ENERGY
CATALYST

Country Guide: Bangladesh

May 2023

Country Guide: Bangladesh

Bangladesh is located in South Asia. It is the 92nd largest country by area and the eighth most populous country in the world. Bangladesh shares land borders with India to the west, north and east, Myanmar to the southeast, and the Bay of Bengal to the south. It is separated from Nepal and Bhutan by India's Siliguri Corridor, and from China by the Indian state of Sikkim in the north, respectively. Dhaka, the capital of Bangladesh is the largest city in the country and is the hub of the nation's economic, political, and cultural activity. Chittagong is the second largest city and has the largest seaport. With numerous criss-crossing rivers and inland waterways, the Ganges delta is the dominant geographic feature of Bangladesh and empties into the Bay of Bengal.

Figure 1 Map of Bangladesh. Source: d-maps

Geography and climate

Located in the belt of the Tropic of Cancer, Bangladesh has mild winters from October to March, hot and humid summers from March to June, and a warm and humid monsoon season from June to October supplying most of the country's rainfall. The country experiences natural calamities such as floods, tropical cyclones, tornadoes, and tidal bores almost every year along with the effects of deforestation, soil degradation and erosion. Bangladesh is also widely recognised to be one of the most vulnerable countries to climate change in the world.

Government

Bangladesh is a de jure representative democracy under its constitution, with a unitary parliamentary republic. The head of government is the Prime Minister, who is invited to form a government every five years by the President. The country is divided into eight divisions. Each division is named after the major city (e.g., Dhaka, Chittagong, Khulna, Slyhet, Rangpur, Rajshahi, Mymensingh and Barisal) within its jurisdiction and serves as the administrative headquarter of that division. Each division is further split into several districts which are then further sub-divided into Upazillas or sub-districts.

Economy

Bangladesh is one of the world's fastest growing economies, the world's 37th largest economy by nominal GDP and 25th largest economy by purchasing power parity.[4] It is a member of the South Asian Association for Regional Cooperation (SAARC), the United Nations, the Commonwealth nations, Organization of Islamic Cooperation, Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) and various other global platforms.

Table 1: Bangladesh at a glance[1]	
Capital	Dhaka
Total Area	0.15 million km^2
Population	0.165 billion (2022)[2]
Official languages	Bengali
Rural Population	68.4% (2022)[3]
GDP	USD 0.4 trillion (2021)
GDP Per Capita	USD 2,458 (2021)
Currency	Bangladeshi Taka (BDT)
Exchange rate 01/03/2023	1 USD = 104.45 BDT
Exchange rate 01/03/2018	1 USD = 85.10 BDT
Access to Electricity	96.2% (2020)

Bangladesh had an average GDP growth rate of 7.1 percent in 2022, an increase from 3.4% in 2020, but a decrease from 7.9% in 2019.[5] The service sector contributes to the highest share of GDP, followed by industries and agriculture sectors.

In the World Bank's Country Policy and Institutional Assessment (CPIA), Bangladesh scored a 3 out of 6 in 2021 for its business regulatory environment[6], 3 out of 6 rating for its fiscal policy[7], and 2.5 out of 6 on transparency, accountability, and corruption in the public sector.[8] Standard & Poor Global Ratings affirmed BB- long-term and B short-term sovereign credit ratings on Bangladesh for 2022 with stable outlook.[9] FDI inflows into Bangladesh have been on a decline since 2015, from USD 2.83 billion to USD 1.72 billion in 2021. There was an increase from USD 1.81 billion in 2017 to USD 2.42 billion in 2018.[10]

There has been a marked improvement in the overall standard of living in Bangladesh over the years. Between 1990 and 2021, Bangladesh's HDI value increased by 66.4%, with life expectancy at birth increasing by 18 years.[11] In 2020, 10.2 years was the expected years of school; however, it was reduced to 6 years when

[1] Bangladesh: The World Bank Data (as of May 2023)
[2] Population and Housing Census 2022, Bangladesh Bureau of Statistics, August 2022
[3] Ibid.
[4] World Economic Outlook Database: International Monetary Fund (as of May 2023)
[5] Bangladesh: Asian Development Bank Data (as of May 2023)
[6] Business regulatory environment assesses the extent to which the legal, regulatory, and policy environments help or hinder private businesses in investing, creating jobs, and becoming more productive.
[7] Fiscal policy assesses the short- and medium-term sustainability of fiscal policy (considering monetary and exchange rate policy and the sustainability of the public debt) and its impact on growth.
[8] Country Policy and Institutional Assessment: The World Bank Data (as of May 2023)
[9] Bangladesh 'BB-/B' Ratings Affirmed, S&P Global Ratings, August 2022
[10] Bangladesh: The World Bank Data (as of May 2023)
[11] Human Development Report 2021-22, UNDP, September 2022

adjusted for actual learning[12]. The adult literacy rate (people ages 15 and above) in Bangladesh increased from 47% in 2001 to 75% in 2020.[13] As of 2021, the infant mortality rate in the country was 23 infants per 1000 live births, a reduction of 60% over the last two decades.[14] Estimated poverty went from 13.47 in 2016 to 10.44 in 2022 (using the international poverty line of USD 2.15). The latest official poverty statistics for 2016/17 show that 24.3% of the population live below the upper poverty line while half of them, 12.9%, live under the extreme poverty line.[15]

The energy sector in Bangladesh

The energy sector in Bangladesh is highly dependent on fossil fuels such as natural gas, oil, and coal, which are the main sources of power generation in the country. As of May 2023, the installed power capacity in Bangladesh was 25.99 GW. 44.15% of the total capacity came from natural gas, 6.8% from coal, 24.15% from HFO, 5.16% from HSD, and 4.5% from renewable sources. The balance was derived from captive power plants (10.77%) and imported from neighbouring countries (4.46%).[17]

Table 2: Breakdown of RE capacity in Bangladesh (April 2023)[16]

Technology	Off-grid (MW)	On-grid (MW)	Total (MW)
Solar	357.09	578.65	935.74
Wind	2.0	0.9	2.9
Hydro	0.0	230.0	230.0
Biogas	0.69	0.0	0.69
Biomass	0.4	0.0	0.4
Total	360.18	809.55	1,169.73

As of 2020, 96.2% of the population in Bangladesh had access to electricity.[18] The Government's vision is to ensure universal access to electricity for all citizens by 2023.[19] According to the 2016 Power System Master Plan (PSMP) of the government, power generation capacity will be 40,000 MW by 2030 and 60,000 MW by 2041.[20]

1,169.73 MW of the total installed power capacity is attributed to Renewable Energy (RE).[21] The detailed break-up of power generated from RE is shown in Table 2. Assessments in the Bangladesh Climate Investment Fund's (CIF) Scaling Up Renewable Energy Program (SREP) investment plan suggest a potential of additional 3,666 MW of RE capacity in Bangladesh. Most of the RE potential comes from solar energy 2,680 MW (73.1%), followed by wind 637 MW (17.4%). Biomass and biogas generation hold a combined potential of 285 MW and small hydro power plants have a potential of 60 MW.[22] To exploit this potential,

[12] Bangladesh Human Capital Index 2020, The World Bank Data, October 2020
[13] Bangladesh: The World Bank Data (as of May 2023)
[14] Bangladesh: The World Bank Data (as of May 2023)
[15] Bangladesh Poverty and Equity Brief, The World Bank Data, April 2023
[16] Ibid.
[17] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[18] Bangladesh: The World Bank Data (as of May 2023)
[19] Bangladesh Economic Review 2023, Ministry of Finance
[20] Power Sector Master Plan 2016, Ministry of Power, Energy and Mineral Resources - Government of People's Republic of Bangladesh, September 2016
[21] Ibid.
[22] Power Sector Master Plan 2016, Ministry of Power, Energy and Mineral Resources - Government of People's Republic of Bangladesh, September 2016

the government has introduced several plans and targets for adding RE capacities, including the 2008 National Renewable Energy Policy (2,000 MW by 2020), the 2016 Renewable Energy Development Targets (3,100 MW by 2021) and the 2016 Power System Master Plan (2,470 MW by 2021 and 3,864 MW by 2041). The Sustainable and Renewable Energy Development Authority (SREDA) was established in 2014 to coordinate the activities related to the development of RE technologies and financing mechanisms. As per Bangladesh's Nationally Determined Contribution (NDC), in a conditional scenario, the country aims to deliver 4,114.3 MW of RE projects by 2030. This would primarily comprise of 2,227 MW (55.3%) of grid-connected solar, 1000 MW (24.3%) of new hydro, and 597 MW (14.5%) of wind. In the unconditional scenario, the country has pledged to reduce its GHG emissions by 27.56 Mt CO2e (6.73%) below Business-as-Usual (BAU) in 2030, while in a conditional scenario, the reduction would be by 61.9 Mt CO2e (15.12%) below BAU in 2030.[23]

To boost the RE sector, in 2014, the Bangladesh Bank established a BDT 2 billion revolving fund to refinance RE energy projects through commercial banks and financial institutions with concessionary terms and conditions. The Infrastructure Development Company Limited (IDCOL) in Bangladesh also finances projects and programs that utilize renewable energy sources by providing start-up subsidy, concessionary credit, and capacity development support. In February 2019, the World Bank approved USD 185 million in financing to support the addition of 310 MW of RE generation capacity (mainly utility-scale RE and rooftop solar PV) in Bangladesh, under the "Bangladesh Scaling-Up Renewable Energy Project."

However, despite multiple initiatives by the government and development organisations, the progress on increasing the share of RE in the energy mix has been slow. Bangladesh's energy sector continues to suffer from regular power shortages, increasing demand, declining domestic natural gas reserves, and inadequate transmission infrastructure. Other key barriers to the growth of RE in Bangladesh include the following:

- **Institutional challenges and limited project experience:** There are very few utility-scale projects in the country, leading to low knowledge and implementation capacities. The institutional capacity to negotiate power purchase agreements (PPAs) with independent power producers (IPPs) is also low.
- **Poor access to land resources:** Accessing land is a major roadblock for utility scale RE projects. Land has various alternative uses such as agriculture, residential and industrial uses and most of the suitable land for RE is often owned by the government in low lying areas which are also prone to seasonal flooding.
- **Financing market challenges:** There remains a lack of financing market to provide long term financing to RE projects (especially utility-scale projects), limited due diligence capacity and lack of a functioning syndication market. Other key issues include limited experience and knowledge of managing utility scale RE projects, limited foreign currency financing capacity, small base of institutional investors and insufficiently developed capital markets.
- **Project development challenges:** There are multiple barriers to project development, including insufficient data on resource availability, inadequate due diligence on projects and lack of technical studies.

[23] Nationally Determined Contributions (NDCs) 2021 - Bangladesh (Updated), Ministry of Environment, Forest and Climate Change - Government of People's Republic of Bangladesh, August 2021

Solar energy

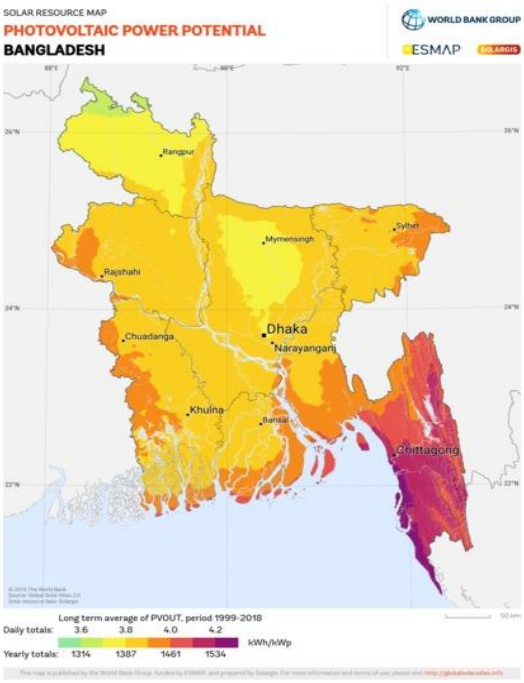

Figure 3 Solar Resource Bangladesh. (2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

Bangladesh receives an average daily solar irradiation of 4–6.5 kWh/m^2 with average peak sun hours of 5 hours/day. The current on-grid and off-grid installed solar power capacity in Bangladesh is 80.9 MW and 312.1 MW respectively.[24] The CIF-SREP investment plan estimates the total potential for ground-mounted solar and solar rooftop to be 2,035 MW.[25]

Bangladesh has one of the largest domestic solar energy programmes in the world. Relevant programs are presented below:

Off-grid projects: Based on data provided by SREDA, Table 3 shows the total installed capacity and number of off-grid solutions like solar home systems (SHS), solar-powered irrigation systems, and solar streetlights in Bangladesh as of May 2023.[26]

On-grid projects: Solar park and net metering rooftop solar are the prominent on-grid technologies. The former accounts for 461 MW of total installed capacity, while the latter accounts for 40.89 MW.[27]

[24] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[25] CIF-SREP Investment Plan for Bangladesh, Climate Investment Funds, November 2015
[26] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[27] Ibid.

Table 3: Installed capacity and no. of SHS and solar streetlights[28]	
Off-grid technologies	Installed capacity (April 2023)
SHS	263.79 MW (6,037,689 nos.)
Rooftop solar except net metering	59.36 MW
Solar irrigation	49.34 MW
Solar streetlights	17.07 MW (296,861 nos.)
Solar mini grid	5.8 MW (28 nos.)

IDCOL plays a pivotal role in the promotion of off-grid SHS in Bangladesh. IDCOL is a non-banking financial institution, established by the Government of Bangladesh in 1997 to bridge the financing gap for developing medium to large scale infrastructure and RE projects in Bangladesh. IDCOL started the SHS program in January 2003 to provide electricity to rural and remote areas that are not connected to the grid. As of May 2023, a total of 4.5 million SHS with an installed capacity of 187.12 MW has been installed by IDCOL.[29] The programme has received credit and grant support from the World Bank, GEF, GIZ, KfW, ADB, IDB, GPOBA, JICA, USAID and DFID. Total investment in the SHS Program was ~USD 1,094.93 million (~USD 266 per household) from multitude of development finance institutions. World Bank (IDA) provided majority of the credit support of USD 601.9 million (69%). Other credit financiers were the ADB, JICA, and IsDB, which provided USD 185.6 million. Grant funds were received from the GEF, GPOBA, USAID, KfW, GIZ, and DFID, amounting to USD 80.9 million. Small-scale SHS deployed by IDCOL provided electricity to more than four million households and about 20 million people in rural areas, constituting one-eighth of the country's population.

Under the programme, IDCOL recruits Participating Organisations (POs) who are provided subsidies and concessionary credit by IDCOL to buy the equipment from suppliers and extend financing to customers. The POs select potential SHS buyers in off-grid areas, extend loans, install the systems, and provide after-sales service support. IDCOL's PO selection committee screens these POs against eligibility criteria for inclusion in the programme. IDCOL's technical standards committee approves the suppliers and the SHS equipment prior to installation. IDCOL also provides necessary trainings and promotional support to POs to ensure the quality of the programme.

IDCOL provides low-cost credit to POs at an interest rate of about 6%–8% (lower than the market rate of 12%–15%), and POs sell the SHS to customers on credit at a 12% interest rate, payable in instalments over three years.[30] The IDCOL programme also involves subsidies in the form of a capital buy-down grant and an institutional development grant. For SHS, loans are provided by IDCOL on the terms highlighted in Table 4.

[28] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[29] Ibid.
[30] Default Risks, Moral Hazard, and Market-Based Solution: Evidence from Renewable Energy Market in Bangladesh, Asian Development Bank, September 2019

Table 4: Lending terms offered by IDCOL for SHS[31]		
Particulars	**Term Details**	
Loan amount	Up to BDT 250 M	80% of POs loans to households
	> BDT 250 M	70% of the POs loans to households
Interest	Up to BDT 250 M	6% p.a.
	> BDT 250 M	7% p.a.
Tenure including Grace	Up to BDT 250 M	Up to 7 years
	> BDT 250 M & <= BDT 500 M	Up to 6 years
	> BDT 500 M & <= BDT 100 M	Up to 6 years
	> BDT 1000 M	Up to 5 years

Although 56 POs are involved in the programme, until 2019 the aggregate share of two POs was 52.7%, with Grameen Shakti at 38.2% and the Rural Services Foundation (RSF) at 14.5%. A few other prominent POs include Srizony Bangladesh and UBOMUS, BRIDGE. The Ministry of Disaster Management and Relief (MoDMR) and Bangladesh Rural Electrification Board (BREB) are two other government organisations that deploy SHS in rural Bangladesh.[32]

Under the Hill Tracts Electrification Project, the Bangladesh Power Development Board (BPDB) has implemented three solar projects in Juraichori Upazilla, Barkal Upazilla and Thanchi Upazilla of Rangamati District to provide electricity access to the population in Chittagong Hill tracts. The project had three phases under which 1,200 sets of SHSs of 120 W each, 30 sets of solar PV streetlight systems of 75 W each, three sets of solar PV submersible water pumps of 1,800 W each, six sets of solar PV vaccine refrigerators for the health care centres of 360 W each and two sets of 10 kW capacity centralised solar system for market electrification have been installed. A total of 173.81 kW solar systems have been installed under this project.[33]

There are a large number of off-grid solar solution providers in Bangladesh, including Bright Green Energy Foundation, Eco Distribution Limited, Grameen Shakti, Rahimafrooz Renewable Energy Limited, Pacific Solar and Renewable Energy Limited, Rimso Foundation, Rural Services Foundation, UBOMUS Solar, and Sherpa Power Engineering Limited.[34] A detailed list of POs and suppliers is available on IDCOL's website and is also referenced in the section on Further Reading.

Encouraged by the success of SHSs, the government has initiated various programmes such as solar irrigation, solar mini/micro-grid, solar park, rooftop solar, and solar boating, among others.

[31] Lending Terms: IDCOL (as of May 2023)
[32] Default Risks, Moral Hazard, and Market-Based Solution: Evidence from Renewable Energy Market in Bangladesh, Asian Development Bank, September 2019
[33] Development of Renewable Energy Technologies by BPDB: Bangladesh Power Development Board (as of May 2023)
[34] Partner Organizations (POs) - IDCOL SHS Program: IDCOL (as of May 2023)

Solar Rooftop: The current installed capacity of solar rooftop with net metering and without net metering is 68.79 (1,865 projects) and 59.36 MW (202 projects) respectively according to SREDA. Bangladesh published its net metering guideline in July 2018 to encourage power consumers of industrial, residential, government and commercial buildings to adopt solar rooftop. The BPDP has implemented the most net metering rooftop solar projects, amounting to 353 installations worth 16.04 MW (average of 0.045 MW per installation). The BREB has implemented largest capacities, amounting to 20.96 MW worth of 312 rooftop solar installations (average of 0.067 MW per installation).[35]

Some of the key players in the solar rooftop sector in Bangladesh are Rahimafrooz Renewable Energy Limited, Joules Power Ltd, Solarland Bangladesh Co. Ltd and Enargion Bangladesh Ltd.

Some of the key challenges impeding development of the solar rooftop segment are:

- **Relatively small ticket size:** Net-metering rules for residential rooftop solar state that the maximum installation capacity for a residential building should not surpass 100 kW, while for C&I the maximum allowable installation capacity has been set at 500 kW. This results in credit requests for relatively small ticket size which is not attractive for commercial financial institutions.
- **Lack of private investments for residential and C&I rooftop solar projects:** The Guideline for Implementation of Solar Power Development Programme states that installing rooftop solar system by private investors based on BOO based on IPP models is only for the roofs of Government and semi-Government, disallowing private investors from developing rooftop solar systems for residential and C&I customers.
- **Restrictive net metering guidelines:** Rooftop solar C&I customers are allowed a maximum installation capacity of 500 kW, and for residential consumers the same is set at 100 kW. Further, Bangladesh mandates the output Alternating Current (AC) capacity of a renewable energy converter to be a maximum of 70% with respect to the sanctioned load of the consumer.[36] However, many factories have large sized roofs capable of producing more than the sanctioned load, and if they were incentivized to produce the extra electricity, they would be more interested in installing solar panels.
- **Quality concerns of solar equipment**: Bangladesh lacks sufficient testing facilities, such as accredited testing laboratories, for imported solar panels and inverts to check and ensure quality. Further, limited monitoring from the Bangladesh Standards and Testing Institute (BSTI) results in market penetration of sub-standard solar equipment

Solar irrigation: Agriculture is a major contributor to Bangladesh's economy in terms of employment generation and GDP growth. Solar-based irrigation can be an appropriate solution to boost the agro-based economy. According to SREDA, the total installed capacity of solar irrigation systems is 51.48 MW (2,813

[35] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[36] Guidelines for Net Metering in Bangladesh, Ministry of Power, Energy and Mineral Resources - Government of People's Republic of Bangladesh, October 2017

nos.) with a further potential of 545 MW.[38]

IDCOL is the primary agency working to mainstream solar irrigation in Bangladesh, with 44.86 MW (1,619 nos.) of the total installed capacity implemented by the agency. It has a target to finance 50,000 solar irrigation pumps by 2025. The programme is supported by the World Bank, KfW, GPOBA, JICA, USAID, ADB and the Bangladesh Climate Change Resilience Fund (BCCRF). Lending terms by IDCOL for the solar irrigation programme are provided in Table 5.

Table 5: Lending terms offered by IDCOL for solar irrigation[37]

Particulars	Term Details
Loan amount	Up to 50% of the Project Cost
Tenure and Grace	8 years including up to 1 Year grace period
Interest Rate	6.00% p.a.

Challenges in this segment include:

- **Reliance on grant-based funding:** Solar-based irrigation pumps (SIPs) depend on subsidies to operate successfully and require funding of at least 50% of the cost as grant support or lease finance to be competitive with diesel pumps. Remaining costs may be met by a combination of equity, concessional loans, or lease finance; however, without necessary support from the government and development partners, implementation of SIPs would be difficult. Further, marginalized farmers require financial assistance, primarily in the form of grants to adopt SIP. This drives up the SIP cost of implementation.
- **Lack of technical capabilities**: For the participating agencies to achieve their SIP targets, they need to have adequate technical capabilities, proper organizational structure, and strong technical provisions. This would ensure proper operation and maintenance. However, local offices, project developers and farmers lack such capabilities.

Solar Parks: While the installed capacity of solar parks to date is 461 MW, the solar park projects under implementation have a combined capacity of 2,406.66 MW, as of May 2023. SREDA estimates a potential of 1,400 MW from solar parks.[39]

A 200 MW Solar Park by Beximco Power Co. Ltd. in Sundarganj, Gaibandha is one of the largest solar parks under the implementation stage in Bangladesh. To date the largest solar PV project in Bangladesh is 28 MW, located in Teknaf in the Cox Bazar region, which became operational in September 2018. It was developed by Joules Power Limited through its SPV, Technaf Solartech Energy Ltd. (TSEL). Some of the key developers of solar parks in Bangladesh include Joules Power Ltd., Parasol Energy Limited, Beximco Power Co. Ltd., Sun Beam solar Ltd., Solarland Bangladesh Co. Ltd., Solar construction & Engineering Ltd. and many more. The list of developers is available on SREDA's website.

[37] Lending Terms: IDCOL (as of May 2023)
[38] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[39] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)

The key challenges pertaining to solar parks are:

- **Lack of project financing**: Financial institutions are reluctant to lend to solar sector projects due to the increase in indebtedness of solar enterprises, high non-performing assets (NPA) and overexposure to power sector, stress on the balance sheets of financial institutions is increasing.
- **No regulated tariff and PPA process**: Bangladesh lacks a regulated tariff structure / incentive for large solar IPP projects, in addition to a lack of transparent competitive bidding process. Most IPPs have been awarded on an unsolicited basis with tariffs determined through bilateral negotiations with the private developer.
- **Lack of energy storage policy**: It is unclear what, if any, role energy storage can play in the power sector under the current Electricity Act. The latest version of the Power System Master Plan (PSMP) excludes the endorsement and plans for energy storage that were included in the previous version. Further, the BERC Licensing Regulations 2006 do not include rules for licensing of energy storage technologies.

Wind energy

The potential of wind energy in Bangladesh is high, but limited to coastal areas, offshore islands, riversides, and other inland open areas with strong wind regimes. The PSMP 2016 states a total potential of 637 MW with an annual generation capacity of 1,250 GWh for wind energy. According to SREDA the total installed capacity of wind energy is 2.9 MW to date. The BPDB has installed the 900 kW capacity grid-connected wind plant at the Muhuri Dam area of Sonagazi in Feni, and the 2,000 kW wind battery Hybrid Power Plant (off-grid) at Kutubdia Island (100 wind turbines of 20 kW each). One 2 MW on-grid connected wind power plant is under construction at Siraj Ganj Sadar Upazilla. About 70 MW of wind power projects are in the planning stage.[40]

Most of the wind power projects, whether under planning or fully operational, are owned by government agencies such as Bangladesh Power Development Board (BPDB), Rural Power Company Limited (RPCL) and Coal Power Generation Company Bangladesh Limited (CPGCBL).

Biogas Based Electricity Projects: There are 12 projects, including 8 completed, focused on biogas-based electricity production. They account for a total of 50.89 MW.

IDCOL has executed all the 8 completed projects, accounting for 990 kW. The capacity of these systems ranges from 10 to 400 kW.[41] The plants use poultry litter and cow dung as feed material into the digesters to generate gas which is used to generate electricity. Lending terms for the Biogas-based Power Projects are provided in Table 7.

[40] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)
[41] National Database of Renewable Energy: Sustainable And Renewable Energy Development Authority (SREDA) (as of May 2023)

Table 7: Lending terms offered by IDCOL for biogas-based power plants[42]	
Particulars	**Term Details**
Loan amount	Up to 80% of the Project Cost
Tenure and Grace	Up to 8 years including up to 1 year grace period
Interest Rate	6% ~ 9% p.a.

Biomass-based Power Projects: IDCOL has also provided concessionary loans and grants to two rice-husk-based power plants in Bangladesh (250 kW in Gazipur, and 400 kW in Thakurgaon). Lending terms for the Biomass-based Power Projects are provided in Table 8 below.

Table 8: Lending terms offered by IDCOL for biomass-based power plants[43]	
Particulars	**Term Details**
Loan amount	60% of the Project Cost
Tenure and Grace	8 years including 1 year grace period
Interest Rate	6% p.a.

The major challenges faced by the biogas projects include high upfront costs associated with the technology, poor access to credit and limited availability of feedstock. As for biomass projects, the key challenges are posed by limited availability of biomass resources, which are depleting with the growing population and their demands, and weak institutional infrastructure to provide necessary clearances and approvals on time, among other factors.

Small hydropower

Currently there are no small hydropower projects (SHP) in Bangladesh according to SREDA. However, the CIF-SREP investment plan estimates a potential generation capacity of 60 MW of small-scale hydropower that could lead to a generation of 200 GWh of electricity annually. The Mineral Resources Department of Bangladesh has identified potential small hydropower sites, with capacities ranging from 10 kW to 6 MW at different locations. Studies suggest that there is significant potential for setting up small and micro scale hydro projects in the Chittagong Hill tract region of Bangladesh. There are lots of canals, tributaries of rivers like Karnafuli, Shangu, Matamuhuri, and tiny waterfalls which make this region suitable for SHP projects.

However, the scope of SHP generation is limited in Bangladesh due to its largely flat terrain, except for a few hilly areas in the northeast and south east of the country. There are also concerns over land use and flooding

[42] Lending Terms: IDCOL (as of May 2023)
[43] Lending Terms: IDCOL (as of May 2023)

in many areas. In addition, there are limited hydrological studies/data and inadequate policy plans for the SHP sector. The high installation cost, effects of climate change, degradation of water catchment areas, limited local capacity and infrastructure to manufacture small hydro components and delays in land acquisition add further to the challenges related to the development of small hydropower plants in Bangladesh.

Renewable energy mini grids

Currently, there are 28 solar mini grids in Bangladesh, with a total capacity of 5.8 MW. All, but one, of these have been developed by IDCOL. One mini grid amounting to 148.5 kW was developed by NESCO. The capacity of the mini grids ranges from 100 kW to 650 kW and the number of customers per mini grid ranges from 400-1500. The average tariff stands at USD 0.38/kWh. USD 394.5 million was disbursed for 28 mini grids, benefitting over 16,000 families.[45] IDCOL has a target to finance 200 solar mini-grid projects by the year 2025. The project financing is supported by the World Bank, KfW, GPOBA, JICA, USAID, ADB and DFID. Lending terms provided by IDCOL for solar mini grid projects are provided in Table 9.

Table 9: Lender terms offered by IDCOL for solar mini grids[44]

Particulars	Term Details
Loan amount	Up to 40% of the Project Cost
Tenure and Grace	10 years including up to 2 years grace period
Interest Rate	6% p.a.

Some of the major mini grid projects include a 650 kW mini grid project at Sullah, Sunanganj; a 250 kW project at Kazipur, Sirajganj; and a 250 kW project at Bhedarganj Upazilla, Shariatpur, among others. About six solar mini grid projects of 1.18 MW capacity are under construction, which include a 280 kW project at Bhola Upazila and a 250 kW project at Harirampur.

Some of the key barriers pertaining to mini grids are:

- **Low commercial viability**: IDCOL computed the tariff ceiling of BDT 32/kWh (USD 0.40) to allow a return on equity of 13-15%; however, the tariff level does not allow mini grids to generate a profit.
- **Lack of commercial finance**: it is difficult to access commercial finance due to requirement of 100% security or collateral and unwillingness of insurance agencies to cover risks for mini grids.
- **Low commercial viability**: IDCOL computed the tariff ceiling of BDT 32/kWh (USD 0.40) to allow a return on equity of 13-15%; however, the tariff level does not allow mini grids to generate a profit.
- **Focus on grid expansion**: Government plans to extend the grid to all areas to achieve 100% access to electricity. In case the grid arrives in areas where mini grids are operating, the mini grids must become small power producers.

[44] Lending Terms: IDCOL (as of May 2023)
[45] IDCOL Annual Report 2021, IDCOL, June 2022

Key government institutions

Institution	Role
Power Division, under the Ministry of Power, Energy and Mineral Resources (MPEMR)	The Power Division under MPEMR formulates polices and regulations, and also develops laws, rules and regulations, related to power generation, transmission and distribution of both conventional and non-conventional energy sources. It prepares necessary short, medium, and long-term plans and programmes to set the national targets of electricity generation. **Website:** www.mpemr.gov.bd
Sustainable and Renewable Energy Development Authority (SREDA)	SREDA facilitates an enabling environment for the development of projects related to renewable energy and energy efficiency. It is also involved in policy making and research for accelerating the growth of renewable energy in Bangladesh. It provides necessary support to access clean development mechanisms and similar climate change mitigation programmes. **Website:** www.sreda.gov.bd
Bangladesh Power Development Board (BPDP)	BPDP is responsible for the generation and distribution of electricity primarily in urban areas of Bangladesh. It sits under the Power Division of the Ministry of Power, Energy and Mineral Resources. **Website:** www.bpdb.gov.bd
Rural Electrification Board (REB)	REB is the largest power distribution organisation in Bangladesh, primarily responsible for rural electrification in the country. **Website:** www.reb.gov.bd
Infrastructure Development Company Limited (IDCOL)	IDCOL is a government-owned non-bank financial institution responsible for driving private sector participation in the promotion, development, and financing of infrastructure, and renewable energy and energy efficient projects through public-private-partnership initiatives. It offers refinancing, grant support, and technical assistance to project sponsors and participating organisations (POs) for the implementation of RE projects and programmes. **Website:** www.idcol.org
Ministry of Finance	MoF develops the energy sector documents such as Bangladesh's Power Energy Sector Road Map (2011). It also arranges public financing for energy projects. **Website:** www.mof.gov.bd
The Bangladesh Energy Regulatory Commission (BERC)	The commission has a mandate to regulate electricity, gas, and petroleum products in Bangladesh. It issues, cancels, amends, and determines conditions of licenses; determines tariff and safety enhancement of electricity generation and transmission, supply, storage, marketing, and distribution of energy; frames and enforces codes and standards to ensure quality; and resolves disputes between licensees and/or between licensees and consumers. **Website:** www.berc.org.bd

Industry associations

The **Bangladesh Solar and Renewable Energy Association (BSREA)** is the largest association of business houses and NGOs working in the clean energy industry. It works closely with policymakers and other relevant stakeholders to promote clean energy in Bangladesh.

The **Solar Module Manufacturers Association of Bangladesh** represents the interests of local solar module manufacturers in Bangladesh, with an aim to boost local manufacturing and generate employment.

Reference and further reading

SREP investment plan for Bangladesh, 2015
https://www.climateinvestmentfunds.org/sites/default/files/meeting-documents/bangladesh_srep_ip_final.pdf

SREDA / National data base of Renewable Energy
http://www.renewableenergy.gov.bd/index.php

IDCOL Annual Report 2018-2019
http://idcol.org/home/an_report

Lending terms for different RE programs by IDCOL
http://idcol.org/home/r_lending_terms

List of IDCOL's Participating Organisations
http://idcol.org/download/POs_Contact_Address_Dec_2019.pdf

List of SHS suppliers
http://idcol.org/home/downloads/solar
https://solar.sreda.gov.bd/stakeholder/view/index.php?i=9&j=2

Bangladesh Scaling Up Renewable Energy Project, World Bank, 2019
http://documents.worldbank.org/curated/en/218251551754892999/pdf/Bangladesh-Scaling-Up-Renewable-Energy-Project.pdf

BPDB reports on Renewable energy in Bangladesh
https://www.bpdb.gov.bd/bpdb_new/index.php/site/page/5a3f-2fdb-e75f-3cab-e66b-f70d-5408-cbc9-f489-c31c

Renewable energy in Bangladesh: Status and prospects

https://reader.elsevier.com/reader/sd/pii/S1876610219313104?token=2DC95DF5B1892C114CF3E99D443E2541800BBEA4394DBFC6311CCFDACEB58FF691156133688C617A314F325D372EE627

Achievements, Opportunities, and Challenges in Bangladesh's Power Sector
http://documents.worldbank.org/curated/en/936461540318296226/pdf/131216-REVISED-Edited-BD-Power-Sector-ASA-FINAL-Oct23-extrapage.pdf

Transforming the power sector in Bangladesh, PwC, 2018
https://www.pwc.in/assets/pdfs/industries/power-mining/executive-summary-pwc-bippa-report-on-transforming-the-power-sector-in-bangladesh/transforming-the-power-sector-in-bangladesh.pdf

ADBI Working Paper Series - Default Risks, Moral Hazard, And Market-Based Solution: Evidence From Renewable Energy Market In Bangladesh, ADB, 2019
adb.org/sites/default/files/publication/526896/adbi-wp1005.pdf

Bangladesh's Net-Metering Policy: Jump Starting the Solar Rooftop Market?
http://reeep.sreda.gov.bd/projects/2018-10-31-Bangladesh-Net-Metering-Policy-Jump-Starting-the-Solar-Rooftop-Market-BSW.pdf

Power systems master plan 2016
https://powerdivision.portal.gov.bd/sites/default/files/files/powerdivision.portal.gov.bd/page/4f81bf4d_1180_4c53_b27c_8fa0eb11e2c1/(E)_FR_PSMP2016_Summary_revised.pdf

Data base of Renewable Energy Stakeholders
https://solar.sreda.gov.bd/stakeholder/view/

Useful contacts

British High Commission Dhaka
United Nation Road
Baridhara , Dhaka-1212
+880 2-9842705,
https://www.gov.uk/world/bangladesh
Dhaka.Consular@fco.gov.uk

Bangladesh High Commission UK
28 Queens Gate
London, SW7 5JA, UK
+44 20 7584 0081
https://bhclondon.org.uk/
info@bhclondon.org.uk

Sustainable Renewable Energy Development Agency (SREDA)
IEB Building, Ramna
Dhaka-1000
+8802-55110340,
www.sreda.gov.bd
info@sreda.gov.bd, secretary@sreda.gov.bd

Rural Electrification Board (REB)
Nikunja-2, Khiliket,
Dhaka-1229
+88-02-8916424-28
www.reb.gov.bd
seict@reb.gov.bd

Bangladesh Electricity Regulatory Commission (BERC)
TCB Building (4th Floor) 1 Kawran Bazar,
Dhaka-1215
+88028189832
www.berc.org.bd
berc2003@gmail.com

Industrial Development Corporation Limited (IDCOL)
UTC Building, Level-16,
8 Panthapath, Dhaka 1215
+880-2-9102171-8
www.idcol.org
contact@idcol.org

Bangladesh Solar and Renewable Energy Association (BSREA)
Flat-A3, House-88 Rd No-17A
Dhaka 1212
+880 1624-868651
bsrea.bd@gmail.com

Ministry of Power, Energy and Minerals Resources (MPEMR)
Building No 6 (1st and 2nd Floor)
Bangladesh Secretariat , Dhaka-1000
+880 955-1265
www.mpemr.gov.bd
info@mpemr.gov.bd

Please contact your Client Relationship Manager if you want help with introductions to specific individuals within these institutions.