

# Transition to Renewable Energy Meeting Energy Security and Sustainability Goals in Bangladesh

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**B**angladesh is one of the fastest developing countries in South Asia. It is also one of the most densely populated countries, having a population density of around 1079 per km<sup>2</sup>. The average annual GDP growth rate was 6.4% between 2017 to 2021, with a peak of 7.88% observed in 2019. According to the Government of Bangladesh (GoB), GDP is expected to grow at an average annual growth rate of 6.1% from 2016 to 2041. According to the current revision of the masterplan, the maximum power demand in Bangladesh is projected to be 71GW by 2050 where coal-fired power plants are assumed to make up 10% of the total fuel mix. Given the recent situations and international trends surrounding fossil-based power plants coupled with the growing uncertainty of fuel prices, GOB has set a roadmap to add more renewable energy-based generation units to ensure the country's long-term energy security & sustainability. In 2050, renewable energy is projected to account for 23% of the total generation.

Bangladesh has been dependent on fossil fuels for its electricity generation and it's continued reliance will require an increase in fossil fuel imports to satisfy the growing electricity demand due to limited domestic reserves. A high contingency on imported gas, coal and oil will not only add economic pressure on Bangladesh but also raise serious questions about its long-term energy security with the ongoing volatile nature of the international market as conventional energy prices continue to soar. Moreover, as one of the world's

most vulnerable countries to be impacted by the threats of rising sea levels in its low-lying areas attributed to global warming, dependence on fossil fuel may put Bangladesh in a precarious position in terms of erosion of trust in its government's commitment towards addressing global warming challenges. Specifically, studies show that about 1 m sea level rise will submerge one-fifth

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of the country's land mass, which might dramatically increase climate change refugees in the coming decades, displacing millions of individuals and communities from their homes. In

addition, the concentration of the human population is steeply rising since 2010 and about 100 thousand people die each year due to the increase in air pollution. The above facts obligate countries like Bangladesh to take more of a proactive approach towards transitioning to renewable energy.

Currently, renewable energy is gaining momentum in the global energy mix, which is seen as a low-risk option in comparison to fossil fuels. This is mainly attributed to the expected cost decline, of the main renewable energy technologies, such as Solar Photovoltaic (PV), wind, etc. Additionally, the Levelized cost of electricity from renewable resources has become cost-competitive with fossil fuel electricity generation. These factors have triggered a positive outlook towards renewable energy technologies all around the world. Several studies have reported that the technical feasibility and economic viability of 100% renewable energy systems for various parts of the world, e.g. Finland, Denmark, Australia, Israel, India, Pakistan, Southeast Asia, Nigeria, Sub-Saharan Africa, etc. are possible with the decreasing costs every year.

For Bangladesh, renewable energy sources could provide as a viable alternative in tackling energy shortages, energy security and long-term energy planning with reduced Green House Gas (GHG) emissions, whilst complying with climate change targets. Bangladesh also lies in a region with high solar energy potential; hence its future energy

supply could have a large share of solar PV and wind.

### **Solar Mini Grid for the Char Area**

Bangladesh being a riverine country currently has about 405 rivers. Several small and large river islands (chars) have formed alongside areas that are bordered by rivers, lakes, seas, or oceans. Char or small river island is the generic name for the topography created by adsorption along a river's course or in its waterway. Chars are regarded in Bangladesh as a by-product of rivers' hydro-morphological motility. An international organization Irrigation Support Project for Asia and the Near East (ISPAN) discovered through a survey that chars which are not eroded or degraded in the first four years of their existence are more durable. Agriculture or habitation can begin in all the chars at the conclusion of these four years. The soil of these chars generated in the downstream regions are, in comparison, more productive and have a grain density of 150 to 185, which is near to the average grain density of the nation, according to a 1996 report by the Bangladesh Bureau of Statistics (BBS). A recent analysis of a series of satellite images show that more than 99 percent of the land on the banks of the river Jamuna is made up of chars. In the last 26 years, between 1983 and 2000, the same analysis further showed that about 75% of these chars had disappeared within one to nine years. According to a 1993 census, the total population of the chars was about 631,000. Most of them (about 75%) live in different chars of Jamuna. The population of chars has increased by 47% in 1993 as compared to 1984. During the same period the population growth of the country was about 26 %. As per these calculations, chars play a significant role in influencing human settlement.

It is now clear that this country, which has a larger population than its limited resources, will have to rely on cultivating land for agriculture to cope with the food crisis in the near future. To cultivate on these char lands, there will be a larger need of electricity, which is an integral part for the national



development as well. Electricity has already reached the urban, sub-urban and rural areas of Bangladesh. Even the village areas have been brought under 100% electricity. However, electrification of these isolated char areas remains a challenging and daunting task due to lack of sustainability and technical feasibility. Moreover, due to frequent soil erosion near the banks damage the facilities and infrastructure often leading to disconnection and even accidents making the maintenance and repair further challenging and taxing.

If small isolated solar power plants could be set up in these char areas which would only supply electricity to these areas, then the approach could be more sustainable. It is not possible for everyone to install home solar panel being relatively expensive and difficult to maintain. People in such regions could readily get access to electricity and would not have maintenance issues. Additionally, the cost would be rather minimal as there would not be the need to install a lot of transmission lines and it is much simpler to maintain such short transmission line which also has a longer life. Even if the connections were disrupted due to any reason, it is a quick and easy fix as the coverage area is small. Such solar mini grid system can be dismantled and replaced from one place to another with minimal effort resulting as a

sustainable alternative for char areas.

In addition, there would also be a lot of system loss with transmission line from power substation in the main lands to the chars which can be avoided with this alternative. Also, the char regions receive abundant sunlight throughout the day and residents in there could have access to energy at night if the power could be stored in the solar plants by using battery. Moreover, with advanced technologies the land under the solar PV panels can also be used for cultivation of certain agricultural products or be used for poultry firms. Therefore, using electricity from a solar power plant rather than a household solar panel is more economic, sustainable and beneficial for them. The household solar panel can produce only a limited quantity of power and is difficult to upgrade should someone need extra energy in any case. With a solar mini grid this energy is not limited. Lastly, it could be argued that solar mini grids are the best and most sustainable alternatives to bring these char areas under full power coverage.

In order to reduce dependency on imported energy and ensuring sustainability in energy needs, the country needs to harness more electricity from solar PV systems.

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