LPG is in Dhaka and Chittagong districts. Selling LPG to semi-urban and rural areas has not yet grown. There is big gap between production cost and retail price of LPG. A tonne of gas yields 83 12-kg cylinders. The production cost of a 12-kg cylinder gas stands at Tk 610. Companies sell the gas at Tk 750-Tk 780 to wholesalers, who then sell it to consumers at about Tk 1,000. Currently, cylinders with 12kg of LPG are selling at Tk 1,100 in cities, while customers in rural areas are charged Tk 50-100 more for the same quantity of gas. Bangladesh Energy Regulatory Commission (BERC) has yet to take any measures to fix the retail tariff.

Using expired LPG cylinders poses great risks. Lax government supervision and lack of proper regulations are the reason behind the rampant use of these cylinders, which are most likely expired. LPG cylinders that are imported by the state-owned LP Gas Limited, a company under Bangladesh Petroleum Corporation (BPC), have the lifespan of 15 years as per the global standard. Lack of awareness among the consumers make the matter worse. Gas cylinders in 250,000 CNG-run vehicles are not generally tested.

Based on the discussion, two questions can be raised.

- What is the projection of LPG demand in the country?
- How big the market of LPG would be?
- How to address the safety concerns of LPG cylinder use?

12. Energy Tariff: When Will It Go beyond Administered System?

The tariff of natural gas has been disproportionately increased for different economic activities: lowest rise in case of fertilizer and power plants and highest rise in case of CNG feed gas and captive power plants (Table 16). The economic logic behind the adjustment of natural gas is poor. A market-based approach is needed in fixing the gas tariff.

Table 16: Natural Gas Tariff in Bangladesh (Tk./MCF)

Effective From	Power	Fertilizer	Industry	Commercial	Tea estate	Cap. Power	CNG feed gas	Domestic		
								Metered	Single Burner	Double Burner
25.04.2008	-	-	-	-	-	-	282.3	–	-	-
01.08.2009	79.82	72.92	165.91	268.09	165.9	118.26	-	146.25	400	450
12.05.2009	-	-	-	-	-	-	509.7	–	-	-
19.09.2011	-	-	-	-	-	-	651.29	-	-	-

01.09.2015	-	-	190.86	321.68	182.64	236.73	764.55	198.22	600	650
01.03.2017	84.67	74.76	205.01	402.1	196.24	254.29	849.5	257.68	750	800
01.06.2017	89.48	76.74	219.74	482.52	210.11	272.41	906.14	317.15	900	950
01.09.2017	89.48	76.74	219.74	482.52	210.11	272.41	906.14	257.68	750	800
% change	12.1	5.2	32.4	80.0	26.6	130.3	221.0	76.2	87.5	77.8

Source: Accounts Division, Petrobangla

Tariff of primary energy used for power generation is widely differ between sources. Changes in tariffs is lower in case of gas compared to that of other energies (Table 17). Keeping the natural gas price very low compared to the market rate for the sake of supplying it at the power plants have distorted the natural gas market. Electricity tariff for different categories of economic activities needs to be justified. Tariff of low voltage electricity users particularly SMEs is higher than those of high voltage electricity users although changes in tariffs over the years were lower for the former (Table 18, 19 and 20). Hence, there would have a possible repercussion when the supply of natural gas will be over for the power plants and it needs to depend on high price other primary energy. There will be a serial effect on energy tariff in all categories of enterprises.

Table 17: Tariff of Different Primary Energy Products

	High Speed Diesel Oil (Tk/Lit)	Furnace oil (TK./ Lit)	Natural Gas (TK./ 1000 Cft)	Coal (USD/M Ton)
01.08.09	42.71	26	79.82	71.5
01.07.10	42.71	26	79.82	86
05.05.11	46	42	79.82	86
01.01.12	61	60	79.82	86
01.02.12	61	60	79.82	105
04.01.13	68	60	79.82	105
01.05.15	68	60	79.82	130
24.05.16	65	42	79.82	130
01.03.17	65	42	84.65	130
01.06.17	65	42	89.46	130
% change	52.2	61.5	12.1	81.8

Source: Bangladesh Power Development Board

Table 18: Electricity Tariff for Using Low Voltage (LT): 230/400 Volt (Tk./KW)

LT- c 1: Small Industries	1-Mar-12	1-Sep-12	13-Mar-14	27-Aug-15	23-Nov-17	2018	% change
Flat Rate	6.02	6.95	7.42	7.66	8.2	8.2	36.2
Off-Peak Time	5.16	5.96	6.64	6.9	7.38	7.38	43.0
Peak Time	7.33	8.47	9	9.24	9.84	9.84	34.2

Source: Bangladesh Power Development Board

Table 19: Electricity Tariff for Using Extra High Voltage (EHT): 132 KV (Tk./KW)

	1-Mar-12	1-Sep-12	13-Mar-14	27-Aug-15	23-Nov-17	2018	% change
Flat Rate	5.33	6.16	6.96	7.35	7.95	7.95	49.2
Off-Peak Time	4.82	5.57	6.35	6.74	7.16	7.16	48.5
Peak Time	7.51	8.67	9.19	9.47	9.94	9.94	32.4

Source: BPDB

Table 20: Extra High Voltage (EHT): 230 KV

		(Tk./KW)					
	1-Mar-12	1-Sep-12	13-Mar-14	27-Aug-15	23-Nov-17	2018	% change
Flat Rate	5.61	6.48	6.48	7.25	7.9	7.9	40.8
Off-Peak Time	5.08	5.87	5.87	6.66	7.11	7.11	40.0
Peak Time	7.91	9.14	9.14	9.4	9.88	9.88	24.9

Source: BPDB

Tariff of petroleum products have been also kept low for the sake of using it in the power plants (Table 20 and 21). To meet the loss of the BPC for importing petroleum products at higher import price, government has provided subsidy over the years. Between 2009 and 2015, a total of Tk. 31586 crore has been provided to BPC as subsidy (Table 22). Since 2009, a total of Tk.89300 crore has been given as subsidy to PDB, BPC and Petrobangla to manage the loss caused for administered market price (lower than the market rate). Highest subsidy has been given to PDB (Tk.52718 crore) followed by BPC (Tk.31586 crore). There needs to have a review on loans and subsidy provided to different public agencies. The rationalization of energy subsidy needs to be examined.

Table 20: Local Selling Price of Petroleum Products

Product Name	Local Selling Price (Tk/litre)	Effective Date
HSD (Diesel)	65	24/04/2016
SKO (Kerosene)	65	24/04/2016
HOBC (Octane)	89	24/04/2016
MS (Petrol)	86	24/04/2016
Jet A-1 (Domestic Flight)	70	10/1/2019
Jet A-1 (International Flight)	USD 0.64	10/1/2019

Source: Bangladesh Petroleum Corporation

Table 21: LP Gas (12.50kg per Cylinder)

	700.00/Cylinder	19/06/2009
SBPS	89	20/02/2017
MTT	69	20/02/2017
JBO	90	29/12/2015
LDO	68	11/1/2013

FO (Furnace Oil)	42	1/4/2016

Source: Bangladesh Petroleum Corporation

Table 22: Loans and subsidy to the energy sector (Crore Tk.)

	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17 (revised)	FY18 (budget)	FY19 (planned)	Total (FY09-19)
PDB	1007	994	4000	6357	4486	6100	8980	2794	5500	6000	6500	52718
BPC	1500	900	4000	8550	13558	2478	600	0	0	0	0	31586
Petrobangla										2000	3000	5000
Total	2507	1894	8000	14907	18044	8578	9580	2794	5500	8000	9500	89304

Source: Bangladesh Petroleum Corporation

Energy tariff in the future will largely be influenced by the extent of use of LNG in the energy sector. Different estimates present the possible rise of energy prices in the future (Table 23 and 24). Energy tariff is heavily influenced by the subsidy provided to different agencies in the energy sector. The future energy tariff will be determined by how much of the costs to be passed through the consumers. If the full cost is not passed through the consumers, the demand for subsidy will increase in the future. The tariff in the energy sector is heavily influenced by the tariff in the power sector.

Table 23: Gas Tariff under 4 Pricing Scenarios (BDT/m3)

	2018	2019	2020	2021	2022	2023
P=MC	36.12	34.78	34.48	34.04	33.66	33.34
P=AC	17.99	19.1	20.47	21.96	23.61	25.45
P=BERC	8.63	9.24	9.92	10.66	11.48	12.37
Existing Tariff	7.17	7.67	8.21	8.78	9.4	10.06
P=Titas	12.95	13.86	14.83	15.86	16.97	18.16

Source: Khan, M. F., Keystone Estimates (2018)

Table 24: Estimated Gas Tariff (BDT/m3)

	2018	2019	2020	2021	2022	2023
BERC Tariff						
25% pass through	7.54	7.69	7.86	8.04	8.25	8.47
50% pass through	7.9	8.21	8.54	8.91	9.32	9.77
100% pass through	8.63	9.24	9.92	10.66	11.48	12.37
P=AC						
25% pass through	9.88	10.15	10.5	10.87	11.28	11.74
50% pass through	12.58	13.14	13.82	14.57	15.39	16.31
100% pass through	17.99	19.1	20.47	21.96	23.61	25.45
P=MC						
25% pass through	14.41	14.07	14	13.89	13.79	13.71
50% pass through	21.65	20.98	20.82	20.61	20.41	20.26
100% pass through	36.12	34.78	34.48	34.04	33.66	33.34
P=Titas						
Proposed	12.95	13.86	14.83	15.86	16.97	18.16

Source: Khan, M. F., Keystone Estimates (2018)

Based on the discussion, several questions can be raised.

- How the issue of equity will be taken into account while tariffs of energy and power will need to make significant upward adjustment?
- How the rising tariff burden to be passed on to different sectors including household, agriculture, industry and services?

13. Governance: How to Address the Growing Concerns on Lack of Transparency, Corruptions and Irregularities?

The energy and power sector has been expanded rapidly over the last one decade particularly with the public expenditure in power and energy sector (Table 26). The operations of each of the related public institutions have been expanded. The demand for better management and operation has been widened. Lack of governance in some of the institutions related to the power and energy sector has been reported. Allegation of corruption against gas sector officials has been reported in the local media; and ACC took some measures against those allegations. For example illegal connections of gas and electricity supply is a chronic problem. Government recently announced to severe illegal connections by June, 2019. On the other hand, the disappearance of 142000 tons of coal from the Barapukuria Coal Mining Company Ltd (BCMCL) is another incidence of lack of governance. The investigation report is expected to identify the reasons behind this. Illegal operations of LPG companies have been reported in the media. Lack of transparency in case of contracting out various public contracts to local and foreign companies raise concern regarding the rational choice for selection of enterprises. Lack of competitive bidding process has been causing extra costs in contracts with foreign companies in the energy sector.

Table 25: Public Expenditure in the Power and Energy Sector (in crore Taka)

Divisons	Year	Non-Development Expenditure	Development Expenditure	Total Expenditure
Power	2009-10	4	2024.54	2028.54
	2010-11	5	6189.92	6194.92
	2011-12	6	7179.65	7185.65
	2012-13	6	8868.01	8874.01
	2013-14	7	7843.99	7850.99
	2014-15	11	8230.78	8241.78
	2015-16	18	15558.46	15576.46
	2016-17	29	18136.89	18165.89
	2017-18	63	22757	22820
	2018-19	43	22893	22936
	Total (FY10-FY19)	**192**	**119682.2**	**119874.2**
Energy and Mineral Resources	2009-10	33	1367.64	1400.64
	2010-11	214	990.02	1204.02
	2011-12	39	746.02	785.02
	2012-13	40	1629.82	1669.82

	2013-14	35	1832.38	1867.38
	2014-15	33	1879.71	1912.71
	2015-16	51	2008.34	2059.34
	2016-17	43	2435.90	2478.9
	2017-18	95	1346	1441
	2018-19	165	1820	1985
	Total (FY10-FY19)	**748**	**16055.8**	**16803.8**

Source: BER-2018

No information is found with regard to reasons behind discontinuation of earlier selected firms for seismic surveys, selection of a firm under G-G contract, ignoring BAPEX as lowest bidder and providing the contract to a foreign company which costs a significant loss, lack of transparency in nuclear deal with regard to terms and conditions and taking back solid waste from Bangladesh, ignoring huge public outcry about the site selection for Rampal power plant on environmental concern, lack of clear direction about long term plan on the use of coal reserve when imported coal has been used in power plants and other purposes.

The growing fiscal burden due to changing energy-mix needs to be handled with due caution. This is related with decision to close down/setting up high-cost HFO based power plants, LNG based power generation, better understanding of domestic gas reserve, plan for using domestic coal, import of electricity/LNG/petroleum from neighboring countries and possible scope of renewable energy.

As an institution, BERC has been playing limited role in setting energy prices, particularly in tariff rationalisation process, equity in energy staff and initiatives towards ensuring market-based operations.

14. Concluding Remarks

Bangladesh's energy and power sector needs to shift its activities from the 'emergency management' (initiated in early 2010s) to 'market-led' management (needs to be initiated towards 2021-2030). It needs to reduce lack of transparency, accountability, efficiency, irregularities and corruption. Given the development of the power and energy sector, the 'Speedy Supply of Power and Energy Act' needs to be discontinued immediately. The sector should gradually return to lead its operation under the public procurement act and rules as the period of emergency need appears to be over.

It is high time to pay attention to the primary energy sector particularly domestic gas and coal. There should have a clear idea about the gas reserve of the country, which should be done immediately. Government should make it clear about the plan to use domestic coal reserve. The environmental concerns of coal based power plants particularly Rampal power plants would be politically costlier. The predominance of power sector value chain over primary energy value chains needs to be gradually reduced. Initiatives must be taken to make the primary energy value chain independent.

The energy and power sector needs to keep balance in number of accounts. These are:

a) Balance between private-public sector power plants in case of power generation
b) Balance between use of LNG in power generation and other purposes

c) Balance between overdependence on a single company in terms of power generation and other activities
d) Balance between overdependence on a single source in terms of generation, transmission and distribution in the power and gas sector
e) Balance between domestic supply and import of energy and power from neighboring countries

There should be gradual withdrawal of all sorts of inefficient activities. For example, operation of quick rental power plants, HFD based power plants, replacing low capacity/high cost power plants and renegotiating terms and conditions of payment for QRR power plants. Energy-mix should ensure supply of energy and power at reasonable tariffs and with good quality. Priority should be given on using domestic resources including gas, coal and renewable energies.

There should have a gradual shift in energy tariff setting mechanism from administered tariff to market-based tariff. For example, energy tariff should not be biased towards power sector; on the other hand, the equity issue needs to be taken into account in case of SMEs, agriculture, low-income households. As an institution, BERC needs to be independent in taking decisions.

Future demand for power and energy needs to be addressed based on the master plan. For example- the frequent deviation from the plan weakens confidence on government's plans. Efficiency in electricity use needs to be improved as per the plan. A proper plan is required in the use of subsidy; similarly providing fiscal incentives to particular companies need to be justified. The possible debt burden due to setting up costlier power plants as well as meeting the huge import bill for import of raw materials (petroleum, LNGs) for power plants needs to be taken into account.

The governance in the power and energy sector institutions needs to be strengthened further. For this, irregularities and corruption in different corporations and associated companies need to be controlled and more transparency is expected in case of signing contracts at local and international level both at G-G and G-B levels.

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