ELECTRICITY OUTAGES HINDERING BANGLADESH'S ROBUST ECONOMIC GROWTH

— NEED TO PROMOTE RENEWABLE ENERGY USE AND POWER GRID DEVELOPMENT —

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SUMMARY

- Bangladesh's energy structure is 98% dependent on fossil fuels, with gas-fired thermal power accounting for over half of total energy supply.
- In recent years, declining domestic gas production has forced the country to import expensive LNG. Factors such as foreign exchange shortages and rising international fuel prices have made fuel procurement unstable, resulting in frequent power outages. These outages are proving to be a drag on economic growth.
- The government will promote the adoption of renewable energy to meet 40% of the country's electricity needs with clean energy by 2041. In addition, the government must focus on developing the planned power grid with India and Nepal.

Bangladesh, with the world's eighth largest population, continues to enjoy robust economic growth, driven by low-cost labor and garment exports. In recent years, however, instability in energy procurement due to rising global fossil fuel prices has led to frequent power outages, and the disruptions are negatively impacting economic growth. In light of these circumstances, the government has set a goal of meeting 40% of its electricity needs with clean energy by 2041, and its efforts are attracting attention.

1. FOSSIL FUEL-DEPENDENT POWER SUPPLY STRUCTURE HINDERING ECONOMIC GROWTH

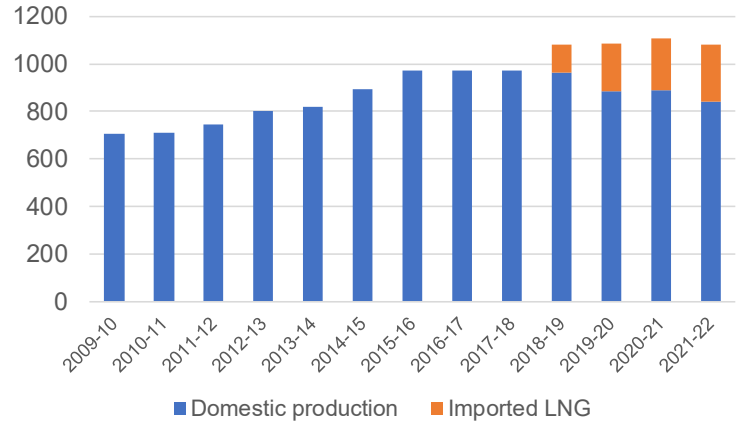
The Bangladesh administration under Prime Minister Sheikh Hasina, inaugurated in 2009, has been encouraging the private sector to set up new power plants to address the country's lack of access to electricity, which affects about half of the population, and frequent power outages. As a result, installed power generation capacity grew from approximately 5.5 GW in 2009 to 26 GW in 2023. Furthermore, 100% of the population had gained access to electricity as of 2022.

However, the country is once again experiencing frequent power outages. Although gas-fired thermal power accounts for over half of the power supply in the country[1], domestic gas production has been declining in recent years, and the country's dependence on LNG imports has been increasing (Figure 1). This, combined with factors destabilizing fuel procurement, such as the country's lack of foreign currency and rising international fuel prices against the backdrop of Russia's invasion of Ukraine and other conditions, has disrupted the power supply.

[1] In 2022, the breakdown of power supply was as follows: gas-fired 50.3%, heavy oil 28%, coal 10%, imports 10%, and renewable energy 1.7%.

In the face of unstable electric power supply, the country, a leading apparel exporter[2], has been promoting the installation of private power generation facilities, mainly for companies that undertake contract production for major overseas apparel brands. Gas demand for electric power generation by those private power plants now accounts for 18% of the country's total gas demand[3]. However, the price of gas for power generation by private power plants is higher than the price of gas for power generation by general power generation facilities[4]. There are concerns that the extended operating hours of private power plants may harm the cost competitiveness of the country's apparel industry. To address this issue, the government is increasing subsidies to ease the burden of rising gas and electricity prices. However, there are concerns about the sustainability of this measure, as the amount of subsidies is estimated to have exceeded 1.0%[5] of GDP in FY 2023, compared to 0.5% of GDP in previous years. The government has signed long-term contracts for LNG purchases with Oman, Qatar, and Excelerate Energy (US) to ensure stable gas procurement. These contracts were signed at a time when market prices are at a premium, which is expected to put upward pressure on electricity rates. Bangladesh's energy structure is heavily reliant on fossil fuels, including coal[6], heavy oil, and gas. This dependence is likely to impede the country's economic growth in the future[7].

Figure 1: Gas supply situation in Bangladesh (unit: Bcf)



Source: Compiled by MGSSI based on announcements by Petrobangla, and other materials

2. NECESSITY OF INCREASING RENEWABLE ENERGY USE TO BECOME A HIGH-INCOME COUNTRY BY 2041

To avoid such energy supply instability and ensure energy security, the government of Bangladesh needs to actively encourage the use of renewable energy. The following is a review of the outlook for Bangladesh's

[2] Bangladesh ranks second in the world after China. Bangladesh's apparel industry accounts for approximately 16% of the country's GDP, and more than 100 global apparel brands either manufacture in Bangladesh or contract out production to makers in the country, capitalizing on the benefits of an extreme concentration in garment manufacturing in the country. The government has set a goal of increasing apparel exports from the current level of approximately US$53 billion to US$100 billion by 2030.

[3] The other constituents of gas demand are general electric power generation 40%, industries 19%, households 13%, fertilizer production 6%, CNG 3.5%, and commerce/tea production 0.5%.

[4] Prices of gas for electricity generation were raised from 5.02 taka/MMBtu (1 taka ≈ ¥1.3) in June 2022 to 14 taka/MMBtu in February 2023, an increase of 179%, while prices of gas for private power generation were similarly increased from 16 taka to l30 taka, reflecting an 88% increase.

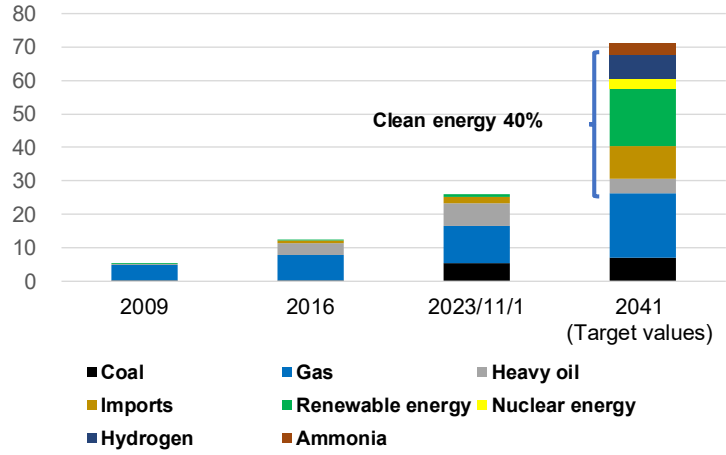
[5] It is likely that Bangladesh cannot fulfill a promise with the IMF to keep the subsidies for fertilizers, gas, and electricity in the budget for FY 2023-2024 within 1.0% of GDP, and the subsidies will likely reach 2.2% of GDP. Furthermore, the IMF projected that the subsidies for electricity and gas would be 0.9% of GDP for FY 2023 (0.5% for FY 2022), but the actual figure is expected to exceed this.

[6] The country has 5.8 GW of coal-fired power plants in operation and 4.4 GW under construction, which will bring the total installed coal-fired capacity to about 10 GW by 2030. Meanwhile, amid the global trend toward decarbonization, Bangladesh decided to scrap the proposed construction of 10 coal-fired power plants (about 8 GW) due to the difficulty of procuring funds from overseas, and decided against building any new ones in the future.

[7] BloombergNEF projects that if new gas fields are not discovered and developed in the country, the majority of gas consumption will have to be covered by LNG imports after 2030. The negative impact of this is expected to spread through the economy.

electricity supply and demand situation. The country aims to join the ranks of high-income countries by 2041[8], which will mark the 70th anniversary of its founding. The use of air conditioners is expected to increase as the income level of its citizens rises, and further growth is anticipated for the manufacturing sector, including the apparel industry. The Integrated Energy and Power Master Plan (IEPMP[9]) for Bangladesh, prepared at the initiative of the Institute of Energy Economics, Japan (IEEJ) (supported by the Japan International Cooperation Agency (JICA)), estimates Bangladesh will have a total installed power capacity of 71 GW in 2041, about 40% of which is expected to be provided by clean energy (Figure 2). Due to Bangladesh's high population density (it is a small country with a population of 170 million) and issues such as flooding, there are limited locations suitable for installing solar power plants. However, by 2041, the country aims to install 10 GW of photovoltaic capacity (6.5 GW rooftop and 3.5 GW mega solar)[10] and 7.5 GW of wind power capacity (1.5 GW onshore and 6 GW offshore).

Figure 2: Installed capacity of various types of electric power (unit: GW)



Source: Compiled by MGSSI based on forecast data of BPDB and JICA reports

To achieve this, the cooperation of foreign companies will be indispensable. In November 2023, private Bangladesh company Summit and two Danish companies, Copenhagen Infrastructure Partners (CIP) and Copenhagen Offshore Partners (COP), announced that they would be investing US$1.3 billion in the development of a 500 MW offshore wind farm. Japanese companies are also constructing a large number of solar power plants through joint ventures with local companies. Apart from renewable energy, two nuclear power plants (with total capacity of 2.4 GW) are being built with Russian financing, and two more plants are under consideration for the future. It is reported that the government has already secured land for these four facilities. Bangladesh is a partner country in Japan's Joint Crediting Mechanism (JCM), which puts it in a favorable position to adopt Japanese renewable energy-related technologies. As Bangladesh expands its adoption of renewable energy, Japanese companies are expected to provide financial and technological support, creating promising business opportunities for them.

The expanded utilization of renewable energy will also assist Bangladesh in meeting the environmental standards of European companies, which are the largest customers of Bangladesh's apparel products, constituting 85% of the country's exports. These standards are expected to cover the entire supply chain, including textile manufacturing and fiber spinning, not just the sewing factories directly engaged with these companies that deal directly with them. It is probable that these standards will eventually be applicable to those factories as well. The apparel industry has set a target to source 20% of the electricity consumed by its factories

[8] The World Bank classifies World Bank Group member countries by income level based on per-capita gross national income (GNI), and according to the latest criteria, countries with per-capita GNI of US$13,846 or more are categorized as high-income countries. Bangladesh's per-capita GNI was US$2,690 in 2023.

[9] The plan is expected to be approved by the government and eventually become a national plan.

[10] According to government officials, while much of the electricity for irrigation is currently provided by diesel power generation, it will all be switched over to solar and other renewable energy sources.

from clean power by 2030. While solar panels are mandatory on factory roofs, they alone cannot generate sufficient electricity, necessitating supplementary measures.

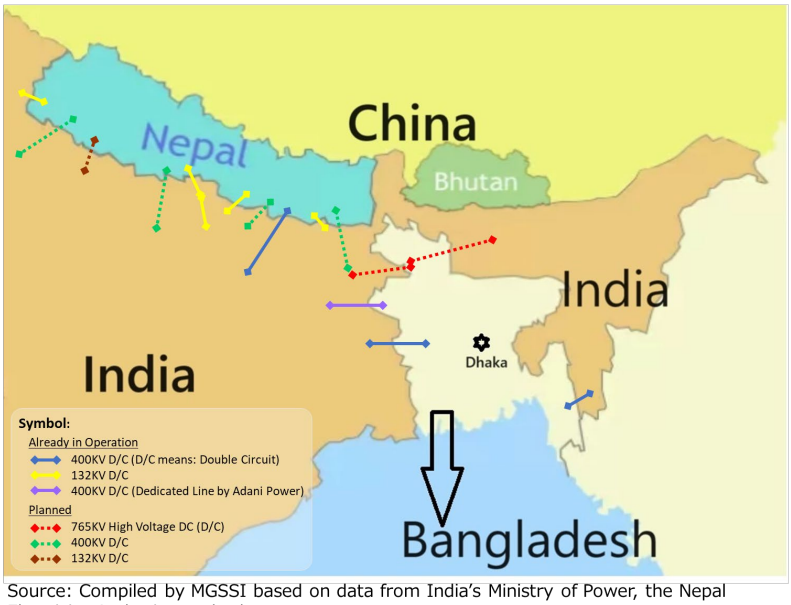
The Bangladesh government has set a target of reducing GHG emissions by 22% from the projected 409MtCO2e in 2030 under the business-as-usual (BAU) scenario[11], and the expansion of renewable energy use will contribute to meeting this target.

3. IMPORTANCE OF IMPROVING THE POWER GRID AND STRENGTHENING ENERGY CONNECTIVITY WITH NEIGHBORING COUNTRIES

The aforementioned master plan, the IEPMP, envisions hydrogen and ammonia power generation constituting approximately 15% of clean energy (Figure 2). However, this remains an economic challenge and is not a guaranteed option. Instead, as a pragmatic approach, priority should be given to the import of renewable energy from Nepal and India, accounting for 14%.

As part of India's initiative to strengthen energy interconnectivity with neighboring countries, a draft power trade agreement between India, Bangladesh, and Nepal was concluded in June 2023[12]. Bangladesh and Nepal have long sought to sell Nepal's hydroelectric power through India, and India has now agreed to do so. The cross-border power grid between Nepal and India is currently under construction. If the planned power grid between Bangladesh and India (Figure 3) is also developed, interregional power trading will become more active. In Europe, power grids have been developed and consolidated to achieve a stable supply of electricity. The Nordic countries have combined Norway's abundant and stable renewable energy (hydroelectric power) with Denmark's variable output renewable energy (wind power, etc.). Similarly, it is expected that the above three countries will be able to secure stable and inexpensive power supply even in the summer, when power demand increases, by connecting their power grids.

Figure 3: Cross-border power grid between India, Bangladesh, and Nepal and its development plan



Source: Compiled by MGSSI based on data from India's Ministry of Power, the Nepal Electricity Authority, and other sources

[11] Bangladesh Ministry of Environment, Forest and Climate Change, Nationally Determined Contributions 2021 [Updated], 26 August 2021 https://unfccc.int/sites/default/files/NDC/2022-06/NDC_submission_20210826revised.pdf

[12] This power trade agreement among the three countries is the first in South Asia. India and Nepal are already trading power, with India purchasing 800 MW of power (hydropower-derived) from Nepal in the summer, and in the winter, India selling power to Nepal. Indian Prime Minister Modi announced in June 2023 that the country will purchase about 10 GW of electricity from Nepal over the next 10 years. Furthermore, the Indian government revised its energy-related policies in October 2023 to allow imported hydropower to be included as part of renewable energy.

Specifically, India is installing 500 GW of renewable energy capacity, mostly solar, by 2030, which will enable it to supply cheap solar power to Bangladesh during the day. During the night, depending on fuel procurement conditions, Bangladesh will be able to supply India with its surplus coal and gas power (generated by baseload power plants). In addition, Bangladesh's electricity demand is characterized by a large increase in summer when the air temperature rises, while in neighboring Nepal, summer is the rainy season and the electricity surplus from hydropower generation is at its maximum. Therefore, if the India-Bangladesh-Nepal power grid is developed, Bangladesh will be able to purchase renewable energy at a much lower cost (currently under negotiation, but expected to be around 10 taka/KWh = about ¥13, assuming a long-term contract) and more stable than the current thermal power generation using imported fuel. Such an arrangement would also eliminate the need for Bangladesh to install equipment with capacity that is not needed in the winter to meet maximum summer electricity demand[13]. It can be expected that Japanese technology will be used to ensure the stable operation of such cross-border power grids.

The development of Bangladesh's domestic power transmission and distribution network is also an issue that needs to be addressed to ensure stable supply. There is the problem of uneven distribution of power supply facilities in the country, due in part to a lack of suitable sites for solar power generation, as mentioned earlier. Furthermore, an increase in grid capacity is required to accommodate the increase in solar and wind power generation, which are variable output power sources.

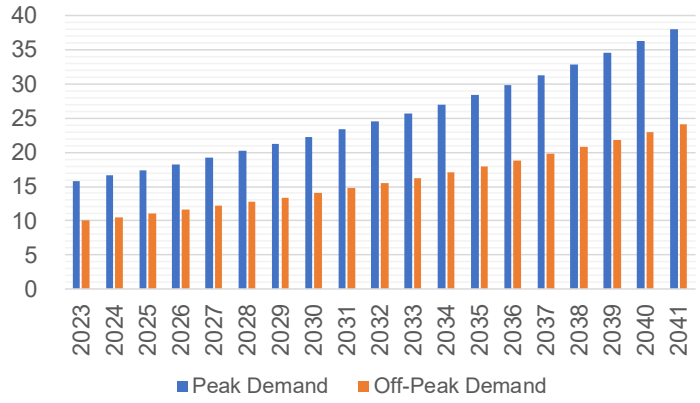
4. FUTURE OUTLOOK: AVOIDING OVERCAPACITY IS ALSO CRUCIAL

In Bangladesh, electricity demand has expanded by an average of about 7.5% per annum over the past eight years, owing to efforts to provide connectivity to electricity-deprived areas and a rapid increase in industrial demand. However, the electrification rate has already reached 100% and the rate of increase in industrial demand is also likely to slow down. Bangladesh is expected to continue to experience high economic growth, and in addition to industrial demand, power consumption is expected to increase due to an increase in the use of air conditioners, coolers, and other equipment. However, even taking these factors into account, it is reasonable to forecast a growth rate of around 5%, which is about twice the average annual growth rate of global electricity demand of 2.4%.

Based on this outlook, peak demand in 2041 is estimated at approximately 38 GW, and even in terms of securing stable supply, the maximum installed capacity required would be about 50 GW (Figure 4). If all thermal power generation facilities currently under construction or planned are completed, that alone will exceed 40 GW of installed capacity by 2030. To prevent excessive investment in thermal power generation facilities, it is recommended to cancel plans for facilities other than those currently under construction. Additionally, it is required to accelerate the adoption of renewable energy and establish a mechanism to meet peak power demand by developing the power grid in cooperation with India and Nepal.

[13] Eliminating the system of paying a fixed amount on an installed capacity basis, regardless of whether the system is in operation or not, will help reduce the budget deficit.

Figure 4: Projected maximum and minimum electricity demand in Bangladesh (GW)



Source: Compiled by MGSSI based on BPDB historical data and economic growth forecast data