



Youth Policy Forum Policy Brief
Energy and Infrastructure Policy Network

CHALLENGES IN BANGLADESH'S RENEWABLE ENERGY TRANSITION

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Challenges in Bangladesh's renewable energy transition

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A. Context

Bangladesh, a lower middle-income country with a per capita income of USD 2,820, aims to become a high-income country by 2041 with a per capita income of over USD 12,500. To achieve this, the country needs to achieve an average GDP growth of 9% from 2021 to 2041. This would reduce Bangladesh's poverty rate and extreme poverty rate to 2.59% and 0.68% by 2041, respectively.¹

To facilitate this rapid, efficient, and sustainable growth, Bangladesh needs to create an enabling environment, with efficient energy and infrastructure being essential components. The government estimated that for a 1% GDP growth, there will be a 1.5% growth in electricity demand.²

In 2022, the Ministry of Environment, Forest and Climate Change proposed the Mujib Climate Prosperity Plan (MCPP), which aims to achieve 40% electricity generation from renewable energy by 2041.³

This YPF policy brief has identified some of the key challenges for Bangladesh's renewable energy transition.

B. Power sector and the policies

Historically Bangladesh's power sector has been dominated by natural gas for obvious reasons. Natural gas is cleaner than most other fossil fuels, more affordable and accessible, thanks to the discovery of at least 26 gas fields since the 1950s. In 2010, 82.81% of Bangladesh's power generation capacity relied on gas. Besides, gas is also used for fertilizer production, industrial purposes, fuel for vehicles and cooking.

Because of the over-reliance on natural gas, as of December 2017, as much as 15.22 TCF of gas was extracted, leaving only 11.91 TCF of recoverable gas, in the discovered gas fields. The usage of gas for different purposes nearly doubled in the last decade, and the demand is expected to increase significantly, according to the Gas Sector Master Plan 2017. Bangladesh will have to import 7,500 MMcf/d of gas in a year by 2041 if new gas fields are not discovered, causing significant budgetary pressure.⁴

In 2010, Bangladesh aimed to reduce its over-reliance on gas for power generation. The Power Sector Master Plan 2010 (PSMP 2010) advocated for an increase of coal by 50% in the energy mix of power generation by 2030 to diversify fuels and ensure energy security.⁵ However, the Power System Master Plan 2016 (PSMP 2016) revised the plan with 35% coal and 35% gas in the mix by 2041, with 15% renewables and 10% nuclear.⁶ An alternative scenario suggested increasing renewables to 35% and reducing gas and coal by 10% each.

Bangladesh adopted the proposed mix with 15% renewable energy-based power generation. The strategy paper also suggested an alternative scenario where Bangladesh could increase renewables to 35%.

C. Renewable Energy Scenario

Bangladesh has been aiming to increase renewable energy in its energy mix since the early 2000s. The Renewable Energy Policy in 2008 set targets of generating 5% of total electricity demand from renewables by 2010 and 10% by 2020. The PSMP 2010 and National Sustainable Development Strategy 2013 (NSDS) further affirmed these targets. However, in the 2019-20 FY, the country generated only 1.24% of total electricity from renewable sources, against the goal of 10%.

According to the newly disclosed Mujib Climate Prosperity Plan (MCPP), Bangladesh aims to attain 15% renewable energy-based power generation capacity by 2030 and to set the trajectories to achieve 40% electricity from renewables by 2041 and 100% by 2050. Meanwhile, the energy minister has suggested producing 40% of electricity from clean energy sources, which include both renewables and energies that emit significantly less CO₂e.

Bangladesh's renewable energy-based power generation capacity was around 1200 MW in July 2023, accounting for 4.6% of total electricity generation capacity. According to PSMP 2016, by 2041, the peak electricity demand would be 61,681 MW. To produce 40% of it from renewable or clean energy sources, Bangladesh will have to commission renewable and clean energy-based power projects of around 25,000 MW, which is 20 times more than the existing capacity.

An analysis of the commissioned power plant projects till 2027, existing power plants as of June 2022, and soon-to-be-retired power projects suggest that by the end of 2027, Bangladesh's power generation capacity will rise to 43,808 MW where nuclear energy will be around 5% and renewables around 7.5% of the total capacity.⁷

Therefore, to achieve the 2041 targets, for both renewable and clean energy sources, Bangladesh needs to deploy a significant amount of renewable energy technologies in the next two decades.

Expected fuel mix according to the capacity by 2027 in MW					
Type of fuel	Capacity as of June 2022	Expected new capacity in 2027	Expected to retire by 2025	Expected capacity by 2027	Percentage
Fossil fuel	22,023	20,410	3,990	38,443	87.75%
Renewable energy	459	2,846	0	3,305	7.54%
Nuclear	0	2060	0	2,060	4.70%
Total	22,482	25,316	3,990	43,808	100.00%

Source: Bangladesh Power Development Board Annual Report 2022

The Potential of Renewables in Bangladesh

Before identifying the barriers, it is imperative to assess the potential of renewable energy in Bangladesh. Bangladesh’s first renewable energy-based power generation started in the 1960s with the Karnaphuli Hydropower Plant. Later, in the 1990s, solar home systems (SHS) were introduced in the rural areas of Bangladesh. In 2005, the first wind power plant was installed in Feni. Meanwhile, smaller domestic biogas plants and solar irrigation projects started taking root in Bangladesh, backed by global donors, mostly development financial institutions (DFI). Recently, the Infrastructure Development Company Limited (IDCOL) has installed biomass power plants as well. A number of waste-to-energy projects around the capital Dhaka are on the cards.

So, as we can observe, Bangladesh has explored at least six renewable energy sources so far: solar, wind, biogas, biomass, waste-to-energy and hydropower.

According to scholars and researchers, Bangladesh’s installable potential for solar is around 50,000 MW,⁸ hydropower is around 750 MW,⁹ on-shore wind power is around 30,000 MW,¹⁰ biomass from rice husk is around 1000 MW¹¹ and biogas is around 300 MW.¹² Besides, there is immense offshore potential, according to the Institute for Sustainable Futures which put it at 134,000 MW.¹³

D. Identifying the challenges

The factors that impede the adoption of renewable energy technology in Bangladesh are identified as challenges in renewable energy transition here. These include challenges around policies, land, financing and technologies.

i. Competing and incoherent policies

Competing policies have been identified as the most prominent reasons behind the decrease in solar home systems (SHS) installation after 2015. Because of the rapid expansion of the national grid in the areas selected for SHS, disregarding the ongoing project, the once successful SHS project of IDCOL could not reach its goal.¹⁴ The apparent downfall of the SHS showed how incoherent policies and measures, along with coordination gaps between different stakeholders can disrupt renewable energy deployment.

The incoherence in policy formulation and implementation was also observed in the setting of goals for renewable energy and the commissioning of power projects in the early 2010s. While the renewable energy policy targeted to achieve 10% electricity generation from renewables by 2020, Bangladesh's annual generation in 2019-20 FY did not even cross 2% of the total electricity generation as, from 2010 and 2020, Bangladesh commissioned renewable power projects with the capacity of only 38 MW out of 16,556 MW capacity's total power projects.

According to the draft IEPMP shared with the stakeholders, Bangladesh's expected renewable energy-based power generation capacity by 2050 would be around 12%, though the MCPP has proposed to increase the share of renewables in the fuel mix for power generation to 40% by 2041. Meanwhile, the Perspective Plan 2041 claimed around 1% of electricity will be generated from renewables by 2041. The different targets set by different ministries suggest that incoherence in policy formulation still exists as a challenge.

ii. Land availability

Studies by USAID¹⁵ and SREDA¹⁶ have highlighted land constraints as a challenge in installing large renewable energy plants in the country.

Bangladesh is a floodplain-dominated and densely populated country with over 1,100 people per km². The country's complex land administration and ownership structure makes it difficult to acquire large amounts of land for large energy projects like solar parks.¹⁷ The country's complicated land administration leads to litigation and harassment of resource-poor households, particularly in rural areas.¹⁸ This results in increased costs and a prolonged project implementation period.

Besides, the National Agriculture Policy 2018 discourages the use of agricultural land for non-agricultural purposes and aims to recover agricultural land used for non-agricultural purposes to maintain self-sufficiency in food production and reduce import burdens. As a

result, the government has not allowed arable and agricultural lands to be used for energy projects, making land acquisition further complicated.

iii. Challenges in green financing

According to IEEFA, Bangladesh requires an annual investment of between US\$1.53 billion and US\$1.71 billion from 2024 to 2041, without considering the cost of grid modernization and storage facilities, to produce 40% of total electricity from renewables.¹⁹

Though Bangladesh has a green banking policy, it has been slowed due to the lack of experience among banks and financial institutions managing green projects. Most eligible lenders have no established investment demand and do not require more than 500,000 USD investment. Commercial banks view loans for small-scale renewable energy plants as risky investments due to operational and market risks. These projects often involve new technology and an underdeveloped green product market, and small policy changes can render them unprofitable.²⁰

Small-scale local green entrepreneurs struggle to secure funding due to difficulties in proving creditworthiness, lack of proper documents, and high transaction costs. Banks often receive applications without proper documentation, making it difficult to provide loans.

iv. Overcapacity

Bangladesh's overall power utilisation is around 60% with an installed capacity of 26,018 MW and peak energy demand of 15,648 MW. This means there is an overcapacity of 40% in the power sector, where 95% of electricity comes from fossil fuel. Analysis has shown that the power generation capacity by 2027 will be 43,808 MW and only 7.5% will be from renewable sources. The expected generation capacity of 2027 is higher than the projected electricity demand of 2034.

If the electricity demand does not grow as estimated, there will be less incentive to install more renewable energy power plants. Overcapacity, with fossil fuel dominance, will shrink space for new renewable energy plants.²¹

v. Insufficient research and development

Bangladesh is yet to develop advanced research and development facilities for renewable energy-related research. The country has allocated only 2% of its GDP to education since 1990, which is lower than most lower-middle-income countries.²² Since 1990s less than 25% of students enrolled in science in higher secondary education in Bangladesh.²³

The Publication of scientific and technical journal articles, submission of patent applications and industrial design applications by the residents of Bangladesh is far lower than the lower middle-income country average and South Asian average.²⁴

As a result, Bangladesh has to import almost all power generation technologies from abroad. Access to sophisticated technologies and the development of such technologies are also hindered because of insufficient research and development in the country.

E. Recommendations

- i. To address the challenges of incoherent and competing policies the Ministry of Planning and Ministry of Power, Energy & Mineral Resources should hold regular discussions with the stakeholders, including implementing organisations and think tanks.
- ii. To overcome the overcapacity problem, an assessment of the overall power sector is a necessity. After the assessment, Bangladesh can work on both short-term policies and long-term policies to gradually phase out the fossil fuel plants, not approving new fossil fuel plants and replacing them with renewable energy-based power plants.
- iii. To mitigate the land constraint, rooftops should be utilised to deploy solar PV and can be connected to the national grid through net metering. Feed-in tariffs can be offered to the owners of the solar PV to promote the installation of more rooftop solar PV.
- iv. To provide a solution to the research and development challenges, the government should utilise the institutions to develop a strategic niche and should pursue a policy of targeted funding to the most potential initiatives. Local inventors and researchers can be offered with tax rebate of 200% to encourage research in renewable energy.

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