Bangladesh
A Green Deal

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Centre for Research and Information

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Introduction

Bangladesh is at the frontline of the global fight against climate change. The country is vulnerable to a wide range of disasters such as flood, cyclone, storm surge, saline intrusion, river erosion and landslide. Since its founding, Bangladesh's development strategy has been designed to protect lives, livelihoods and assets from disasters. Over the years, laws and regulations have been enacted to protect the environment, and policies are in place to adapt and mitigate the adverse effects of climate change.

An important breakthrough on the climate strategy and policy front happened with the adoption of the long-term Bangladesh Delta Plan 2100 in 2018. This is a comprehensive strategy for managing the risks posed by the deltaic formation of the country along with the incidence of natural disasters and climate change.

In recent years, Bangladesh has emerged as the leading voice in advocating for actions against climate change. Over the years, Bangladesh has played a significant role at the Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC). Bangladesh's Prime Minister Sheikh Hasina chairs the Climate Vulnerable Forum (CVF), the influential international consortium of the most climate vulnerable countries.

One of the new initiatives under Sheikh Hasina's leadership is that each CVF member country would develop a climate prosperity plan on top of their existing adaptation plans. She has unveiled 'Mujib Climate Prosperity Plan – Decade 2030' for Bangladesh. The plan turns climate-related vulnerabilities to opportunities. It aims to secure Bangladesh's economic future threatened by climate risks while supporting robust delivery of the Sustainable Development Goals. It has set an example for other countries to adopt a similar preparedness plan.

Bangladesh is a minimal contributor to the greenhouse gas emissions that affect global climate change. Bangladesh's policies such as Climate Change Strategy and Action Plan (BCCSAP), Power System Master Plan 2016 (PSMP), and Nationally Determined Contributions, articulate the country's intention to contribute to adaptation and mitigation measures in alignment with the global endeavor. It is shifting its policy towards clean energy. It also renewed the commitment to embrace renewable energy development as part of Bangladesh's commitment to de-carbonization - with zero emissions by 2050.

Since 2009, Bangladesh has made steady progress in renewable energy sector development. Currently, there are 6 million solar home systems in the country. At present, solar power is changing the lives of 20 million people in rural areas. Wind, hydropower, and biomass are also growing. The potential for a swift transition and a diversified renewable energy mix is there. Bangladesh is strongly pursuing its goal to generate 40% power from renewables by 2041.

Chapter 1: Climate resilience

Bangladesh has one of the richest biodiversity due to its deltaic terrain. The country is located in the low-lying areas of the Ganga–Brahmaputra–Meghna delta, which is the third largest in the world after the Amazon and Congo. Global environmental degradation is causing multidimensional challenges for Bangladesh. The stability of Bangladesh's natural ecosystems is critical to the country's economic growth and infrastructure boom. Like many other developing countries, Bangladesh's economic development is highly inhibited by the effects of climate change.

Bangladesh has the world's largest river system which is vulnerable due to climate change. The country experiences intense climate change impacts such as sea level rise, coastal erosion, salinization, frequent cyclones, floods, and disruption in rainfall patterns. These severely stress the people who are highly dependent on natural resources. They also threaten agricultural production chains.

Due to low-lying terrain, the rise in sea level poses a significant threat to the lives and livelihood of the coastal residents. Floods are a regular phenomenon, which can inundate one-third of the delta region displacing at least 5 million people. Cyclonic storms wreak havoc on the shoreline from time to time, claiming lives and damaging property. Moreover, approximately 10,000 people are displaced due to river erosion every year.

Bangladesh has been facing multidimensional challenges in its quest for sustainable development. However, the country has been preparing to protect its economic gains for more than a decade. It has responded to these inevitable threats through planning for adaptation, mitigation and participation in global climate conversations.

Climate change has made Bangladeshi policymakers align the climate actions with national development policies. The policies have emphasized on natural resource management in order to achieve sustainable development. Bangladesh has also ratified 44 international treaty-commitments related to environment and ecology.

Climate governance

Bangladesh, being one of the most vulnerable countries to climate change, has heavily invested substantial amounts in climate change adaptation, disaster risk reduction, flood protection, coastal embankment projects, building cyclone shelters, comprehensive disaster management projects, and coastal 'greenbelt' projects. Establishment of the Climate Change Unit within the Department of Environment in 2004, was one of the Bangladesh's first initiatives exclusively focused on climate governance.

Moreover, Bangladesh government firmly regulates the industries on the environmental clearance criteria to run the operation. Bangladesh has made the establishment of Effluent Treatment Plant (ETP) mandatory to prevent water pollution and to ensure that industrial liquid waste is being discharged after proper treatment. Legal actions are taken through environmental and mobile courts, guided by the penal code under the 'Environmental Conservation Act 1995' (revised in 2010).

Nationally Determined Contributions (NDC)

Bangladesh is virtually a zero contributor to the greenhouse gas (GHG) emissions that affect global climate change. However, it will not be able to escape the disastrous eventuality of climate change that is likely to occur in the coming decades. As part of its mitigation initiative, Bangladesh has already prepared the Nationally Determined Contribution (NDC) plan to regulate GHG emissions. According to this plan, it is estimated to reduce 15% carbon emission with international cooperation and decline 5% carbon release by 2030. The government is also formulating a NDC Implementation Road Map and NDC Mitigation Action Plan in order to provide necessary tools for implementation of the plan.

National Adaptation Plan (NAP)

Bangladesh is developing a National Adaptation Plan (NAP) in order to strategize integrated adaptation to tackle long-term impact of climate change by building adaptive capacity and resilience. The NAP will facilitate the integration of climate change adaptation into relevant new and existing policies, programs and activities in a coherent manner, in particular, development planning processes and strategies, within all relevant sectors.

According to the Global Climate Risk Index 2021 by Germanwatch, Bangladesh lost **11,450 lives,** incurred economic losses worth **$3.7 billion** and experienced **185 extreme weather events** between 2000 and 2019 due to climate change. According to the index, Bangladesh is the **7th most climate change vulnerable** country in the world.

The Providing Regional Climates for Impact Studies (PRCIS) has projected that Bangladesh's annual **average rainfall will increase about 4%** by 2030.

The General Circulation Model has projected that Bangladesh's annual **average temperature will increase by 2.4 degree celsius,** while the annual average **rainfall will be increased by 9.7%** within 2100.

According to a World Bank study, **up to two-thirds of Bangladesh** is inundated by floods in every three to five years. The situation ends up causing massive damage to the agriculture sector, and livelihood of the people.

According to the Intergovernmental Panel on Climate Change (IPCC), Bangladesh will **lose 17% of its land by 2050** due to climate change.

Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009

Bangladesh is implementing the 'National Environment Policy 2018'. The policy instrument has identified the roles and activities of the different ministries and agencies. Based on the policy Bangladesh Climate Change Strategy and Action Plan 2009 (BCCSAP 2009) is being implemented by the government. BCCSAP 2009 is addressing the impact of climate change issues shrewdly identifying the realistic adaptation and mitigation activities. Bangladesh is the first country among the developing countries to form an integrated action plan where 44 activities within 6 thematic areas are identified. All attempts to address climate change in Bangladesh are based on the BCCSAP 2009. Currently, Bangladesh is updating the BCCSAP.

Mujib Climate Prosperity Plan-Decade 2030

In 2021, Bangladesh chaired the virtual event of 'Vulnerable Twenty' (V20)-Climate Vulnerable Finance Summit. The event was organized to address the compound, destabilizing effect of climate disasters and the COVID-19 pandemic on low- and middle-income economies. Sheikh Hasina, Prime Minister of Bangladesh, inaugurated the summit. During the event, 'Mujib Climate Prosperity Plan – Decade 2030' was unveiled, which was dedicated to Bangladesh's founding father Sheikh Mujibur Rahman. Mujib Climate Prosperity Plan aims to secure Bangladesh's economic future threatened by climate risks while supporting robust delivery of the Sustainable Development Goals. It has been designed to set an example for other vulnerable countries to adopt a similar preparedness plan.

Bangladesh Delta Plan 2100

Bangladesh has formulated the Bangladesh Delta Plan 2100, a long-term integrated mega plan which aims to tackle the impact of climate change. It is one of the most comprehensive climate resilient development documents for addressing the hazards posed by the country's deltaic formation, as well as natural catastrophes and climate change. Recognizing the immense challenge, the government approved the Delta Plan in 2018.

The plan aims to integrate environment sensitive finance for all development projects and to integrate sustainable practices within the design of all projects under government regulation. The plan will also minimize the damage caused by rivers during flooding events. Speedy implementation of the Delta Plan will be a significant contribution to reducing climate related vulnerabilities and will greatly improve the prospects for sustainable development and poverty reduction.

Bangladesh Delta Plan 2100 has 6 specific goals

- Ensure safety from floods and climate change related disasters
- Enhance water security and efficiency of water usages
- Ensure sustainable and integrated river systems and estuaries management
- Conserve and preserve wetlands and ecosystems and promote their appropriate use
- Develop effective institutions and equitable governance for in-country and trans-boundary water resources management
- Achieve optimal and integrated use of land and water resources

Bangladesh Climate Change Trust Fund (BCCTF) 2009

Bangladesh has formed Bangladesh Climate Change Trust Fund (BCCTF) in 2010 with its own revenue to ensure adequate investment in building resilience and managing disasters. Government has also enacted Climate Change Trust Fund Act 2010 in order to give a proper legal framework for the action plan. Moreover, the country has formulated Climate Change Trust Fund Guidelines with a view to smoothen the operation of BCCTF. Between 2009-10 and 2019-20 fiscal year, $430 million has been allocated from the budget for the Climate Change Trust Fund (CCTF). BCCT has taken 720 development projects to combat the vulnerability posed by climate change.

National climate budget

Bangladesh is leading the developing country's bloc on climate finance for adaptation and mitigation. Bangladesh government published its first climate budget report in the year 2017-2018. Since then, the government regularly publishes climate budget reports. The climate budget allocation increased from 6.6% in 2015-2016 to 8.7% in 2019-2020.

Climate adaptation and disaster risk reduction programs

720 projects

to combat the climate vulnerability implemented

86 million

trees planted

4,510 cyclone shelters

and 523 flood shelters built

76,000 volunteers

for cyclone preparedness

$2 billion

average spending for climate adaptation since 2010

$430 million

publicly-financed for Bangladesh Climate Change Trust Fund since 2009

Disaster resilience

Bangladesh is situated at the hotspot of environmental degradation and climate change induced catastrophes. The country has been facing the challenges of natural or anthropogenic disasters for decades. Bangladesh is vulnerable to a wide range of hazards such as flood, cyclone, storm surge, saline intrusion, river erosion, landslide and earthquake due to its geographical setting.

The country has experienced 219 natural disasters between 1980 and 2008, causing over $17 billion in economic loss and lost 11,450 lives. Between 2000 and 2019, the country incurred economic losses worth $3.72 billion and experienced 185 extreme weather events due to climate change.

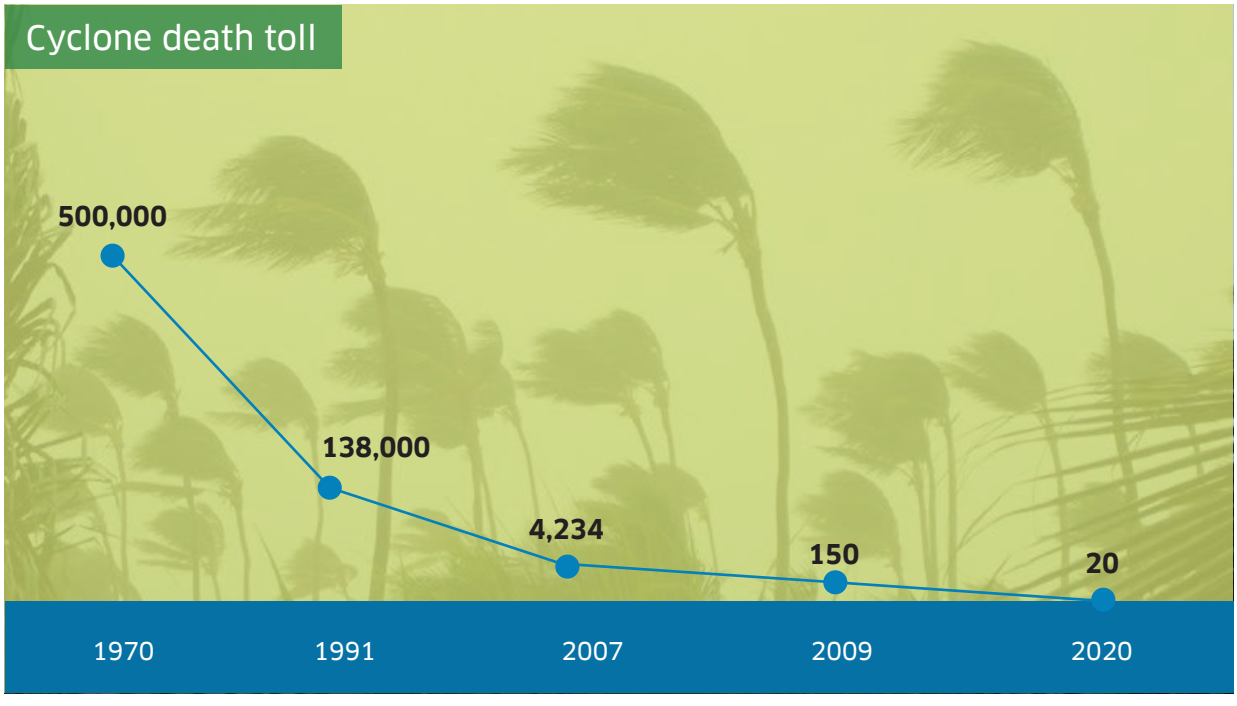
Bangladesh devised its development strategy from the very beginning to protect lives, livelihoods and assets from disasters. After five decades, Bangladesh is at the frontline of the global fight against climate change. The country has shown remarkable resilience to disaster management, climate change mitigation, adaptation and nature-based solutions. Bangladesh has become a leader in disaster risk reduction.

Managing cyclone

Bangladesh has about 700 km of coastline facing the Bay of Bengal of the Indian Ocean, one of the world's most cyclone-prone regions. The unique geophysical characteristics of the country's coastal region contribute to the high vulnerability of the residents to cyclones.

Bangladesh launched a Cyclone Preparedness Program in 1972, two years after the world's deadliest tropical storm 'Bhola Cyclone' in November 1970 that devastated the coastline. The country became a member of the World Bank in 1972 and newly independent Bangladesh's first project was the 'Cyclone Protection and Coastal Area Rehabilitation Project.'

In the last two decades, Bangladesh became a cyclone resilient nation through prudent policy interventions and systematic investment in resilience. Bangladesh brought down the number of casualties during cyclones, a widely narrated success in cyclone preparedness. The reduction alluded to the advancement in the early warning system, engagement of trained volunteers, increased number of cyclone-shelters and capacity enhancement of relevant institutions.



Source: Bangladesh Bureau of Statistics

Major disaster risk reduction policy and institutional frameworks

Over the past five decades, Bangladesh heavily invested in disaster risk reduction by formulating a number of laws, policies and by building a number of institutional frameworks.

Bangladesh has initiated building a number of institutions in the last decade. These institutional frameworks aim to ensure technical monitoring, capacity building, preparedness and response in reducing disaster risks. National Disaster Management Advisory Committee (NDMAC) and National Disaster Management Council (NDMC) are among them.

Instruments which propelled Bangladesh's disaster resilience

- National Plan for Disaster Management (2010 and 2016-2020)
- Standing Orders on Disaster (1997, 2010 and 2019)
- Comprehensive Disaster Management Program (CDMP)
- Disaster Management Act (2012)
- Disaster Management Policy (2015)
- National Earthquake Contingency Plan
- Bangladesh Delta Plan 2100
- Mujib Climate Prosperity Plan 2030

Chapter 2: Climate diplomacy

In recent years, Bangladesh has emerged as the leading voice in advocating for actions against climate change. Bangladesh's Prime Minister Sheikh Hasina took the lead to prioritize climate diplomacy at the international level. The country is leading the charge to hold the developed world accountable for their high-consumption leading to climate change. Bangladesh has been a prominent voice on the negotiation table to see-through the delivery of adequate compensation.

Treaties	Signed	Ratified
United Nations Framework Convention on Climate Change (UNFCCC), New York	1992	1994
Convention on Biological Diversity, Rio De Janeiro	1992	1994
Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar	-	1992
International Convention to Combat Desertification, Paris	1994	1995
Kyoto Protocol to the UNFCCC, Kyoto	-	2001
Paris Agreement, Paris	2016	2016

Source: Ministry of Environment, Forestry and Climate Change

Over the years, Bangladesh has played a significant role at the Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC). Bangladesh is recognized in the UNFCCC talks as an important country both due to its actions at home as well as its negotiators and other representatives at the COPs. Bangladesh played a very important role in climate diplomacy during the 2009 Copenhagen Climate Summit (COP15) and other subsequent COP meetings.

To save the developing countries from climate change impacts, Prime Minister Sheikh Hasina called for a $100 billion fund every year. She also placed a four-point proposal which included a mechanism to establish climate justice.

Bangladesh negotiates as a member of the least developed countries (LDCs) group and was the chair of the group but now remains in the senior group of LDC negotiators. PM Hasina highlighted the actions that Bangladesh is taking at home to tackle climate change and also reiterated the importance of dealing with migration and displacement at the global level should be a priority for UNFCCC.

Bangladesh has also been a member of important bodies set up by the UNFCCC over the years, such as the Adaptation Fund Board, the Green Climate Fund Board and the Executive Committee of the Warsaw International Mechanism on Loss and Damage.
In 2020, Bangladesh took up the presidency of the Climate Vulnerable Forum (CVF), an international consortium of nearly 50 of the most climate vulnerable countries, to represent climate-vulnerable nations' interests and help map out a sustainable and climate-resilient pathway. PM Hasina as the Chair of CVF, is now the leader of the climate vulnerable nations.

She chaired the CVF leader's virtual event in 2020 hosted by Bangladesh along with Global Center on Adaptation (GCA). One of the new initiatives under her leadership is that each CVF member country would develop a climate prosperity plan (CPP) on top of their respective national adaptation plan (NAP). The aim of CPP is to go beyond coping with the adverse impacts, rather transform the socio-economic systems, so that each country is able to prosper while they build resilience to climate change impacts. She also declared that Bangladesh would prepare the first such plan, named the Mujib Climate Prosperity Plan (MCPP), which has the potential to become a tool for Bangladesh's climate diplomacy for the next decade.

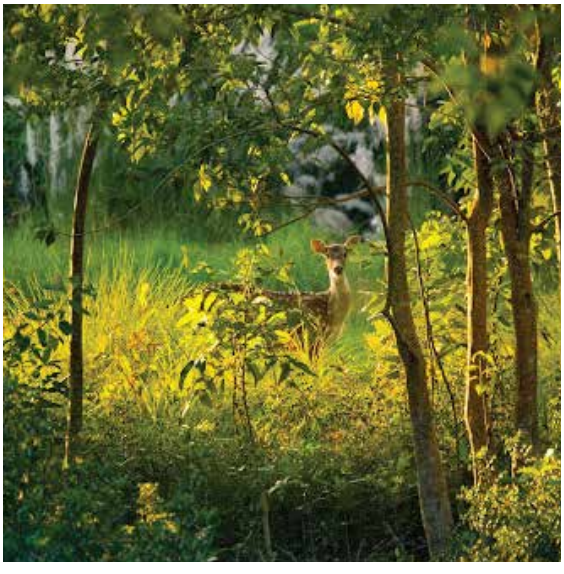
Prime Minister Sheikh Hasina, the chair of the Climate Vulnerable Forum, has declared that Bangladesh would prepare the first climate prosperity plan, named the Mujib Climate Prosperity Plan (MCPP), which has the potential to become a tool for Bangladesh's climate diplomacy for the next decade.

As part of the broader partnership in climate adaptation, Bangladesh launched the South Asian regional office for Global Center on Adaptation (GCA) in Dhaka in September 2020. Together with the regional countries, the GCA Bangladesh office will promote indigenous nature-based sustainable solutions and innovative adaptation measures.

Bangladesh Finance Minister is now chairing the V20 Group of Finance Ministers of the CVF. Formed in 2015, the V20 is a dedicated cooperation initiative of economies vulnerable to climate change. In leading the V20, Bangladesh therefore aims to work tirelessly, at home and with all the partner countries and institutions, to ensure economic systems adjust to the prevailing realities. Bangladesh hosted the first-ever virtual 'V20 Climate Vulnerable Finance Summit' aimed at shaping up cooperative responses to the problems related to global warming and climate change.

As part of the broader partnership in climate adaptation, Bangladesh launched the South Asian regional office for Global Center on Adaptation (GCA) in Dhaka in 2020. Together with the regional countries, the GCA Bangladesh office will promote indigenous nature-based sustainable solutions and innovative adaptation measures. It will facilitate strategies to accelerate adaptation and address climate change vulnerabilities across South Asia. It will also integrate international expertise to support Bangladesh to prosper amidst changing climate.

Bangladesh's Ministry of Environment, Forest and Climate Change (MOEFCC) continues to hold the leading role on behalf of the country at the United Nations Framework Convention on Climate Change (UNFCCC) meetings, such as the COPs. All three, namely the MOEFCC, Ministry of Foreign Affairs (MOFA), and Economic Relations Division (ERD), have very important international roles to play on behalf of Bangladesh on the global stage.



What Bangladesh has achieved in the practice of adaptation is nothing short of miraculous. The results can be measured not just in terms of the property and livelihoods protected, but in the number of lives that have been saved.

Ban Ki-moon
Former UN Secretary-General
at the inaugural meeting of the Global Commission on Adaptation in Dhaka

It needs a greater collaboration from the international community for a unified, stronger and green mechanism to tackle the negative impacts of climate change and uphold sustainability.

Sheikh Hasina
Bangladesh Prime Minister

Efforts from the non-government sector

Scientists and think tanks from Bangladesh provided the leaderships in United Nations Framework Convention on Climate Change (UNFCCC) and Intergovernmental Panel on Climate Change (IPCC) from their inception in the late eighties. They continued to give leadership in adaptation discourse, assessing vulnerability and impacts, highlighting issues of inequity and need for global climate justice.

Individuals and institutions from Bangladesh continue to be global leaders in national, regional and global discourse, planning science and policy mobilization, particularly among least developed countries and poor developing countries. The NGOs in Bangladesh have incorporated climate change in most of their programs. They have developed extensive training for grassroot communities. These include wide-ranging efforts in food production, water and land management, agriculture, fisheries, forestry, energy efficiency, education and training, gender and child-sensitive adaptation practices, better ecosystem management and biodiversity production.

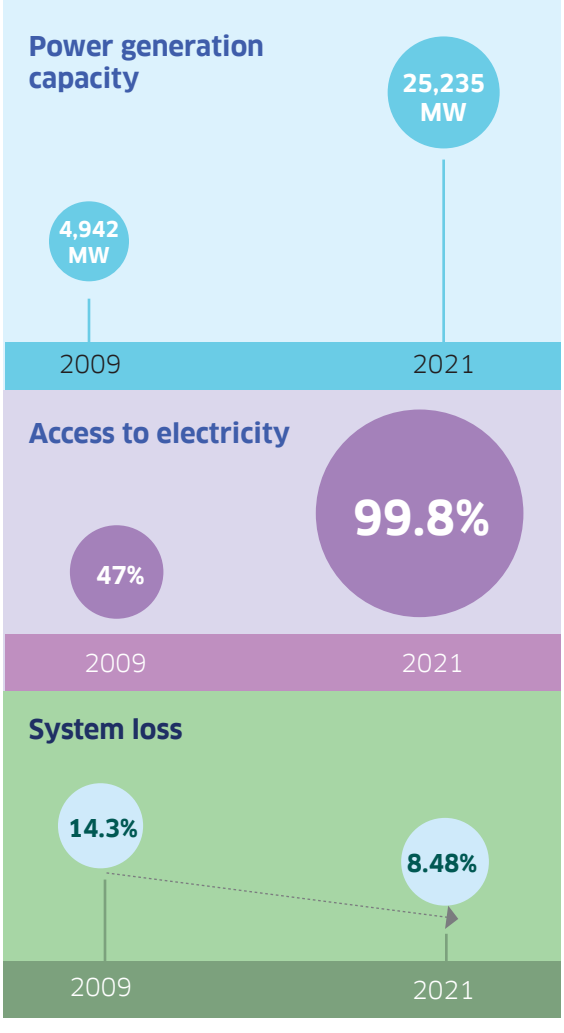
Bangladesh government with support from its research, non-government organizations (NGO) and academia have been playing a leadership role in climate change negotiations, global climate governance, and financial mechanism related discourse.

Chapter 3: Green energy

The power sector of Bangladesh is one of the fastest growing sectors in South Asia. The sector is the major driver of the country's economic growth in the past five decades. The sector registered spectacular growth especially in the past one decade. The growth was augmented due to prudent policy interventions, increased power generation capacity and massive infrastructure development. It has also achieved near-full electrification rate, much of which was due to adoption of renewable energy revolution through solar home systems.

Before 2009, Bangladesh faced a severe energy crisis owing to sluggish growth in energy supplies. In response, the country sought to secure a major expansion in the supply of power to sustain high growth while improving efficiency, increasing private participation and diversifying energy sources. Consequently, impressive gains were made in increasing power supply, growing at an average annual pace of 13.4% per year between 2010 and 2019, when generation capacity quadrupled from about 5,000MW to over 22,000 MW.

Soon after the power generation expansion, Bangladesh shifted its gear towards energy sustainability. It has significantly improved efficiency in the power sector and reduced the system loss to 8.5% in 2021 from 14.3% in 2009. Due to the introduction of prepaid meters, system loss has significantly been reduced. Bangladesh has set a target to bring all large and medium consumers under the prepaid meter coverage.



Bangladesh has adopted energy efficiency policy in order to reduce its carbon emission. Its long-term Delta Plan inculcates the clean and renewable energy options for a land-scarce country like Bangladesh.

Bangladesh Power Development Board (BPDB), the national body that oversees power sector planning, rigorously updates its Power System Master Plan. According to Power System Master Plan (PSMP) 2017-2030, the government has set a target to increase efficient electricity generation as per demand.

Bold decisions by Bangladesh

40% energy
from renewables
by 2041

Zero carbon
emission
by 2050

10 coal power plants
amounting to
8500 MW scrapped

$3 billion
divested from coal

Bangladesh's many ongoing projects, especially the Delta Plan 2100, with its recovery of land, green growth, efficient use of water, are projected to make huge contributions.

Sheikh Hasina
Bangladesh Prime Minister

Bangladesh is committed to achieving universal access to affordable, clean and sustainable energy for its people. Moreover, Bangladesh is inspiring the international community to decarbonize their power sector. It is shifting its policy towards clean energy. Accordingly, the government has indicated a shift in its energy plan and reviewing its coal-fired power plants in the development pipeline.

Bangladesh has so far divested $3 billion from coal-fired plants, an unprecedented move setting a new example for countries fighting climate change. It also renewed the commitment to embrace renewable energy development as part of Bangladesh's commitment to de-carbonization.

Rise of the renewable sector

Renewable energy sector in Bangladesh has enormous potential to be innovative. Bangladesh made a big step forward in the renewable energy sector by formulating National Renewable Energy Policy 2008 which became effective in 2009. Since then, Bangladesh has made steady progress in renewable energy sector development.

Bangladesh formed its mandated agency for renewable energy, the Sustainable and Renewable Energy Development Authority (SREDA), in 2012. SREDA has since been facilitating the country's transition to clean energy, with a focus on promoting renewable energy and increasing energy efficiency. SREDA prepares short, medium and long-term plans to meet the targets set by the government through its policy.

Bangladesh has so far divested $3 billion from coal-fired plants, an unprecedented move setting a new example for countries fighting climate change.

Bangladesh's Ministry of Power, Energy and Mineral Resources has prepared the SDGs Action Plan to ensure universal access to affordable, reliable and modern energy services by 2030. The plan has a roadmap to increase substantially the share of renewable energy in the total energy mix by 2030. Bangladesh has a target to produce 10% of total power generation from renewable sources by 2030, and thereby pickup the momentum. It eyes 40% power generation from green energy by 2041.

To expedite the process of integration of renewable energy technology in the country, the government approved the Renewable Energy Policy in 2008. The objectives of the policy are to harness the potential of renewable energy resources and disseminate it to the people, as well as to enable, encourage and facilitate both public and private sector investment.

Green energy policy frameworks

- ***Renewable Energy Policy 2008***
- ***Power System Master Plan 2010***
- ***Power System Master Plan 2016***
- ***National Solar Energy Action Plan, 2021 – 2041***
- ***Sustainable and Renewable Energy Development Authority Act 2012***
- ***Energy Efficiency and Conservation Rules 2016 and 2018***
- ***Guidelines for the Implementation of Solar Power Development Program***
- ***SDG Implementation Action Plan (up to 2030)***
- ***Preparation of Energy Efficiency and Conservation Master Plan (up to 2030)***

Renewable energy installed capacity

Technology	Off-grid (MW)	On-grid (MW)	Total (MW)
Solar	347	195	542
Wind	2	0.9	2.9
Hydro	0	230	230
Biogas	0.7	0	0.9
Biomass	0.4	0	0.4
Total	350.16	425.83	776

Source: Sustainable and Renewable Energy Development Authority (SREDA), Bangladesh

Bangladesh is known for its innovative development approaches. In remote and hard to reach areas, the government successfully introduced affordable off-grid renewable energy solutions through a public-private partnership. Clean electricity meant better health and living conditions for families and more study time for children.

Mercy Tembon
World Bank Country Director for Bangladesh and Bhutan

We are preparing an integrated energy sector master plan to encourage zero carbon emission. A year-wise roadmap will implement our renewable energy policy.

Nasrul Hamid
State Minster for Power, Energy and Mineral Resources, Bangladesh
At International Forum for Energy Transition 2021

Renewables in combating climate change

National plan and policy related documents such as, the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), Power System Master Plan 2016 (PSMP), Nationally Determined Contributions (NDC), etc. articulate Bangladesh's intention to contribute to adaptation and mitigation measures in alignment with the global endeavor. These documents thus also emphasize the importance of RE technologies due to their low emission features. The BCCSAP has declared 'Renewable energy development' to be a major program under the theme -Mitigation and Low Carbon Development.

Renewable energy sector consists of

730 MW
generation capacity power plant

6 million
Solar Home Systems

2,186
solar irrigation pumps

27
solar mini-grid projects

10,000
solar systems in Chattogram hill tracts

1 MW
waste to electricity station

1665.413 MW
solar power plant in process

200 MW
wind power station in process

Source: SREDA, Bangladesh

Solar revolution

Bangladesh has one of the world's largest solar energy programs. The country is now generating 776 MW electricity from renewable sources of which 542 MW power comes from the solar home systems. Scaling-up of solar PV systems assisted by the development partners are being implemented through Infrastructure Development Company Limited (IDCOL), Rural Electrification Board (REB), Local Government Engineering Department (LGED), Bangladesh Power Development Board (BPDB), NGOs and Private Organizations implementing solar energy program.

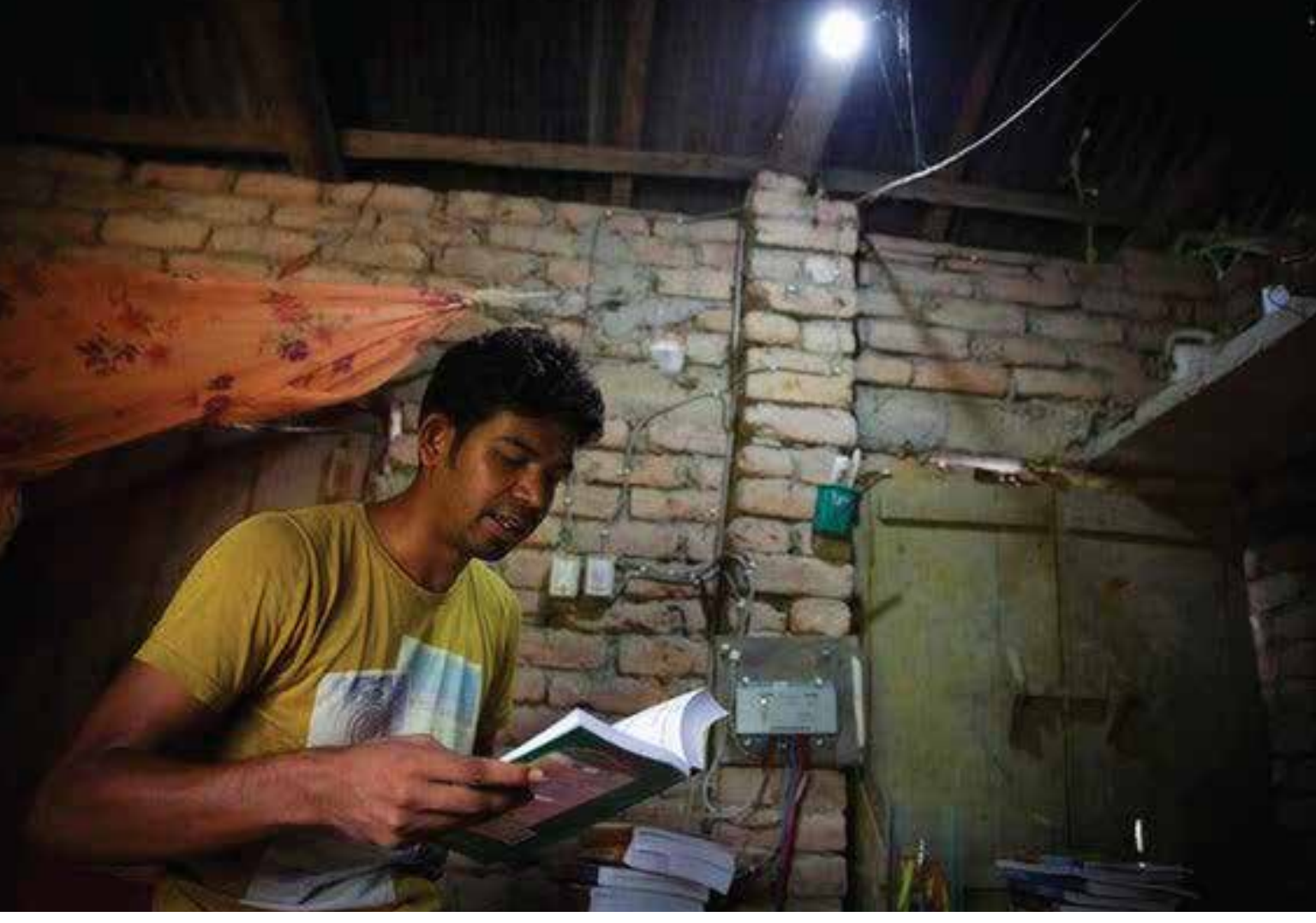
Bangladesh is an example of decentralized solar power systems, which is being studied by energy planners of other countries. It is home to the world's largest and longest running off-grid power program, which began as a rural household pilot in 2003, but peaked in 2016. Currently, there are 6 million solar home systems (SHS) in the country. At present, solar power is changing the lives of 20 million people in rural areas, who can now work, study and go out after dark.

Bangladesh is one of the top six countries with electricity access from off-grid solar solutions. Bangladesh secured 2nd position in providing renewable energy to its people.

Global Status Report (GSR) 2020 by Renewable Energy Policy Network (REN 21)

Bangladesh has created around 137,400 jobs in solar home systems. Bangladesh stands 5th among 161 countries in renewable energy jobs.

Renewable Energy and Jobs: Annual Review 2020 by International Renewable Energy Agency (IRENA)



More than 65,000 SHSs are now being installed every month under the program with average year to year installation growth of 58%. The program replaces 180,000 tons of kerosene having an estimated value of $225 million per year. Moreover, around 70,000 people are directly or indirectly involved with the program. The program has been acclaimed as the fastest growing off-grid renewable energy program in the world.

Solar photovoltaic (PV) based mini-grid projects are being installed in remote areas of the country where grid expansion is not possible in near future. So far 26 solar mini-grids have been installed with 5 MW cumulative generation capacity. The mini-grid projects have successfully created access to low-emission electricity for approximately 16,000 beneficiaries in rural Bangladesh. The government is encouraging the use of rooftops of industries and public agencies to generate about 300MW of clean electricity through solar PV. It has enacted the Net Metering Guideline in 2018 to encourage the use of vacant spaces and rooftops in solar power generation.

Net-metering system is a system where the owners get their regular electricity bills adjusted by feeding solar electrical energy to the national grid. When solar power is not used by the residential, government, industrial and commercial, buildings power consumers during holidays and for other causes, the solar electricity can still be sold to the national grid. The bill is adjusted at the close of each month based on the electricity added to the national grid produced from solar.

So far, 1456 net metered rooftop solar installations have the capacity to generate 34 MW electricity. The industrial areas have been the early adopters of the efficient net metering initiative. Moreover, Bangladesh is opening new solar parks in addition to expanding the use of solar home systems. Four independent power producer (IPP) projects – of some 80MW - are currently in operation.

Innovations from Bangladesh

Solar based irrigation systems are innovative and environment friendly solution for the agro-based economy of Bangladesh. The program intends to provide irrigation facility to rural off-grid areas. Solar irrigation systems reduce dependency on fossil fuel and demand for electricity from national grid in irrigation seasons. Up to March 2021, some 1,515 solar irrigation pumps are operational with an installed capacity of around 40 MWp.

Bangladesh-based SOLshare, a renewable energy startup, has created the world's first peer-to-peer energy exchange network. The solution allows remote households with rooftop solar home systems to sell excess power into the microgrid network, where neighbouring households or businesses can buy it, creating a new income source: the sun. As the global pioneer in solar energy sharing grids, SOLshare been selected as a finalist for the prestigious Earthshot Prize at COP26.

Solar powered battery charging stations are another important component of solar PV sector. Building a charging infrastructure is imperative for the wide-spread utilization of electric vehicles. To reduce this huge burden on the national grid, Bangladesh has already started to implement solar-powered charging stations at various locations. So far 14 solar charging stations have been installed in different parts of the country.

Wind energy

Currently, Bangladesh generates only 3 MW electricity from three wind power projects of which only one has been connected to the grid. Moreover, two wind power projects are under implementation phase. Bangladesh has formulated guidelines for installation of onshore wind power plants as the country attempts to shift towards clean energy policy.

Hydropower

The total hydropower potential of the country was reported as 1,500 MkWh/year at southeastern hilly areas of Kaptai. The first hydropower generator was installed in Bangladesh in 1962, which inundated 40% of the agricultural land of the Chittagong Hill Tract area. In 2013, the total generation capacity of five hydropower units installed at Kaptai was 230 MW and electricity generated was 893.9 MkWh. Implementing the Sangu and Matamuhuri Hydro projects, which have the potential to generate 500 MW of electricity, is a much-debated issue among experts. Due to the heavy toll on the environment and ecology, Bangladesh is no more pursuing dam-based hydropower.

Renewable energy financing

In line with the government policies, various schemes have been promoted both in public and private sectors to add off-grid and grid connected power based on renewable energy sources. Moreover, international development agencies like the UNDP, ADB, GIZ, USAID, JICA, KOICA are already playing essential roles in terms of financing the sector.

As the leader in the infrastructure and project finance area, a government established non-bank financial institution named IDCOL offers a range of financing solutions to viable private-sector owned infrastructure projects. The financial institution so far introduced many refinancing schemes and concerted programs to diversify the renewable energy installations in areas like biogas and biomass-based power and energy generation, solar micro and mini-grid, solar irrigation and other types of commercials scale renewable energy projects.

Bangladesh's central bank launched a $27 million green banking refinance scheme in 2009 to set up solar panels, bio-gas plants and industrial effluent treatment plants under the scheme to help reduce industrial pollution and increase power supply. The fund has been named the "Solar energy, biogas and effluent treatment plant sector refinance scheme". It has been providing loans to commercial banks at interest rates from 5% to 12% for direct refinancing and credit wholesale to the entrepreneurs.

In 2020, the central bank announced its sustainable finance policy and made it mandatory for 2% of all the loans by the banks to be devoted to renewable energy and green projects. The bank has brought 47 green products under its refinance scheme where 23 are green energy products.

Challenges

Bangladesh has achieved substantial progress in generation capacity along with expansion of transmission and distribution networks. To satisfy its energy consumption needs, the country currently relies mainly on natural gas and biofuels. However, wind, hydropower, and solar PV are also growing. The potential for a swift transition and a diversified renewable energy mix is there. To make a quick transition, Bangladesh has to solve a plethora of challenges.

Scarcity of suitable lands

Large-scale projects, such as solar parks or mega-grids require vast stretches of land. Being an agriculture dominated economy; Bangladesh understandably preserves agricultural lands from being used for solar PV project development. As a result, there are very little non-agricultural lands that lie mostly in the north eastern part of the country, in the river banks and islands, sand bars and in coastal regions. These areas are far away from the national grid facilities or limited by the grid capacity.

Ownership of land

The population density is very high in Bangladesh and very often it is found that the ownership of suitable lands for solar PV projects is distributed among several hundred individuals. The legal acquisition of land from several hundred owners requires a considerable amount of time. Moreover, it has also been found very often that the transfer of lands through deeds was not properly conducted, which also delays the project implementation period and thus incurs cost.

Weather conditions

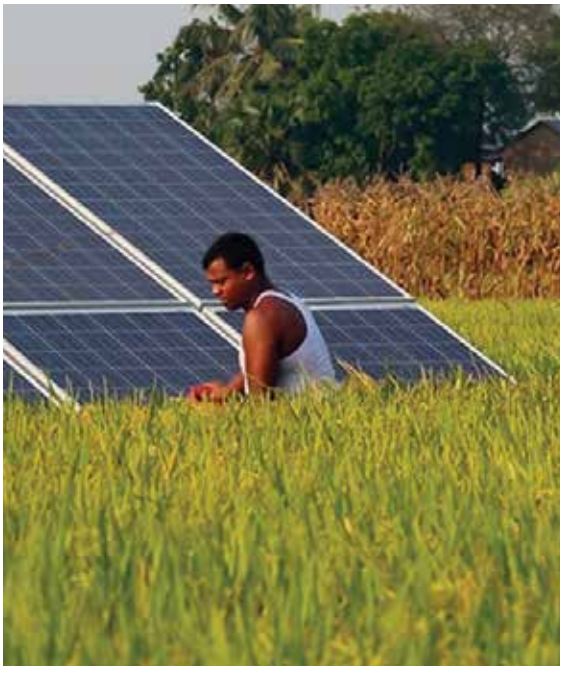
Very often, Bangladesh experiences cyclones in the southern region due to its geographical location. This creates the need for special precaution in the form of mounting structure design and also the assembly, thus increasing the project cost.

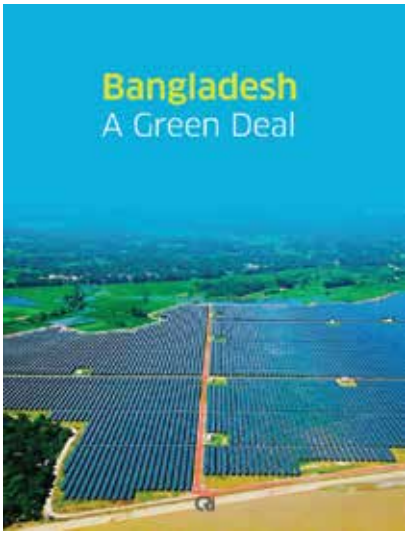
Insufficient local human resources

There is a lack of human resources with sufficient technical knowledge of renewable energy project development in Bangladesh.

Limited information on available services

Lack of information on relevant services, such as supply chain companies, finance, developers, and relevant standards affects and delays important design related decisions.





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