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Stakeholders' Perspectives on Key Challenges of the Power Sector

Level of Stakeholders' Engagement in the Formulation of Master Plans

Khondaker Golam Moazzem
Abdullah Fahad
Helen Mashiyat Preoty
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The **Centre for Policy Dialogue (CPD)** was established in 1993 as a civil society initiative to promote an ongoing dialogue between the principle partners in the decision-making and implementing process. Over the past 30 years, the Centre has emerged as a globally reputed independent think tank, with local roots and global reach.

A key area of CPD's activism is to organise dialogues to address developmental policy issues that are critical to national, regional and global interests, with a view to seeking constructive solutions from major stakeholders. The other key area of CPD's activities is to undertake research programmes on current and strategic issues.

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The present paper titled ***Stakeholders' Perspectives on Key Challenges of the Power Sector: Level of Stakeholders' Engagement in the Formulation of Master Plans*** has been prepared by *Dr Khondaker Golam Moazzem*, Research Director, CPD (moazzem@cpd.org.bd), *Abdullah Fahad*, former Senior Research Associate, CPD, *Ms Helen Mashiyat Preoty*, Research Associate, CPD (preoty@cpd.org.bd), and *Dr Shah Md. Ahsan Habib*, Professor (Selection Grade), Bangladesh Institute of Bank Management (BIBM).

Series Editor: *Dr Fahmida Khatun*, Executive Director, CPD.

Bangladesh's power sector is guided by the Power Sector Master Plan 2016 (PSMP 2016) which is being updated right now. The study looks into the state of the power sector during the last three master plans (PSMP 2005, PSMP 2010, PSMP 2016) to review the major issues and challenges of the sector. Three expert group meetings (EGMs) were conducted representing three stakeholder groups—government, private sector, civil society organisations (CSOs) and academia—to identify stakeholders' views on the challenges of the power sector. Finally, the study analyses the level of stakeholders' participation in the formulation of master plans for the power sector. It was found that the lack of coordination was the key weakness in successive PSMP formulation processes, and stakeholders' participation was mainly limited to government agencies.

Keywords: Power Sector Master Plan (PSMP), power sector, challenges, stakeholder participation, policymaking, coordination, clean energy

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Abbreviations

ADB	Asian Development Bank
BERC	Bangladesh Energy Regulatory Commission
BIBM	Bangladesh Institute of Bank Management
BPDB	Bangladesh Power Development Board
BREB	Bangladesh Rural Electrification Board
CPD	Centre for Policy Dialogue
CSO	Civil Society Organisation
DESCO	Dhaka Electric Supply Company Limited
DPDC	Dhaka Power Distribution Company
EECMP	Energy Efficiency and Conservation Master Plan
EGM	Expert Group Meeting
FY	Fiscal Year
GDP	Gross Domestic Product
GoB	Government of Bangladesh
GSMP	Gas Sector Master Plan
GW	Gigawatt
IDCOL	Infrastructure Development Company Limited
IEEJ	Institute of Energy Economics, Japan
IEPMP	Integrated Energy and Power Master Plan
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
JICA	Japan International Cooperation Agency
LNG	Liquefied Natural Gas
MCPP	Mujib Climate Prosperity Plan
MoPEMR	Ministry of Power, Energy and Mineral Resources
MW	Megawatt
NESCO	Northern Electricity Supply Company Limited
OECD	Organisation for Economic Co-operation and Development
PGCB	Power Grid Company of Bangladesh Limited
PSMP	Power Sector Master Plan
PV	Photovoltaics
RE	Renewable Energy
SAM	Sectoral Analysis Method
SREDA	Sustainable and Renewable Energy Development Authority
WZPDCL	West Zone Power Distribution Company Limited

1. INTRODUCTION

Since 2021, the Ministry of Power, Energy and Mineral Resources (MoPEMR) has been in the process of formulating a new power and energy master plan which will be called the Integrated Energy and Power Master Plan (IEPMP). Similar to previous master plans, the new IEPMP bears special attention in terms of energy security, clean energy initiatives, and investment for generation, transmission and distribution system considering the targeted economic growth for being upper middle-income country by 2031. Unlike other sectoral policies, the power and energy related policies have multi-dimensionality both within and beyond the country in terms of in terms of the following factors: demand for and supply of power and energy, availability of energy mix, use of technology, sourcing of energy, environmental and social impact and implications of energy-use and their mitigating measures. Hence, a well-designed medium to long term plan with a targeted action plan is of critical importance for Bangladesh in the coming decade.

The formulation of the IEPMP is being carried out by the MoPEMR with the technical support of the Japan International Cooperation Agency (JICA). A Japanese firm, Institute of Energy Economics, Japan (IEEJ) under the overall supervision of the MoPEMR has been preparing the draft plan. For the first time, an integrated energy master plan is being formulated with the motivation to create cross-cutting synergies between interrelated policies and actions to achieve overall energy security and ensure clean energy-based development in the country.

Bangladesh's power sector is now operated under the guidance of the Power Sector Master Plan 2016 (PSMP 2016). The PSMP 2016 aims to reach an energy mix with more than 70 per cent share of fossil fuels by 2041. The energy sector on the other hand is operated under the guidance of two master plans: The energy Efficiency and Conservation Master Plan (EECMP 2016) and the Gas Sector Master Plan (GSMP 2017). The EECMP 2016 aims to reduce 20 per cent primary energy consumption per GDP by 2030 (SREDA, 2016). The GSMP 2017 first outlined the gas demand and supply situation of Bangladesh till 2041 and then recommended the least supply solutions (Ramboll, 2018). Apart from these policies, the power and energy sector is being emphasised in other national policy documents including Mujib Climate Prosperity Plan (MCP), 8th Five Year Plan (2021–25), and Renewable Energy Policy 2008.

The study looks into the state of the power sector during the last three master plans (PSMP 2005, PSMP 2010, PSMP 2016) to review the major issues and challenges of the sector. Key stakeholders of the power sector including the government, the private sector and the CSOs/academia shared their views and recommendations on relevant critical issues. One of the important aspects of the study is to analyse the level of stakeholders' participation in the formulation of master plans for the power sector. It is to be noted that this paper focuses only on the power sector.

1.1 Objectives and Methodology

The objective of the study is to identify the key issues and challenges concerning the power sector which need to be addressed in the IEPMP. The key stakeholders of the power sector such as the government, the private sector and the CSOs/academia shared their perspectives on the critical aspects of those issues and challenges. Moreover, the study reviews the level of stakeholder participation in the formulation process of the new integrated master plan for the power and energy sector.

Based on the secondary data and primary information collected from three stakeholder groups, this study identified the challenges, documented the perception of stakeholder groups, and examined the level of participation of these groups in the policy formulation process. As part of this, three separate Expert Group Meetings (EGMs) were conducted with these three stakeholder groups to identify their opinions and suggestions regarding the important factors that should be considered in the upcoming master plan.

1.2 Stakeholder Participation in Public Policymaking: Conceptual Framework

Public policymaking in Bangladesh usually happens through a limited level of stakeholder engagement. Often the engagement takes place through an expert-based approach where major policy-related issues have been discussed and decided by a limited number of experts under the overall guidance of the concerned ministry. Such an approach has many limitations including a lack of proper justification and rationality of the entire policy frame, less inclusivity, limited accountability and a dearth of evidence and analysis. In the case of policymaking in the power sector, it is largely guided by the PSMP. Successive PSMPs in most cases provide little attention to the participatory approach—the PSMPs have been criticised for less involvement of the experts.

A participatory approach requires stakeholder engagement at least in the form of consultation so that stakeholders can contribute to problem framing, policy analysis, and decision-making (Arnstein, 1969; Biggs, 1989). In contrast, public policymaking in Bangladesh has often been influenced by selected stakeholders, particularly those of influential stakeholders. In the majority of cases, power sector-related policies and operational decisions are carried out based on the interests of select influential stakeholders (Bijlsma, *et al.* 2011). On the other hand, a participatory approach usually requires a complex approach where stakeholders should get a chance to take part in the discussion and negotiation with uncertainty about the conclusion.

According to Bijlsma *et al.* (2011), the uncertainties are usually dealt differently under expert-based and participatory policy development. It is found that experts usually do not emphasise institutional uncertainties. Since experts depend on models, addressing uncertainties require detailed data and information to put in the model. Often lack of data makes this type of policy development reliant on experts' knowledge. In the participatory approach, the uncertainties are handled differently—more cooperation between stakeholders is required. The major uncertainty in the participatory approach is how different actors engage in the decision-making process.

A public involvement continuum explains and differentiates between different levels of public involvement in public decision-making. In a guide to 'Stakeholder Involvement in Decision Making' by the Organisation for Economic Co-operation and Development (OECD), the public involvement continuum was outlined in detail (Table 1). According to the outline, the engagement of stakeholders maintains a progressive ladder. These progressivity in engagement appears in five phases such as - (a) informing; (b) consultation; (c) engagement; (d) collaboration; and (e) participation.

Table 1 presents various levels of public involvement in policymaking. Given the nature of participation in the above-mentioned five phases, the level of involvement could be categorised into three groups— (a) low level of public involvement; (b) medium level of public involvement; and (c) high level of public involvement. The low level of public involvement indicates when stakeholders are involved in the form of informing, educating, sharing or disseminating activities or at best in gathering information and views which can contribute through keeping the stakeholders informed, listening to them and providing feedback on how the inputs influenced the decision-making.

A medium level of public involvement indicates promoting two-way dialogue where modification of public policies happened considering public references. Major reflection of such public involvement in case of medium level evidenced when the policymakers ensure that the concerns of the public are considered and reflected in the form of alternatives, and their inputs influenced decisions. On the other hand, a high level of public involvement is reflected through collaboration and partnering where public engagement is reflected in the form of framing issues and debating options together and thereby engaging in the form of binding processes and decisions. The most important part of this engagement is the recommendations which are incorporated to the maximum extent possible and a partnership in decision-making is ensured.

Against this backdrop, this study analyses the level of participation of various government and non-government stakeholders in public policymaking.

Table 1: Public Involvement Continuum

Low Level of Public Involvement		Mid-level Public Involvement	High Level of Public Involvement	
Inform	Consult	Engage	Collaborate	Partnering
Inform, educate, share or disseminate information	Gather information, views	Promote two-way dialogue	Commit to frame issues and debate options together	Partner in selecting and implementing solutions
Increasing literacy; inducing behavioural changes	Modifying policies following public preferences and/or reaching an informed consent		Obtaining the self-commitment of each participant as well as contributions that may result in binding processes and decisions	
"We will keep you informed"	"We will keep you informed, listen to you, and provide feedback on how your input influenced the decision"	"We will work with you to ensure your concerns are considered and reflected in the alternatives, and your input influenced the decision"	"We will incorporate your advice and recommendations to the maximum extent possible"	"We will implement what we decided together"

Source: Organisation for Economic Co-operation and Development (OECD, 2015).

2 ANALYSIS OF THE PREVIOUS PSMPs

2.1 Strategies of Different PSMPs

Successive PSMP (PSMP 2005, PSMP 2010, PSMP 2016) undertook different strategies and approaches to address the key issues and concerns related to development of the power sector.

The objective of the PSMP 2005 was to develop a least cost generation-expansion plan for the Bangladeshi power system covering the period 2005-2025 based on fuel availability. It was assumed that Bangladesh has a substantial proven reserve of natural gas and some proven reserves of coal. PSMP 2010 incorporates a long-term power development strategy titled Vision 2030. Vision 2030 consists of six value-up plans—(a) actively developing domestic primary energy resources; (b) establishing the power system portfolio by fuel diversification; (c) realising a low carbon society by introducing a highly efficient power supply and low CO₂ emission technology; (d) building the necessary infrastructure for stable power supply under joint coordination by the multi-sector; (e) building an efficient and effective mechanism, organisation and regulations for stable power supply; and (f) reducing poverty through socio-economic growth.

PSMP 2016 was extensive energy and power development plan up to the year 2041 also referred to as Vision 2041. There is five value-up plan in vision 2041: (a) robust infrastructure for primary energy import; (b) domestic energy resource development and efficient use; (c) high-quality and robust power system development; (d) advanced deployment of green energy; and (e) policy and human capital development for stable energy supply.

The Government of Bangladesh (GoB) has undertaken 8th Five Year Plan (8FYP) which provides strong evidence that the government has changed its thinking on power development since 2016. From a dependence on coal and LNG which have put an unsustainable financial strain on the power system, 8FYP shows that the government now has an increased focus on renewable energy, energy efficiency, and the financial sustainability of the power system.

The successive PSMPs strategise the development of the power sector mainly based on the availability of domestic fossil-fuel particularly gas, and partly coal. Against this backdrop, the Formulation of the new PSMP is in progress. A key focus of the formulation of the new power and energy system master plan will be to promote a low or zero-carbon transformation of the total energy supply and demand system.

2.2 Key Issues and Concerns Related to the Power Sector

Experiences with the earlier master plans are crucial in preparation for the upcoming master plan. A review of the last three master plans (PSMP 2005, PSMP 2010, PSMP 2016) has been conducted as a part of this study on the key areas.

2.2.1 Demand Forecast

The previous PSMPs have forecasted maximum demand for electricity using various methodological approaches but have been overly dependent on the GDP growth rate. Three scenarios had been taken into consideration to forecast the electricity demand for different years—‘base case’, ‘low case’, and ‘high case’ (Table 2).

In PSMP 2005, the impact of price elasticity was relaxed, and electricity demand was only calculated based on the forecast (GDP) at the base case. PSMP 2016 forecasted the power demand by both GDP elasticity and sectoral analysis methods. The results were almost identical as the latter exceeded the former by only 5 per cent. PSMP 2016 predicted that in the base case (business as usual),

Table 2: Power Demand Forecast in Different PSMPs and Actual Demand

	PSMP 2005			PSMP 2010			PSMP 2016			Actual Peak Demand	Actual Peak Generation
	Base	Low	High	Low	High	Govt. Policy	Base	Low	High		
2015	9786	8501	13408	8232	9019	10283	8920	8920	8920	8920	7817
2016	10512	9066	15223	8680	9705	11405	9584	9600	9600	9600	9036
2017	11291	10313	17166	9165	10463	12644	10400	10400	10400	10400	9479
2018	12128	11000	19357	9689	11300	14014	11200	11200	11200	11200	10958
2019	13027	11732	21827	10255	12224	15527	12100	13300	12100	12100	12893
2020	13993	12424	24445	10868	13244	17304	13300	13300	13300	13300	12738
2021				11442	14249	18838	14500	14500	14500	14500	13792

Source: PSMP 2005, 2010, 2016 and BPDB Annual Reports.

maximum power demand will be 13,300 MW in 2020 and it will be 14,500 MW in 2021. According to the Bangladesh Power Development Board (BPDB) annual report 2020–21, the maximum peak generation was 13,792 MW, whereas the maximum peak demand was 14,500 MW in the fiscal year (FY) 2020–21. Therefore, there was a supply gap of 708 MW.

There are some major weaknesses in the demand forecast in the successive PSMPs. These include a questionable estimation method using GDP/GDP growth rate only, considering a limited number of variables and making a projection for the long term. Despite the importance of using a bottom-up approach to estimate future demand, successive master plans followed a top-down approach for estimating power demand.

2.2.2 Fuel Mix

Fuel mix for the power sector has been overwhelmingly based on hydro-carbon. The PSMP 2005 was formulated with the focus on domestic natural gas (85 per cent). The remaining fuel mixes were imported oil (10 per cent) and hydropower (5 per cent). While formulating PSMP 2010, power generation capacity was designed to be based on gas (84 per cent) with some share of oil (8 per cent), coal (4 per cent), and hydropower (4 per cent). PSMP 2016 developed several scenarios by varying fuel share. In the cost-effective combination, the share of gas was planned to be 35 per cent where coal was 35 per cent and import/renewable energy was 15 per cent. Most of the fuel mix targets of successive PSMPs could not be achieved. According to Table 3, the major fuel mix targeted in PSMP 2016 was not achieved; against the planned share of gas, oil and coal of 47 per cent, 18 per cent and 28 per cent respectively actual fuel mix was 52 per cent, 33 per cent and 8 per cent respectively (Table 3). A significant deviation was observed in the case of target for oil and coal-based power generation. Renewable energy has remained neglected both in term of in plan and actual power generation. Only 2 per cent of total grid-based electricity was generated from renewable energy during FY2020–21. A major reason for the gap in meeting the fuel mix target under successive PSMPs is mainly due to over-dependence on imported fossil fuels which are highly unstable.

Table 3: Fuel Mix Target for 2021 in Different PSMPs and Actual Fuel Mix in 2021

Fuel mix	PSMP 2005	PSMP 2010	PSMP 2016 ¹	Actual ²
Gas	94 per cent	44 per cent	47 per cent	52 per cent
Oil	3 per cent	5 per cent	18 per cent	33 per cent
Hydro	2 per cent	2 per cent	1 per cent	1 per cent
Coal	1 per cent	31 per cent	28 per cent	8 per cent
Nuclear	-	11 per cent	-	-
Power import	-	7 per cent	6 per cent	5 per cent
Solar	-	-	-	1 per cent

Source: PSMP 2005, 2010, 2016; and BPDB Annual Report 2020–21.

2.2.3 Transmission and Distribution System

The transmission and distribution system did not get equal emphasis in successive PSMPs like the emphasis on power generation. In PSMP 2005, the transmission expansion line planned to focus on 400 kV, 230 kV, and 132 kV. The power network system is examined by categorising the study phase

¹Target for PSMP 2016 is for 2020 instead of 2021.

²Based on BPDB Annual Report 2020-21.

into medium term (2025) and long term (2035) through reviews of PSMP 2010 in consideration with the application of 400 kV and 765 kV. According to the BPDB annual report 2020–2021, a total length of 552.398 circuit kilometre transmission lines has been added to the system via various projects in FY2015–2020. The total length of the 400 kV transmission line increased to 950.14 circuit km from 861 circuit km and the total length of the 132 kV transmission line increased to 8,227.8 circuit km from 7764 circuit km in 2020-2021.

The power distribution system is operated through five urban distribution companies. Dhaka Electric Supply Company Limited (DESCO) and Dhaka Power Distribution Company (DPDC) are in charge of the Dhaka area, and West Zone Power Distribution Company Limited (WZPDCL) is in charge of the western municipalities, including areas in Khulna and Barisal. The rest of municipal power distribution is still under BPDB's operation. Over time, one distribution utility company has been added. Right now, six distribution utilities handle power distribution: the BPDB, DPDC, DESCO, WZPDCL, Bangladesh Rural Electrification Board (BREB) (which comprised 80 rural cooperatives as of June 2019), and Northern Electricity Supply Company (NESCO). The total number of customers served by these six distribution utilities was about 36.4 million as of March 2020 (ADB, 2022).

A major target of the successive plans was to reduce the system loss in the transmission and distribution system. Despite various initiatives, transmission and distribution system loss is still high, it was 11.1 per cent in the FY2020–21 (BPDB, 2021). The smart grid in Bangladesh merely consists of deploying smart meters. If it is implemented, then smart grid will improve grid performance, leading to the reduction of the pollution caused by fossil fuel-based power plants.

2.2.4 Pricing

A major strategic focus of the successive plans is to make the energy price affordable for all. Hence, price rationalisation has been driven by an important area of activity. It is found that the average cost of generating electricity was 7.83 Tk/kWh in FY2009–10 while the bulk selling price was 2.37 Tk/kWh for BPDB. PSMP 2010 suggested two-phase action to address this large difference. The first phase is to develop an electricity tariff based on domestic fuel price and the second phase is to adjust the fuel price and electricity tariff to the international level. In FY2014–15, BPDB procured electricity from generating entities at an average price of Tk 5.94 kWh and sold it to distributing entities at Tk 4.69 kWh (Table 4). PSMP 2016 suggested increasing the household electricity price except for low-income households to reduce the gap between procurement cost and selling price.

Table 4: BPDB Electricity Procurement Cost versus Selling Price

Item	Unit	FY2009-10	FY2014-15	FY 2020-21
Generating/ procurement cost	Tk/kWh	7.83	5.94	6.61
Bulk selling price	Tk/kWh	2.37	4.69	5.17
Difference	Tk/kWh	5.46	1.25	1.44

Source: PSMP 2010, PSMP 2016; BPDB Annual Report 2020-21; BERC (2022).

The previous two PSMPs (PSMP 2010 and PSMP 2016) explicitly suggested increasing the price of electricity to address the difference between generating cost and selling price. Since the formulation and implementation of PSMP 2016, Bangladesh Energy Regulatory Commission (BERC) increased electricity tariffs twice, once in 2017 and once in 2020. In the fiscal year 2020-21, the average electricity generation and procurement cost for BPDB were Tk 6.61 kWh (BPDB, 2021). BPDB then sold at an

average bulk price of Tk 5.17 kWh determined by BERC (BERC, 2022). BPDB has been experiencing losses over the years since its generation cost has been always greater than its selling price.

2.2.5 Financing

The power sector has been enriched with public and private sector financing over the last decades. A major share of financing is targeted at electricity generation. A major part of the financing of the PSMPs has originated from the public sector which includes long-term foreign financing from bilateral and multilateral agencies. A part of public finance has been used for meeting fiscal expenses in the form of providing subsidies, cash incentives, and tax and duty waivers, among others. While power generation is the main area of focus of public finance, in recent years, public finance for transmission and distribution has been increasing. The financing for clean energy and power is however not receiving attention yet among the investors and financiers.

2.2.6 Clean Energy and Power

Clean energy and power had yet to receive adequate attention in successive power and energy sector master plans. PSMP 2005 found neither any renewable generation option at utility scale nor any feasible hydro potential. The situation improved in case of the PSMP 2010 as it has targeted the potential of 100 MW of hydropower in the Karnafuli River. The PSMP 2010 also suggested importing hydropower from Myanmar, Nepal, and Bhutan. While having a mixed target of nuclear, renewables, and import of 20 per cent by 2030, there was no unit addition from renewables found in the power development plan except for that 100 MW hydropower plant. There was no share of renewable energy in the energy mix of the scenario chosen in the PSMP 2016. PSMP 2016 considered renewable energy in the energy mix of the power development plan but found it expensive. In PSMP 2016, a 3E (economy, environment, energy security) evaluation was conducted to develop a least-cost energy mix. Based on that evaluation, renewable energy was found expensive. It was recommended that with the technological advancement the cost of renewable will go down in future and then a shift to renewable might be considered.

It is important to note here that the scenario has changed for renewable energy since PSMP 2016. Solar photovoltaics (PV) is an economical choice, according to the International Renewable Energy Agency (IRENA) the installation cost of Solar PV is almost reduced by half from 2015 to 2019 (IRENA, 2022). Against this backdrop, excluding renewable energy in the power development plan on the ground of cost does not seem to be realistic now.

3. STAKEHOLDERS' VIEWS ABOUT MAJOR CHALLENGES OF THE POWER SECTOR IN LIGHT OF THE MASTER PLANS

3.1 Views of the Government Representatives

A total of five government representatives have taken part in a discussion session. They were requested to share their views on challenges on major power sector related issues which include estimation of demand for electricity, energy mix, energy pricing, and option for clean energy.

Regarding the estimation of electricity demand, government representatives mentioned that the GDP-based approach is good in general as it addresses the whole economy. On the other hand, the sectoral approach is time-consuming and data availability is also a big issue. In PSMP 2016, a Sectoral Analysis Method (SAM) was used to verify the GDP-based approach, and only a 5 per cent

difference was found between GDP based and sectoral based estimates. In the case of access to energy, the government put focuses on access for the poor and marginalized despite the electricity cost is not effective. Hence, the government provides a subsidy to the BPDB to accommodate the additional expenses. However, the excess electricity generation capacity resulted due to huge investment is being criticized which caused huge fiscal expenditure. According to the officials, the government is aware of the burden of capacity payment and it is currently working to eliminate that. In this context, the “no electricity, no payment” policy will be implemented soon. According to the officials, the reserve capacity of Bangladesh if it is compared with other countries, is not so high—Germany’s reserve margin sometimes goes up to 100 per cent while India has a reserve capacity of 40–45 per cent.

In connection with the energy mix, the perception of government representatives is there is a critical time-bound demand for using fossil-fuel-based power plants. At present, a total of 12 GW of gas-based power plants are available in the country whereas 6 GW is often not in operation. Hence, oil-based power plants need to operate sometimes because of not have alternate options to meet the peak demand. According to the officials, the baseload of electricity demand is going to be met by fossil fuel-based power plants and is highly unlikely to change in the recent future. While the optimism toward phasing out of coal-based power plants increases, it is not likely that the existing coal-based power plants (either in operation or in implementation) will be phased out soon. According to the government officials, it would be difficult to go for a complete phase-out of coal-based power plants in Bangladesh. One of the reasons behind the continuing operation is there is a contractual liability to the government to ensure the smooth operation of these projects. However, concerns about coal-based power plants may get addressed in the new IEPMP. The use of captive power is also becoming more and more expensive for the industries.

In the case of transmission and distribution, government officials believe that investment for the development of transmission and distribution got more focus in the IPEMP2016 compared to that the previous ones. The new IPEMP is expected to focus on transmission and distribution—it intends to find a balance between all the areas (e.g., generation, transmission, and distribution). The system losses are decreasing over the years and it is going to decrease even more. The work has already started for the smart grid, a contract has been signed with the German Development Bank to implement smart grid technologies in Bangladesh. There may be some opportunity for the private sector in the transmission system, but it is highly unlikely that they will be involved in distribution in near future.

Regarding the progress of renewable energy-based power generation, the government officials think that the progress isn’t linear as technologies in this domain become obsolete very quickly. Bangladesh has made some improvements recently with the net-metering system. The private sector has a big opportunity here as no licensing is required now for establishing solar power plants up to 5 MW. The effort is currently ongoing to innovate appropriate technologies for converting waste to energy.

As for the institutional capacity, BERC lacks institutional capacity and has much room to improve further. The Sustainable and Renewable Energy Development Authority (SREDA) can be strengthened through capacity building initiatives. In addition, there should be an audit to determine the current situation of the BREB to improve its capacity. Govt. officials’ comments and/or recommendations regarding the discussed issues are presented in table 5.

Table 5: Comments by Stakeholder Group: Government Officials

Issue	Comments by Government Officials
Demand forecast	<ul style="list-style-type: none"> • The sectoral approach is very time-consuming and data availability is also a big issue • The government is bound by law to provide electricity to the poor • “No electricity, no payment” policy will be implemented soon
Fuel mix	<ul style="list-style-type: none"> • The baseload will be met by fossil-fuel based power plants in Bangladesh • We need some coal-fired power plants and we also have contractual liabilities
Transmission and distribution	<ul style="list-style-type: none"> • New IPEMP is going to focus on transmission and distribution • Work has already started for the smart grid
Clean energy	<ul style="list-style-type: none"> • The progress of renewable energy isn't linear • Bangladesh has made some improvements recently with the net-metering policy • The private sector has a big opportunity here • Discovered the potential for waste-to-energy
Institutional issues	There is room for improvement of key power sector related institutions such as BERC, SREDA and BREB

Source: Based on the EGM with the Government Officials.

3.2 Views of the Private Sector

Several private sector representatives including those having investments in independent power producer (IPPs), QRRs as well as in solar power have taken part in the discussion on different challenges of the power sector. The representatives have commented on various issues related to the PSMP formulation process, demand estimate, the prospect of renewable energy, and policy reform related issues.

Concerning the policy formulation process, the private sector representatives believe that previous PSMPs were drafted by a single international agency. The main problem was that the boundary of PSMPs was overstepped in the implementing stage, although a good result that has come out of this is the distributed generation. It is positive since it reduces transmission and distribution losses of the power system. The private sector group believes that the coordination needs to improve among stakeholders including the private sector. A master plan is a business plan in the end; and hopefully, it will get better in future. The plan should also be adjusted once in every 5 years.

Successive PSMPs were only GDP-based, and no micro-level household or industrial survey was conducted. We now have the sectoral data; hence the new PSMP can consider sectoral demand projection. The private sector can help get the data. The demand projection should be based on real and detailed data.

Considering the energy mix, the private sector thinks that focus should be given to improving the country's power generation capacity, and import should be a secondary option. Bangladesh can import renewable-based electricity from neighbouring countries. It may even develop joint-country projects with India, Nepal, and Bhutan. Another option can be relying on domestic resources like extracting coal and using it with good technology. A viability study on options for the level of import of LNG and their use in power generation is important to examine. The government should develop a plan for gradual phasing out of captive power by improving the efficiency of the gas supply.

Concerning transmission and distribution systems some gaps in the systems need to be matched with increasing generation. Generation planning can reduce the dependency on transmission. It will also

reduce the stress on land use and will decrease transmission loss. The private sector is already willing to invest in transmission and distribution systems and is waiting for government guidelines. PGCB cannot keep up with the increasing generation these days and some regulations are also affecting the cost. In view of ensuring a free market for electricity, the transmission and distribution system must be privatised fully incorporating wheeling charges.

For renewable energy, Bangladesh’s resource potential has not been fully utilised. Land scarcity is an issue but it could have been avoided by Char areas. Land scarcity can be solved by the government as there are many kinds of khas land available that can be utilised to develop renewable energy projects with the private sector. Deployment of solar energy can be done in large quantities as it is not as expensive like before—can be some floating solar or hybrid structure with battery or wind. There is scope to explore wind resources. It is about time that Bangladesh starts harnessing its off-shore wind potential. Developing joint ventures and renewable energy projects with neighbouring countries could be a good solution here. Bangladesh can be benefitted from cross-border electricity trade as we have energy surpluses during winter.

Regarding capacity payment, it is mentioned by the private sector that the capacity payment also exists in the developed countries where it is known as ‘availability payment’. The private sector can be able to operate without capacity payment but, direct access to the end consumers is necessary for that without PDB is in the ‘middle’. There is a potential conflict of interest with PDB in the middle since PDB has to consider their generation plants as well. The major share in the electricity price comes from fuel costs and that’s why the cost of electricity won’t go down if the price of fuel doesn’t go down. Solar projects are capital-intensive projects hence it is difficult to attract investments. Due to the decrease in renewable electricity prices, the feed-in-tariff could be a good idea for Bangladesh. Lifting single-party exposure in the bank for renewable-based power plants could mitigate that as it was done for IPPs before. The government is committed to implementing a ‘no electricity, no payment’ policy. It will happen in the end and will aid in getting rid of diesel-based power plants.

According to the private sector, the extension of the Quick Enhancement of Electricity and Energy Supply Act happened because of the Covid-19 pandemic, otherwise, it would not have. The machines imported by the private sector for generating electricity are national assets and they are in good condition. Those can be still used to produce power and the private producers are trying to negotiate that with the government. Many public power plants will not likely generate electricity ever again. However, in the statistics, these are presented as operational. Despite having the excess power generation capacity, there is load shedding at the time of pick load this summer (about 14 GW). About 4.5 GW capacity worth of power plants are not operating because of shortages in fuel supply.

Table 7 represents the views and comments of the private stakeholders regarding the discussed issues of the IEPMP.

Table 6: Key Recommendations by Stakeholder Group: Private Sector

Issue	Key Recommendations by Private Sector
Contextual	<ul style="list-style-type: none"> • Better coordination among stakeholders including the private sector • The plan should be adjusted every 5 years
Demand forecast	<ul style="list-style-type: none"> • Demand projection should be based on real and sectoral data
Fuel mix	<ul style="list-style-type: none"> • Increase domestic power generation capacity • Might import renewable-based electricity • Phase out captive power by improving the efficiency of gas infrastructure

(Table 6 contd.)

(Table 6 contd.)

Issue	Key Recommendations by Private Sector
Transmission and distribution	<ul style="list-style-type: none"> • Matching transmission and distribution systems with increasing generation • Privatization of the transmission and distribution sector
Clean energy	<ul style="list-style-type: none"> • Identification of land by the government for deploying renewable energy • Explore wind resource potential • Develop joint renewable energy projects with neighbouring countries • Feed-in-tariff for renewable energy projects • Lifting single-party exposure in the bank for renewable-based power plants

Source: Based on the EGM with the private sector.

3.3 Views of the CSOs and Academia

A total of five CSOs and academia discussed the possible challenges in the power sector and the way forward. The key issues highlighted by the CSOs and academia include methodological weaknesses, challenges of over-dependence on fossil fuel, transmission and distribution related challenges, the scope for renewable energy-based power sector development and institutional strengthening.

According to the CSOs/academia Lack of coordination among stakeholders was the major weakness in formulating previous PSMPs. Only government organisations were involved in the processes. No local experts were utilised also in those times, which was another shortcoming of the previous PSMPs. The inclusion of local experts in the formulation of power system master plans is crucial and the foreign experts should be there in an advisory role, not leading. The power sector should not pursue a long-term plan; instead, it should go for a short term plan. The long-term plan could be there as a vision with a short-term roadmap.

Regarding the methodology used for estimates of power demand, the forecasting of previous PSMPs was not adequate as it was not a bottom-up demand projection. Also, the GDP elasticity method is not appropriate for the demand projection. GDP is a significant variable for estimating the electric power demand, but the estimation should not be solely based on GDP. The sectoral approach for demand forecasting is a more appropriate one. The global power and energy sector is unstable and going through a transition now. Hence, any long-term demand forecast will be risky. The experts believe that, in the next master plan, the data for FY2019–20 and FY2020–21 should not be considered while conducting the demand projection due to the pandemic.

Putting the primary focus on fossil fuels was the biggest problem in the previous PSMPs as mentioned by the experts. The cost of nuclear energy is much more and it is going to increase in the future. Electricity import can be an option alongside local development of the power sector. Four issues need to be considered in the upcoming master plan: (i) domestic fuels have to be prioritized in the energy mix, (ii) Bangladesh should not be relying on the spot market for LNG import, rather needs more long-term contracts, (iii) nuclear energy cannot be considered as renewable energy, and (iv) the country will have to move away from coal due to the global pressure eventually. In the next master plan, there should be a roadmap regarding how the fuel mix can be gradually transferred from coal to renewables.

The transmission line should be built followed by the power plants. For the Payra power plant, the GoB is paying 115 crore taka every month and the transmission lines will not be even ready until December 2022. The transmission and distribution have to be done by the government, privatisation

is not needed here. We need a smart grid or have to increase the capacity of the electric grid so that it can tolerate more than 10 per cent of variable renewable power.

According to the CSO leaders, many misleading arguments are going on regarding the deployment of renewable energy, one of them is that it will require many agricultural lands. The government is also making excuses without making any visible progress. Wind resource assessment should be done so that we can find out the implementable wind power capacity. We are not able to attract small investors to renewable energy projects because of the lack of incentive options available in Bangladesh. The share of government financing in renewable-based power generation was about two per cent in the last decade; it got a little bit better in the last fiscal year (4.35 per cent). By maintaining an equal balance between the current subsidy and the subsidy provided to the renewable sector we can attract investments in the renewable energy sector.

The CSO leaders proposed a new institution to oversee the master plan. In their view, the IDCOL should be abandoned from the power sector-related activities and regulations. SREDA should be provided with a regulatory committee. A new law should be introduced to ensure the quality of electricity. Rental and quick rental power plants should be shut immediately. None of the policies will work unless the Quick Enhancement of Electricity and Energy Supply Act that enables quick rental of power plants is nullified. Some key recommendations by the CSOs and academia on the issues have been represented in table 7.

Table 7: Key Recommendations by Stakeholder Group: CSOs and Academia

Issue	Key Recommendations by CSOs and Academia
Contextual	Include local experts Make a short-term plan
Demand forecast	Use sectoral approach Exclude 2020 and 2021 data in the model
Fuel mix	Focus on domestic resources Make more long-term contracts for LNG import Make a road map for the energy transition
Transmission and distribution	Build transmission line first Make the grid ready for renewable energy deployment
Clean energy	Wind resource assessment to determine the implementable capacity More incentives to attract investors
Others	A law to ensure the quality of electricity Rental and quick rental power plants should be shut down immediately

Source: Based on the EGM with CSOs and academia.

4. STAKEHOLDER ENGAGEMENTS IN THE FORMULATION OF MASTER PLANS

4.1 Stakeholder Engagements in the PSMP 2016

The participation of stakeholders in the formulation process of the Power Sector Master Plan 2016 is mainly dominated by government officials. Participation from academia and CSOs were minimum. In the high-level discussion meetings, nobody was invited from academia, CSOs, or the private sector (Table 8). Participation of different stakeholder groups in the PSMP 2016 formulation process can be understood from the table below 9.

Table 8: Participation of Different Stakeholders in Seminar/Meetings during PSMP 2016

Stakeholder Group	1st Seminar	2nd Seminar	3rd Seminar	Pre-High-Level Discussion Meeting	High-Level Discussion Meeting	4th Seminar	Official Comments Meetings for the Final Report
Government Agency	20	25	44	10	57	97	5
Private sector	1		2			1	
Academia		1	1			4	
CSOs						1	
ADB						4	
Media			3		6	9	
Total	21	26	50	10	63	116	5

Source: PSMP 2016.

Table 9: Stakeholders' Engagement Level in PSMP 2016

Stakeholder Group	Level of Involvement	Example of Involvement
Government	Partnering	Played an important role in formulating the PSMP 2016
Private sector	Inform	Only the information, knowledge, process and outcome were shared
Citizen's group	Inform	Only the information, knowledge, process and outcome were shared

Source: Authors' Illustration.

Based on these data, it can be inferred that the stakeholder participation from the private sector as well as CSOs and academia falls into the category of low-level public involvement or influence. It can also be concluded that the involvement was in the "Inform" level in the public involvement continuum (Arnstein, 1969).

4.2 Nature of Stakeholder Engagements in the IEPMP 2021

Stakeholder engagement in the IEPMP 2021 appears improved from the PSMP 2016, but still it has a long way to go. In the formulation process of IEPMP, public sector representatives seem to play the dominating role similar to the previous master plan. Two meetings have been arranged so far by JICA with stakeholders other than the government sector. On 23 November 2021, the first stakeholders' meeting was arranged to inform them regarding the plan and preliminary progress of the IEPMP. Plans of all sectors were revealed but not in detail. The initial plans regarding methodology, probable scenario development, fuel mix, T&D plans, and other issues were shared to inform the stakeholders. From the stakeholders' engagement so far, it can be concluded that it is still at the 'inform' or 'educate' stage in the progressive ladder. JICA and the government together have initiated to explain the process of the IEPMP to the stakeholders and public, as it is the right of the public to be informed and be educated.

Apart from the level of engagement, it is observed that the suggestions put by different stakeholders have been taken seriously by the policymakers and those are reflected in the initial plan of IEPMP (Table 10). IEPMP 2022 is aiming for a sectoral level demand forecast using a wide range of variables not only GDP. As mentioned before, it was one of the core suggestions of different stakeholders. In

Table 10: Engagement Level in IEPMP 2021

Stakeholder	Level	Example of Involvement
Government	Partnering	Played an important role in formulating the IEPMP 2021
Private sector	Inform	Only the information, knowledge, process and outcome have been shared
CSOs	Inform	Only the information, knowledge, process and outcome have been shared

Source: Authors' Illustration.

past years, transmission and distribution systems is getting more attention than that of generation, which was also one of the recommendations of civil society. The number of suggestions considered may be minimal, but the fact that policymakers have started to consider stakeholders' is a positive sign of future collaboration.

5. CONCLUSION

Aligning with the government planning and strategic documents, the new integrated power and energy system master plan should have a better demand forecast, have a better fuel mix focusing on clean energy, reduce system losses, address ever-increasing losses of BPDB, have a robust strategy of integrating renewable energy in the power system.

There is no doubt that the lack of coordination is a key weakness in the successive PSMP formulation processes. While the situation has improved with time, but expected result is yet to achieve. Other key issues that draw the division between stakeholders are—(i) electricity import, (ii) privatisation of transmission and distribution systems, (iii) excess generation capacity, and (iv) electricity pricing and capacity payment.

Non-government stakeholders do not see electricity import as much of an opportunity while the government is keen to import electricity from the neighbouring country to improve energy security of Bangladesh. The emergence of opinion comes when it becomes cross-border electricity trading in which all stakeholders unanimously accept it. They all also agree about importing renewable-based electricity as it will improve energy mix of Bangladesh.

While the CSOs believe that the transmission and distribution have to be done by the government, the private sector is already keen to invest in transmission and distribution systems and is waiting for government guidelines. Government officials also think there may be some opportunities for the private sector in the transmission system, but it is highly unlikely that they will be involved in distribution in near future.

According to government statistics, we have excess generation capacity while the private sector professionals said there is a need to do a stock-take on those statistics as there may be many old government power plants that will never come into operation. Excess generation capacity, also known as 'reserve margin' is something that each power system of a country needs to have. However, the amount is country-specific based on the nature of the power systems and their reliability factors. While the civil society believes that we have a reserve margin that is more than necessary, the government officials disagree. They argued about the neighbouring country India has a higher reserve capacity than Bangladesh.

The private sector offers the best electricity price in the country if we consider all the subsidies going into public electricity generations, according to private sector professionals. CSOs are currently advocating for the discontinuation of many private power producers because of the burden created due to capacity payment. The private sector argued that if we remove capacity payments, then the rental power exists no more. Government officials explained that we need them for a few more years. The private sector also agrees here as those power plants are still in good condition and those are national assets.

From PSMP 2016 to IEPMP 2021, stakeholder participation got better to some extents, but still there is low level of involvement in the public involvement continuum. The private sector accounts for about 43 per cent of the total installed capacity of the country's power generation (BPDB, 2021). Excluding them in case of the formulation of the power system master plan is out of the question now. The academics of our country is capable enough to consult the GoB in developing master plans. Hence, it is important to include them in the formulation of the master plan that represents Bangladesh.

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