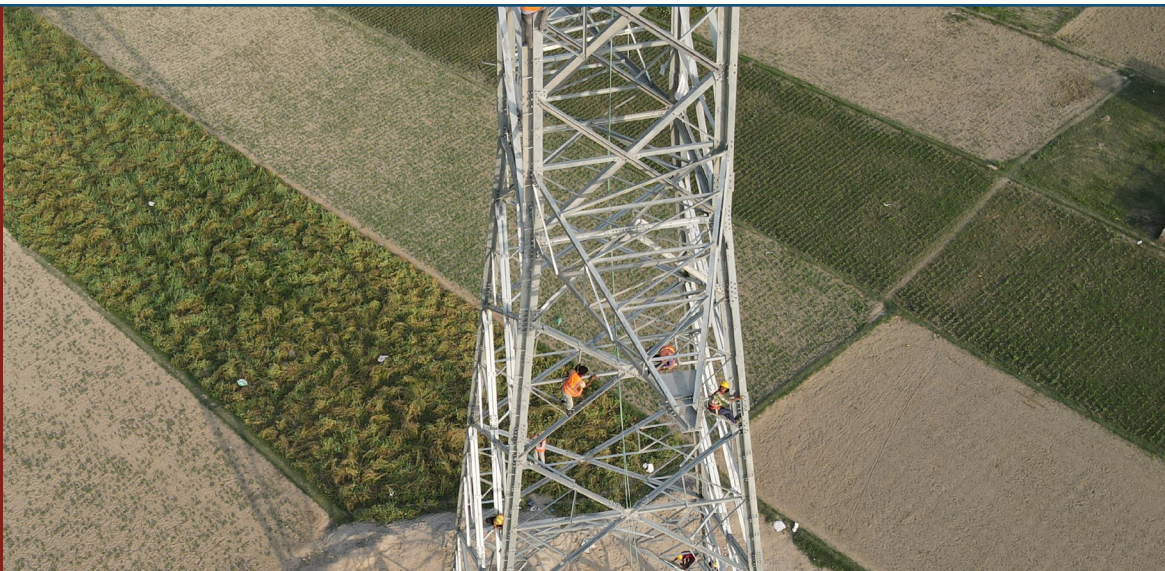




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Toward a Sustainable Energy Pathway for Bangladesh

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The rapid cost reduction of solar and wind power generation since 2007 has made the transition toward clean energy more feasible for countries working to drastically contain greenhouse gas emissions to meet the targets of the Paris Agreement. While there are still technical challenges of large-scale grid integration, owing to the high cost of energy storage to address the problem of intermittency, the present situation is more favorable for the deployment of renewable energy. Energy efficiency is now prioritized as an avenue to not only save energy but also minimize costs while reducing greenhouse gas emissions. Both goals must be pursued simultaneously to make the energy system of a country sustainable.

To this end, Bangladesh has been promoting renewable energy and energy efficiency, supported by policies and regulations. Yet the country has its own set of obstacles to utilizing renewable energy at scale.

In light of the above trends, this essay describes the transformation of Bangladesh's energy sector during the last decade and identifies the factors that have influenced this transformation. The essay then sheds light on the challenges that currently confront the sector. It concludes by considering policy options for Bangladesh to make strides toward a sustainable energy transition and build an energy system that is resilient against the price shocks of fossil fuels in the international markets.

The Transformation of Bangladesh's Energy Sector over the Last Decade

In 2009, Bangladesh was facing severe challenges, with access to electricity at only 47%.¹ As demand for electricity rose significantly and surpassed supply, the utilities in the power sector had to adopt load shedding to distribute

electricity among different areas, while maintaining uninterrupted electricity supply to industries critical for economic growth. The government had no option but to deploy a quick-fix strategy to ensure continuous electricity supply through purchasing electricity from private rental and quick-rental power plants.² Under the 2008 policy guidelines, private organizations were allowed to set up power plants in the country to provide relief amid the growing supply-demand gap for electricity.³ The public sector utilities had the provision to then buy electricity from these power plants at a negotiated rate.

Backed by new power plants in both the public and private sectors, the installed electricity capacity increased by fivefold. As a result, in March 2022, Bangladesh attained universal electricity access.⁴


Challenges of the Energy Sector

While access to electricity in Bangladesh is now 100%, the overall contribution of renewable energies to national electricity generation is still very limited. Policymaking in the power sector is largely centered on imports of fossil fuels, including extremely polluting coal.⁵ The target of achieving 10% electricity from renewable energy sources, originally set for 2021, is far from being accomplished. On an

installed capacity basis, renewable energies have a share of 3.4% in the national electricity generation system.⁶ If, however, the percentage of national electricity demand met by renewable energies is being considered, their contribution is even less due to intermittence, particularly of solar power.

The policy that was devised in 2008 included supporting instruments, such as a preferential tariff and an exemption from value added tax (VAT) for renewable energy equipment, to enhance the share of renewable energies in the national grid. However, no feed-in-tariff or preferential tariff system was implemented in Bangladesh, even when the cost of solar was very high. It was recommended that all renewable energy equipment be excluded from the VAT, but the importers of solar panel and related accessories are required to pay VAT ranging from 11.33% to 38.47%.⁷ This is clearly a market barrier for the promotion of solar energy.

While the waiver for VAT on solar panel and accessories was proposed to reduce project costs, one of the potential reasons for imposing VAT was to protect the interests of the local manufacturers of solar panels. Unfortunately, local manufacturers do not have sufficient capacity to meet the demand. On the other hand, to promote solar rooftop



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systems in the country, net-metering guidelines were approved in 2018 and revised in 2019, which have proved to be effective.⁸

Given the limited success in renewable energies, particularly in solar, coupled with the burgeoning pressure to meet growing demand, the Power Systems Master Plan 2016 (PSMP-16) focused on imported coal and liquefied natural gas (LNG).⁹ What was not anticipated at the time was that renewable energies such as solar and wind would become cheaper than coal. Likewise, the PSMP-16 assumed economic growth scenarios in forecasting future demand for electricity. Moreover, the new fossil fuel-fired power plants, based on PSMP-16, were installed without scrutinizing the demand side as to whether Bangladesh would really need the installed electricity capacity. As a result, the country now has a surplus capacity.¹⁰

Since 2009, electricity generation capacity has increased significantly, but the demand for electricity has not risen. This is in sharp contrast with the situation over a decade ago when the supply was much lower than the demand for electricity. One factor has been disruptions from the Covid-19 pandemic, which slowed economic growth.¹¹

Yet both urban and rural areas continue to face electricity disruptions because the distribution network has not been expanded and the quality of the network has not been improved in line with the rising installed capacity.¹² Many industries use their own gas- and diesel-based power-generating sets (known as “captive generation”) as the main source to ensure uninterrupted power supply and reduce costs.¹³ The combined capacity of industrial captive power plants is 4,486 megawatts (MW), of which 82% are run by natural gas.¹⁴ Therefore, if

the industries fully relied on the national grid, the demand could have been marginally over 18,000 MW, as the maximum demand served in the country in 2021 was 13,792 MW.¹⁵ With 22,031 MW of installed capacity, excluding the Solar Home System, if the reserve margin of 15% is taken to allow increasing the share of variable renewable energies in the future, the present grid would not have a considerable amount of surplus capacity.¹⁶

Notably, oil-based power plants, despite operating at a very low capacity, receive capacity payments, which are contractual obligations of the government utilities to purchase power from private electricity producers even when there is not enough demand.¹⁷ Overall, such payments are not only weakening the energy sector but also straining the economy. The present trajectory of fuel imports is further aggravating energy security. Although ten coal-fired power plants from the pipeline were scrapped last year,¹⁸ five of these plants are scheduled to be transformed into LNG-based power plants, continuing the upward trend in energy imports.

At the same time, the country has yet to reap the multitude of benefits that renewable energies could offer. These include not only environmental benefits but also economic benefits arising from the cost competitiveness of most renewable energies compared to fossil fuels and less exposure to price fluctuations in the international markets as well as enhanced energy security through greater reliance on internal resources.

Policy Options for the Energy Sector of Bangladesh

A secure, sustainable energy pathway for Bangladesh would involve accurate demand

projection, an emphasis on reliability, phasing out subsidy and price distortions, enhancement of energy efficiency, and an increased share of renewable energies. To that end, the country should consider the following measures.

Estimate future demand. When estimating future demand, several factors should be considered, such as the current suppressed demand for electricity, rising disposable income and demand in the near term, and future energy efficiency gains. Plans should also be made for the national grid to cover industrial demand currently being met by captive generation. Another priority is adopting new technologies, such as electric vehicles and associated infrastructure.

Modernize electrical grids and address energy price distortions. To meet rising economic and industrial demand, the national grid needs to be reliable, and energy pricing should be set without any distortion. The modernization of grid infrastructure is necessary to ensure continuous electricity supply to both urban and rural areas. In parallel, the price advantage that industries receive from captive generation should be removed gradually.

The other side of the price distortion that is more commonly known as capacity payment could be addressed in two ways. First, when industries completely rely on the national grid, the plant factor (i.e., capacity utilization) of the power plants—specifically the rental and quick-rental ones—will need to be increased to meet the demand, thereby reducing capacity payments. Second, phasing out rental and quick-rental power plants sooner will make the average cost of electricity generation much lower, relieving the fiscal burdens that Bangladesh currently has due to subsidies and capacity payments. This will eventually provide

market signals promoting renewable energy, such as solar, which is already cheaper in the international market than most fossil fuels, including coal.¹⁹

Such changes in pricing can significantly affect the energy system of a country. In the case of Vietnam, for example, less than two years after the country launched a feed-in-tariff, the energy sector saw a solar boom with added installation of 4,500 MW.²⁰ Bangladesh could create similarly favorable conditions for solar rooftop systems and thus significantly meet future morning peak demand without any investment in a costly energy storage system by removing energy price distortions. Addressing the present energy pricing issue will help large-scale renewable energy projects too. Nevertheless, subsidies should be phased out gradually in order to reduce the impact on the poor quarter of society.

Improve energy efficiency. On the supply side, improving the efficiency of electricity generation is crucial. Publicly owned power plants are currently around only 41%, and some peaking power plants have very low efficiency.²¹ Over the period from 1999 to 2021, the combined losses from transmission and distribution have been reduced from 31.8% to just over 11%.²² The major focus on the supply side, therefore, should be on improving efficiency in electricity generation. Moreover, because different industrial sectors and processes have energy efficiency improvement opportunities ranging from 25% to 76%, energy efficiency on the demand side should also be improved.²³

Set realistic renewable targets. Bangladesh should assess the true renewable energy potential for investment in the short, medium, and long run amid discussion about increasing its renewable


energy target to 40% for 2041. Notably, the rooftops of textile and other industries could accommodate a total capacity of 5,000 MW in solar installations.²⁴ Moreover, the agrophotovoltaic (APV) system, which provides the opportunity to combine energy generation from solar and food production, could be an option for Bangladesh as the country faces challenges to allocate dedicated land for utility-scale solar energy. Since food production and energy generation are possible simultaneously, the APV system would enhance land-use efficiency.²⁵ While crop cultivation may be reduced directly beneath solar panels, an APV system could improve overall land productivity by up to 70%.²⁶

Reduce dependence on imports. By ramping up local gas exploration, Bangladesh could minimize its dependence on imported fossil fuels, such as LNG, oil, and coal, and thus enhance national energy security. This strategy, along with promoting renewable energy locally, will reduce the country's vulnerability to external shocks in international fossil fuel markets. Russia's invasion of Ukraine has only increased the volatility of fossil fuel prices and is a wakeup call to spearhead measures to transition to low-cost renewable energies.²⁷ As an impact of the Ukraine crisis, Bangladesh is currently implementing load shedding across

the country for two hours, alternately in different areas, to reduce costly fuel imports and save foreign currency reserves. This also substantiates the need for immediately ramping up efforts on local gas exploration and renewable energy promotion.²⁸

Promote cross-border electricity trade. Bangladesh is importing not only fossil fuels but also electricity from conventional sources. Hence, it could explore possibilities to procure electricity from renewable energy sources in other countries. Utility-scale solar projects in India, for instance, have offered attractive prices.²⁹ The economics of purchasing renewable energy-based electricity from India, therefore, could be examined. Likewise, Bangladesh could evaluate the options and economics of procuring hydropower from Nepal and Bhutan, as these two countries have a combined capacity of more than 100 gigawatts of hydropower potential.³⁰ There have already been discussions about importing hydropower from Nepal, and even some progress has been made, but the process should be expedited.³¹

Encourage green investment. In addition to assessing the true potential of renewable energies and eliminating energy price distortions, green financing should be made attractive to help promote the development of renewable energies and incentivize greater energy efficiency on the demand side. One of



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the major caveats of green financing in Bangladesh is the high transaction cost that discourages private investors.³² Furthermore, financial institutions have limited capacity for processing proposals to improve energy efficiency and find such projects risky.³³ In that regard, Bangladesh might explore international low-cost financing schemes, along with developing its capacity to finance clean energy projects.

Develop holistic energy and power sector policies. Both policy-level traction and sufficient technical capacity are needed to transition to clean energy. As of now, Bangladesh's power and energy policies are developed separately. To make a clean energy transition and sustain it, these policies should be integrated so as to ensure that issues on the supply and demand sides of both energy and electricity are addressed. Specifically, the integrated energy policy should factor in the respective advantages of clean energy over fossil fuels, including coal. In terms of technical capacity, the ability to estimate demand more accurately, implement clean energy projects with high quality, and monitor energy efficiency gains, among other factors, is necessary.

Conclusion

Bangladesh is on a course to graduate from least developed country status in 2026 and become a developed country in 2041. This, however, is predicated on enhanced competitiveness. Subsidies, capacity payments, and the rising volatility of fossil fuel prices in international markets may diminish the competitiveness that has propelled the country's rise.

Within this context, low-cost renewable energies could offer significant benefits to Bangladesh. Similarly, policymakers must prioritize improving energy efficiency. As the country has raised its ambition for mitigating greenhouse gas emissions in the revised nationally determined contributions, both renewable energy and energy efficiency are crucial to achieve the new targets. What is imperative is that Bangladesh have a clear vision for transforming its energy sector to remove the prevailing barriers to the country's clean energy transition, supported by suitable policy instruments. ∞

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