CPD Power and Energy Study
Towards Carbon Neutral Economy

Revisiting Targets Set for Renewable Energy-based Power Generation by 2040

Projection of 'SMART' Target and Required Investment

Khondaker Golam Moazzem
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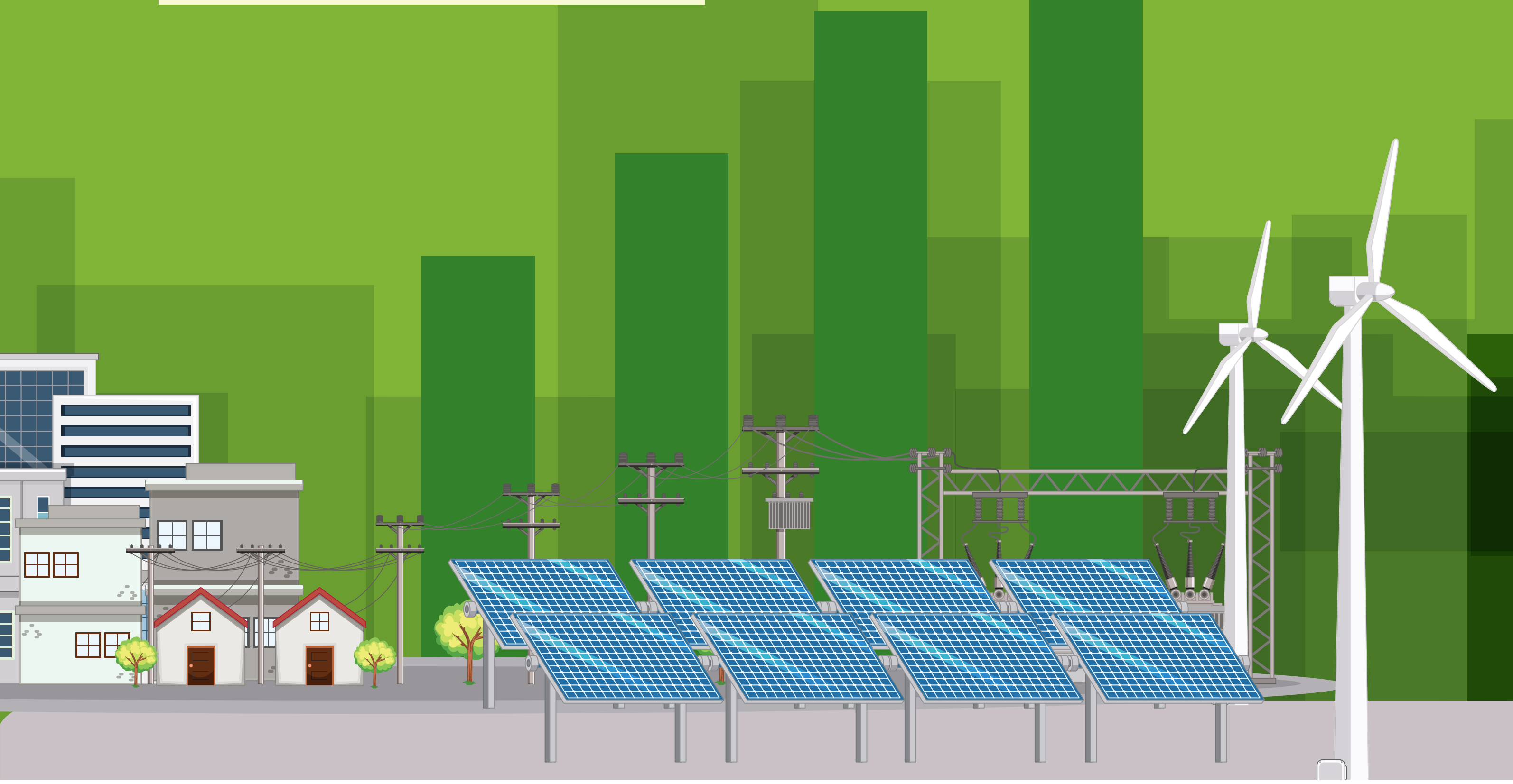

CENTRE FOR POLICY DIALOGUE

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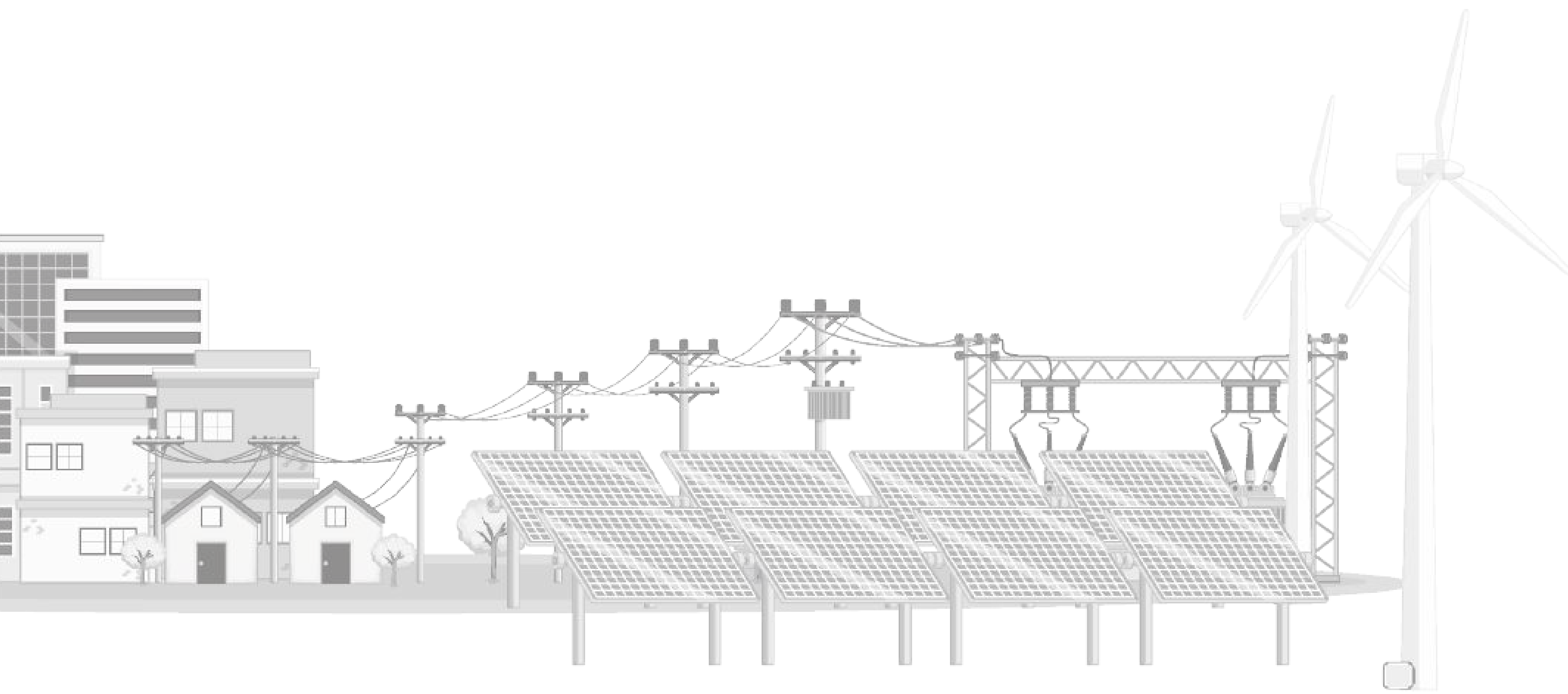

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Centre for Policy Dialogue (CPD)
House 40/C, Road No 11 (new)
Dhanmondi, Dhaka – 1209, Bangladesh
Phone: (+88 02) 41021780-2
E-mail: info@cpd.org.bd
Website: www.cpd.org.bd

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Authors' Biography

Dr. Khondaker Golam Moazzem is the Research Director at the Centre for Policy Dialogue (CPD). He is currently heading the CPD Power and Energy Study – a dedicated unit working on clean and renewable energy development in Bangladesh. He is actively involved in pursuing research and policy influencing activities related to power and energy sector, climate mitigation and climate financing etc.

Email: moazzem@cpd.org.bd

ORCiD: https://orcid.org/0000-0002-9049-2031

Jebunnesa was a former programme associate at the Centre for Policy Dialogue (CPD), working at the intersection of environmental economics, labour economics, and behavioural economics. She holds a BSS in Economics from the Bangladesh University of Professionals (BUP) and is currently pursuing an MSc in Environmental and Resource Economics. Her research interests centre on advancing sustainable development and contributing to the transition toward a low-carbon, environmentally responsible economy.

Md. Mehadi Hasan Shamim is an energy systems researcher with technical and analytical expertise in renewable energy, smart grid development, techno-economic evaluation, and energy modelling. He holds an M.Tech. in Energy Systems from IIT Madras and a B.Sc. in EEE, and has hands-on experience with simulation tools such as HOMER Pro and PVsyst. His research supports evidence-based policymaking for clean energy transition in Bangladesh, with a focus on distributed power generation and solar-powered EV charging systems.

Email: shamim@cpd.org.bd

ORCiD: https://orcid.org/0000-0002-0738-0582

Abstract

Bangladesh stands at a pivotal moment in its energy transition, where ambitious renewable energy targets face the reality of slow deployment and a continued dominance of fossil fuels. This study, prepared by the Centre for Policy Dialogue (CPD), revisits Bangladesh's renewable energy targets and develops an evidence-based roadmap to achieve 30 per cent renewable electricity generation by 2040. It critically assesses the current power sector landscape, identifies inconsistencies across policy frameworks, and re-estimates electricity demands for the terminal years—2030, 2035, and 2040. The analysis projects that to achieve the 2040 target, Bangladesh must install around 35,753 MW of renewable capacity, with solar and wind accounting for the largest shares and hydro, biomass, and biogas making smaller contributions. Meeting this target will require an estimated investment of USD 35.2–42.6 billion, with most financing needs concentrated between 2025 and 2035. However, the study argues that capacity expansion alone will not suffice without a parallel, well-structured phase-out of fossil fuel-based plants, grid modernisation, regulatory clarity, and institutional strengthening. To ensure a realistic and orderly transition, the study recommends the adoption of a legally binding renewable energy target, development of a SMART (Specific, Measurable, Achievable, Realistic, and Time-bound) roadmap, enhanced regional power cooperation, and mobilisation of multilateral and climate finance. By aligning policy consistency with investment strategies and institutional reforms, this study offers strategic guidance for policymakers, investors, and development partners on advancing Bangladesh's renewable energy transition in a realistic, achievable, and time-bound manner.

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Acronyms

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
BPDB	Bangladesh Power Development Board
BERC	Bangladesh Energy Regulatory Commission
CPD	Centre for Policy Dialogue
GCF	Green Climate Fund
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HFO	Heavy Fuel Oil
HSD	High-Speed Diesel
IEA	International Energy Agency
IEPMP	Integrated Energy and Power Master Plan
LNG	Liquefied Natural Gas
MDBs	Multilateral Development Banks
MCPP	Mujib Climate Prosperity Plan
MW	Megawatt
NEM	Net Energy Metering
PV	Photovoltaic
RE	Renewable Energy
SREDA	Sustainable and Renewable Energy Development Authority
TWh	Terawatt-hour
USD	United States Dollar
VECM	Vector Error Correction Model

1

Introduction

Bangladesh's national policy documents have set multiple, and at times inconsistent, targets for increasing electricity generation from renewable energy. The Integrated Energy and Power Master Plan (IEPMP) 2023 outlines a 40 per cent clean energy target by 2041, whilst the Mujib Climate Prosperity Plan (MCPP) 2022–2041 aims to achieve 30 per cent renewable energy by 2030. More recently, a Renewable Energy Policy (2025) proposed revised renewable energy targets of 20 per cent by 2030 and 30 per cent by 2040.[1] These shifting targets reflect both the ambition and uncertainty surrounding Bangladesh's energy transition pathway.

Despite these goals, the actual expansion of renewable energy has been far from satisfactory stage. As of March 2025, renewable energy contributes just 3.6 per cent to the total grid-connected installed power generation capacity of 27,645 MW (BPDB, 2025). Solar leads to renewable mix of around 1,269 MW, whilst other sources like wind, hydro, biomass, and biogas contribute marginally. In contrast, fossil fuels continue to dominate the energy mix, with natural gas accounting for 43.4 per cent, followed by heavy fuel oil (20.9 per cent) and coal (20.6 per cent). These figures underscore that scaling up renewable energy alone will be insufficient without a timely and planned phase-out of fossil fuel-based plants. Shifting to sustainable energy involves more than just expanding renewable energy capacity; it also requires a deliberate plan to reduce or phase out fossil fuel-based power plants. Without a clear strategy for retiring outdated fossil fuel infrastructure, these plants may continue operating alongside new renewable installations, resulting in system inefficiencies and conflicting priorities.

To address some of these gaps, the Renewable Energy Roadmap has been introduced by power division with a revised target of achieving 30 per cent of electricity generation from renewables by 2040. However, the roadmap falls short in several critical areas. It lacks a detailed breakdown of the fuel mix over time, omits source-specific projections (such as how much from solar vs wind, how much from rooftop solar vs bio-mass based electricity), and fails to specify how much installed capacity will be needed to meet projected demand. Moreover, there is no clear indication of when and how fossil fuel-based power plants would be phased down. This lack of clarity creates significant challenges for operational planning. Stakeholders are left uncertain about the government's long-term priorities and how they should align their activities with the target.

A major challenge of lack of clarity in targets is less investors' confidence in the renewable energy market. When government-set targets are frequently revised, lack clear timelines, or are not backed by concrete implementation plans, investors face uncertainty about the long-term direction of the sector. This uncertainty discourages private sector participation, increases the perceived risk of investment, and limits the flow of both domestic and foreign capital into renewable energy projects. Investment is weakened due

1 In Renewable Energy Policy 2025, the terminal year for renewable energy-based electricity generation is reset in 2040 instead of 2041 (as mentioned in the IEPMP and MCPP).

to the absence of strategic signals needed to guide investment decisions. Under the interim government, the renewable energy-based power generation has received new political commitment and institutional favour. Hence both local and foreign investors and financiers are taking increasing interest in investing in the renewable energy market. According to Mondal et al. (2010), Bangladesh has significant investment potentials in different types of renewable energy sources. However, potentials on investment in the renewable energy sector is not sufficient for the investors unless source-wise distribution of energy-mix with terminal targets is not made clear to them. There is a knowledge-gap regarding the investment requirement on different renewable energy-mix for different terminal years 2030, 2035 and 2040.

Against this backdrop, Centre for Policy Dialogue (CPD) has undertaken this study to review the current state of renewable energy development in Bangladesh, evaluate a time-bound and source-specific optimal fuel mix needed to meet the 2040 targets, and estimate the scale of investment required to make this transition achievable. This initiative seeks to provide evidence-based insights that can support informed policymaking and attract strategic investments to realise Bangladesh's renewable energy ambitions.

2

Objectives of the Study

This study deals with setting-up detailed source-wise renewable energy-based power generation in three specific terminal years—2030, 2035 and 2040, and the required investment to attain those energy targets. Taking those broader objectives into account, this study will focus on the following three specific objectives:

I. To re-estimate the target for 2040 on renewable energy-based power generation, including a possible renewable energy mix which would be achievable through proper measures;

II. To estimate the possible investment required for the newly estimated renewable energy target for 2040, considering the possible energy mix; and

III. To put forward suggestions for the multilateral development banks (MDBs), including the Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB), regarding possible financing options to facilitate investment in the renewable energy sector of Bangladesh.

3

Theoretical Framework for Estimating Renewable Energy-Based Electricity Generation

Most important feature of effective renewable energy targets is that they should be SMART: (a) Specific; (b) Measurable; (c) Achievable; (d) Realistic, and (e) Time-bound (Toby Couture, 2015)(Edvardsson and Hansson, 2005). Figure 1 presents the structure of the SMART model for renewable energy-based electricity generation.

Specific and Measurable: The renewable energy target has to be reasonably precise to be measurable, such as in terms of MW or KWh. A further distinction emerges as reflected in different policy documents—targets set as a percentage of final energy or electricity consumption (e.g., 30 per cent of the installed generation capacity by 2040), or as a fixed amount of renewable energy to be supplied (e.g., 500 GWh of renewable energy-based electricity by 2040). A target framed as a per cent of final electricity demand ensures that the target grows or shrinks as a function of actual energy demand. Whilst this may introduce more uncertainty about the total actual output required to achieve the target, it also has the advantage of keeping up with potentially rapid demand growth. Whilst setting the target in absolute terms is more likely to reduce uncertainty for market participants, it also shows the shortcomings of absolute targets in the face of hard-to-predict electricity demand. One way to resolve this ambiguity is to include a clause that establishes the renewable energy target in both absolute and percentage-based terms, and states that the requirement is based on whichever of the two is greater (or smaller, as the case may be).

Another related aspect is clarity of the target, which is essential to ensure that the target can be understood and implemented by a wide range of stakeholders (i.e. policy makers, experts and the public at large). In addition, the renewable energy target can only guide effectively if it is possible to know and measure to what extent it has been achieved; this also entails that it must be possible to monitor and check compliance.

Achievable and Realistic: The third and fourth criteria relate to the extent to which it is possible to reach the target – i.e., well-designed targets must be both achievable and realistic. The degree of realism is linked to both the time horizon and the level of effort required to reach the target. In theory, the renewable energy target should stimulate stakeholders to go beyond the business-as-usual trajectory and should be based on a clear strategic vision for the future (Herten and Schepers, 2000). Conversely, targets set too high can result in non-achievement, frustration or complacency (Van Herten and Gunning-Schepers, 2000). The level of ambition of targets is often the result of political decisions or negotiations and can change over time. However, other issues such as land availability, resource availability, existing grid structure etc. are also the factors that need to be considered whilst setting an achievable and realistic target.

Figure 1 **SMART Model for Setting Targets for Renewable Energy-based Power Generation**

Specific
- What needs to be accomplished?
- Who is responsible for it (ministries, departments and other stakeholders)?
- What steps need to be taken to achieve it?

Measurable
- What are the measurable, trackable benchmarks - such as achieving 10,000 or 14,000 MW from renewable energy?

Achievable
- What is the updated situation?
- What is the gap between current state and future target?

Realistic
- Is the target realistic in terms of available resources and facilities within the set timeline?

Time bound
- Inclusion of time-related parameters built in a designated time frame (such as targets by 2030, 2035 and 2041)

Source: Prepared by authors.

Timebound: The time dimension of targets plays is a critical role in both the effectiveness and implementation of renewable energy target. If the time period is not defined properly, there is little motivation to achieve the target, and ultimately it will be difficult to measure progress. In case of the shorter time frame, there may be little incentive to go beyond it, and if the time frame is too long, there may be diminishing motivation (Rietbergen and Blok, 2010) (Martijn G. Rietbergen, 2010) (Rietbergen and Blok, 2010). Short-to-medium-term targets, i.e., ranging between three and 10 years along with longer-term aims will make the target more measurable and attainable. Short-term (e.g., three-year) intervals enable more effective implementation and rapid learning from the policy process and can coincide with electoral cycles. In contrast, long-term targets, i.e., beyond 10 years, aim to provide a long-term trajectory and allow for more holistic policies. In the case of some renewable energy technologies (RET), a long ramp-up period and vision for the sector can allow the development of the entire supply chain and the required upgrades to grid infrastructure. However, long-term targets arguably provide less clarity for concrete implementation. So, to address this, they are often accompanied by intermediate milestones to help track progress and ensure effective monitoring. Thereby, the renewable energy targets are often set in a long-term perspective, typically 10 to 20 years.[2]

2 In some cases, renewable energy targets extend further into the future, with Denmark, Germany, as well as some US states such as Vermont having set targets or goals that extend to 2050.

4

Methodology: Calculating Renewable Energy Fuel Mix and Investment Requirements

The fuel mix and investment need to reach renewable energy target in Bangladesh's electricity generation by 2040 are calculated in this methodological part. Equations will be used in the approach to compute the potential of every renewable energy source (solar, wind, biomass, waste-to-energy, and hydro) and their contributions to the mix of total power generation. Furthermore, thumb rules depending on the cost per MW of installed capacity will help to project the investment required for every renewable energy source. The approach is meant to be scalable, realistic, based on facts, and reasonable.

The approach will go in the following lines: first, using suitable calculations, the overall power demand and renewable energy target for 2040 will be determined in MW. Following that, using comprehensive equations and Bangladesh-specific criteria, the potential of every renewable energy source such as solar, wind, biomass, waste-to-energy, and hydro will be evaluated. The targeted percentage will thereafter be met by scaling the renewable energy contributions. Lastly, the final fuel mix for 2040 will be shown together with the contributions made by every renewable energy source and the total investment needed to reach the goal in different terminal years—2030, 2035 and 2040.

4.1 Projecting the Renewable Energy-based Electricity Demand by 2040

This study will consider three different scenarios for the share of electricity generation from renewable energy in Bangladesh. The total electricity demand in Bangladesh by 2040 will be projected to be total demand (MW). The methodology to estimate the total electricity demand (MW) from renewable energy will be adapted from Moazzem and Quaiyyum (2024) for 2030, 2035, and 2040. The authors critically evaluated Bangladesh's energy forecasting framework and forecasted the actual electricity demand by introducing an advanced econometric approach through the Vector Error Correction Model (VECM) (Moazzem and Quaiyyum, 2024).

4.2 Fuel Mix Scenario by 2040

To determine the demand—specifically from renewable energy sources, various annual reports from government power sector entities such as the Bangladesh Power Development Board (BPDB) and the Sustainable and Renewable Energy Development Authority (SREDA) publications—will be analysed and incorporated. Therefore, the estimation of the installed generation capacity will be as follows:

Table 1 **Fuel mix for electricity generation, including renewable energy**

Sources	Base case	Target		
	2025	2030	2035	2040
Coal	5,683	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition
Gas (including LNG)	11,947	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition
HSD	626	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition
HFO	5741	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition	• Continuing • Phase out • Addition
Solar	700	• Continuing • Addition	• Continuing • Addition	• Continuing • Addition
Wind	62	• Continuing • Addition	• Continuing • Addition	• Continuing • Addition
Hydro	230	• Continuing • Addition	• Continuing • Addition	• Continuing • Addition
Biogas	0	• Continuing • Addition	• Continuing • Addition	• Continuing • Addition
Biomass	0	• Continuing • Addition	• Continuing • Addition	• Continuing • Addition

Source: Prepared by authors.

4.3 Investment Requirements for Renewable Energy Target

A. Investment Required for Solar Energy-based Plants: Land availability, rooftop potential, solar irradiation, and system efficiency all help to determine solar energy prospective. The investment required for solar energy is calculated based on the cost per MW of installed capacity. Assuming the cost per MW of solar capacity is Cost per MW (Solar), the total investment for solar energy is:

Total Solar Investment (MW)=Installed Capacity (MW)×Cost per MW (Solar)

B. Investment Required for Wind Energy-based Plants: Install capacity, capacity factor, and yearly operation hours are required to determine wind energy potential. However, the investment required for wind energy is calculated based on the cost per MW of installed capacity. Assuming the cost per MW of wind capacity is Cost per MW (Wind), the total investment in wind energy is:

Total Wind Investment (MW)=Installed Capacity (MW)×Cost per MW (Wind)

C. Investment Required for Biomass Energy-based Plants: Feedstock availability, energy content, and conversion efficiency determine biomass energy potential. Estimating the whole number of agricultural wastes, animal waste, and other biomass sources helps one to determine the whole biomass energy potential by means of feedstock availability multiplied by energy content and conversion efficiency. However, the investment required for biomass energy in MW scale can be calculated based on the cost per

MW of installed capacity. Assuming the cost per MW of biomass capacity is Cost per MW (Biomass), the total investment for biomass energy is:

Total Biomass Investment (MW)=Installed Capacity (MW)×Cost per MW (Biomass)

D. Investment Required for Waste-to-Energy-based Plants: Waste-to-energy prospects are computed depending on waste availability, energy content, and conversion efficiency. Estimating the overall amount of municipal solid waste (MSW) and industrial waste helps one to determine the total waste-to-energy potential by means of a multiplication of waste availability by energy content and conversion efficiency. The investment required in MW scale for waste-to-energy is calculated based on the cost per MW of installed capacity. Assuming the cost per MW of waste-to-energy capacity is Cost per MW (Waste-to-Energy), the total investment for waste-to-energy is:

Total Waste to Energy Investment (MW)=Installed Capacity (MW)×Cost per MW

E. Investment Required for Hydro Energy-based Plants: The installed capacity, the capacity factor, and yearly running hours determine hydropower potential. By multiplying the installed capacity by the capacity factor and the annual operating hours, the entire hydroelectric energy potential from estimated installed capacity could be determined. On the other side, in MW scale, the investment required for hydropower is calculated based on the cost per MW of installed capacity. Assuming the cost per MW of hydropower capacity is Cost per MW (Hydro), the total investment for hydropower is:

Total Hydro Investment (MW)=Installed Capacity (MW)×Cost per MW (Hydro)

F. Total Renewable Potential & Required Investments: The total renewable energy potential will be estimated as the cumulative sum of the scaled contributions from various renewable energy sources. Correspondingly, the total investment required will be calculated using the following formulas:

*Total RE Potential (MW)=SolarEnergy+Wind Energy+Biomass Energy+Waste to Energy+Hydro Energy (*in MW*)*

Total Investment Required (MW)
=Scaled Solar Investment (MW)+Scaled Wind Investment (MW)
+Scaled Biomass Investment (MW)
+Scaled Waste to Energy Investment (MW)
+Scaled Hydro Investment (MW)

5

Present Landscape of the Power Sector in Bangladesh

Bangladesh's electricity supply system is undergoing continuous transformation, with older plants being phased out, new plants coming into operation, and existing plants sustaining operations with derated capacity. As of 31 March 2025, the BPDB reports a total installed capacity of approximately 27,645 MW (excluding captive and off-grid renewable sources), whilst the maximum daily generation reached 16,477 MW, indicating a 40.4 per cent reserve margin compared to peak grid demand.

There are approximately 140 plants currently in operation with a total installed capacity of 27,645 MW. The current fuel mix remains heavily dominated by natural gas (43.4 per cent), followed by furnace oil (20.9 per cent) and coal (20.6 per cent), with a very small number of renewables (Table 2).

Table 2 Fuel-wise current installed capacity

Fuel type	Capacity (MW)	Per cent in fuel mix
Hydro	230	0.84
Gas	11,947	43.39
Furnace Oil	5,741	20.85
Diesel	626	2.27
Coal	5,683	20.64
Solar PV & Wind	762	2.77
Power Import	2,656	9.65
Total	**27,645**	**100**

Source: BPDB Key Statistics (April 2025).

Table 3 Year-wise fossil fuel-based plants to be phased out

Fuel Type	Up to 2030 (MW)	Up to 2035 (MW)	Up to 2040 (MW)
Coal	0	0	170
Gas	1428	581	2795
Diesel	0	0	230
Furnace Oil	415	3811	914
Total	**1843**	**4392**	**4109**

Source: BPDB.

Over the next two decades, Bangladesh plans to retire 10,344 MW of fossil fuel-based plants, primarily gas and furnace oil-based plants, by 2040 (Table 3). A detailed plant list with expiration dates is given in the Annexure (Anne Tables 1, 2 and 3).

Simultaneously, the generation system is expected to expand significantly, with 9,186 MW of new capacity projected to be added by 2030 (Table 4). This includes gas (3,173 MW), coal (2,491 MW), nuclear energy (2,400 MW), and renewable sources such as solar (320.77 MW) and wind (57 MW), alongside an increase in power imports (540 MW).

Table 4 Plants to be added up to 2030 as per their commission date

Fuel Type	Up to 2030 (MW)
Coal	2,491
Gas	3,173
HSD	162
Solar	321
Wind	57
Hydro	0
Biomass	43
Nuclear	2,400
Import (fossil + hydro)	540
Total	**9,187**

Source: BPDB Monthly Report (April 2025).

6

Electricity Demand: Projections up to 2040

Accurate electricity demand projection is fundamental for strategic planning and developing power systems. It ensures that investments in generation, transmission, and distribution infrastructure are optimised to meet future needs whilst avoiding both overcapacity and undercapacity (Chattopadhyay, 2011). Overestimation of demand can lead to stranded assets and increased financial burdens on utilities and governments, whilst underestimation risks supply shortages, reliability issues, and suppressed economic growth (Bhattacharyya, 2011). Long-term demand forecasts also play a critical role in aligning energy policies with broader objectives such as sustainable development, decarbonisation, and energy security (International Energy Agency, 2018).

In the context of renewable energy transition, demand projection becomes even more crucial as it affects the scale and type of renewable investments needed to meet national targets (Pfenninger et al., 2014) (Pfenninger et al., 2014). Bangladesh has a handful of policy documents that have shed light on electricity demand. This study will primarily focus on the Renewable Energy Policy 2025, Integrated Energy and Power Master Plan (IEPMP) 2023, and the Mujib Climate Prosperity Plan (MCPP) 2022–2041, given their comprehensive scope and strategic importance for Bangladesh's energy transition.

6.1. Projections According to the Mujib Climate Prosperity Plan (MCPP), Integrated Energy and Power Master Plan (IEPMP), and Renewable Energy Policy (draft) 2025

The Mujib Climate Prosperity Plan (MCPP) sets a clear and substantial renewable target, provides an ambitious framework for transforming Bangladesh's energy system into a more resilient and sustainable model. The plan sets clear renewable energy targets as shown in Table 5. According to the MCPP, Bangladesh aims to meet 30 per cent of its electricity generation needs from renewable sources by 2030, rising to 40 per cent by 2041 (Table 5). The plan emphasises expanding solar, wind, and other renewable energy sources, alongside strengthening energy efficiency and decentralisation measures. It aligns with a vision of controlled, sustainable energy growth that would require large-scale mobilisation of private and public sector investment towards renewable technologies. However, in terms of electricity demand, the MCPP does not directly specify any quantifiable demand forecasts for the following years.

Table 5 Renewable energy target in the Mujib Climate Prosperity Plan (MCPP)

Year	Renewable Energy Target (per cent)
2030	30%
2041	40%

Source: Mujib Climate Prosperity Plan (MCPP).

On the other hand, the Integrated Energy and Power Master Plan (2023) provide a long-term roadmap for Bangladesh's energy sector, incorporating targets for renewable energy development and overall electricity demand growth. Specifically, as per the IEPMP, by 2041, Bangladesh is projected to require a generation capacity of 58,680 MW (with 25 per cent reserve margin), and 40 per cent of this, approximately 24 GW, is expected to be met through 'clean energy' sources (Table 6).

Table 6 Electricity demand projections as per Integrated Energy and Power Master Plan (IEPMP)

Year	Power Demand (TWh)	Average Demand (MW)	With 25 per cent Reserve Margin (MW)
2030	206.1	23,534	29,418
2041	411.1	46,944	58,680
2050	673.7	76,905	96,131

Source: Authors' calculation based on IEPMP.

However, there are two fundamental issues with the projections and methods adapted in the IEPMP. The first concern relates to the inflated electricity demand forecasts. The methodology used in estimating the demand for clean energy (58 GW by 2041) introduces preferential biases, making it unrealistic to meet the target of generating 40 per cent of power demand from renewable energy sources and could lead to overcapacity, inefficient investment allocation, and significant financial strain on the energy sector.

The second critical issue concerns the definition and categorisation of 'clean energy' within the IEPMP. The Plan adopts a broad interpretation of clean energy, encompassing not only renewable sources like solar, wind, hydro, and biomass but also technologies such as nuclear power, natural gas-based generation with carbon capture and storage (CCS), hydrogen production, and ammonia co-firing. As a result, under the Plan, the target of 40 per cent clean energy by 2041 (24 GW) would be achieved with only 9 per cent from traditional renewable energy (5,280 MW), whilst the remaining 18,720 MW would rely on nuclear and advanced technologies such as CCS, hydrogen, and ammonia.

Furthermore, the plan places significant emphasis on the extraction and production of domestic coal over imports, reflecting a 'coal transition' approach than a shift to cleaner energy alternatives.

Lastly, the Renewable Energy Policy 2025 outlines Bangladesh's updated targets for renewable energy integration in the national power system. It aims to generate 20 per cent of electricity from renewable sources by 2030, and to reach 30 per cent by 2040 (Table 7).

Table 7 Renewable energy target in the draft renewable energy policy 2025

Year	argeted renewable energy share (per cent)
2030	20%
2040	30%

Source: Renewable Energy Policy 2025.

The Renewable Energy Policy 2025 has been selected as the reference point for renewable energy target in the calculation of this study over other existing policy documents due to its most recent timeline and updated targets that represent more realistic approaches.

6.2. Demand Projections by Centre for Policy Dialogue (CPD)

6.2.1. Assumptions Considered

To estimate the demand and the scale of investment required for renewable energy development in Bangladesh, this study adopts some key planning parameters. The analysis considers several critical assumptions on variables such as projected electricity demand, renewable energy targets in the fuel mix, reserve margins, and the capacity factors of power plants. Together, these variables enable the calculation of total installed capacity needed and, by extension, the necessary investment to achieve the targets.

a. **Demand Projections:** The study utilises long-term energy demand forecasts based on the study 'The Future Unplugged: Forecasting a Comprehensive Energy Demand of Bangladesh - a Long Run Error Correction Model'.

b. **Reserve Margin:** A reserve margin of 25 per cent same suggested by the IEPMP is assumed to maintain reliability and accommodate fluctuations in demand and potential generation shortfalls. In another word, this reserve margin will accommodate the seasonal surge in demand/peak demand. This margin exceeds the typical international benchmark of 15–20 per cent (Chris Trimble, 2016) (World Bank, 2017; NERC, 2023). However, the study finds that it accounts for the additional variability introduced by higher renewable energy penetration, and the methodological choice of using average demand instead of peak demand.

c. **Capacity Factor of Plants:** To estimate the required installed capacity, the study assumes a capacity factor of 25 per cent 0.25 for renewable energy-based power plants and 61 percent for fossil fuel-based plants. These assumptions are grounded in the findings of (Natanael Bolson et al., 2022) Bolson et al. (2022), who present comparative global data on capacity factors across major power generation technologies. According to their study, the capacity factors for biomass, hydro, solar, and wind power plants in Bangladesh are 0.15, 0.46, 0.15, and 0.21, respectively. To simplify and standardise calculations, the study employs the arithmetic mean of these four values, 0.25, as the representative capacity factor for renewable energy technologies.

d. **Renewable Energy Targets:** Whilst the Mujib Climate Prosperity Plan (MCPP) and IPEMP sets a long-term goal of achieving 40 per cent clean energy in electricity generation by 2041, the recently proposed Renewable Energy Policy 2025 sets a more specific target of 30 per cent electricity generation from renewable sources by 2040, with an interim target of 20 per cent by 2030. To calculate the required fuel mix and investment, the present study will focus on the target set by the Renewable Energy Policy 2025 and will introduce an interim milestone for 2035.

e. **Setting up a Target for 2035:** To establish a realistic interim target for renewable electricity generation in Bangladesh by 2035, three standard modeling approaches commonly used in energy planning and transition literature—linear, exponential, and logistic (S-curve) models were reviewed. Each provides a different lens to estimate progress between the government's declared goals of generating 20 per cent of electricity from renewable sources by 2030 and 30 per cent by 2040. The study considers the exponential growth model. The exponential growth model captures accelerating change, accommodating technology diffusion where costs drop and deployment scales up quickly. Its formula is:

$$P(t) = P_0 \times e^{[r \times (t - t_0)]}$$; where the growth rate r is calculated using:

$$r = \ln(P_x / P_0) / (t_x - t_0)$$

Plug in the values in the model,

$$r = (1 / 10) \times \ln(30 \text{ per cent} / 20 \text{ per cent}) = (1 / 10) \times \ln(1.5) \approx (1 / 10) \times 0.4055 = 0.04055$$

$$P(2035) = 20 \text{ per cent} \times e^{(0.04055 \times 5)} \approx 20 \text{ per cent} \times e^{(0.20275)} \approx 20 \text{ per cent} \times 1.2246 \approx$$

24.5 per cent

Therefore, based on this model, the paper assumes a renewable electricity generation target of 24.5 per cent for the year 2035.

Finally, the study will provide investment estimates based on projected electricity demand and evaluate the required installed generation capacity to meet that demand, considering the plant (capacity) factors of different technologies. Adopting this approach ensures a more realistic and technically grounded estimation of infrastructural needs, particularly given the variability in generation efficiency between renewable and thermal power sources.

6.2.2. Electricity Demand Calculation

CPD, in one of its working papers titled 'The Future Unplugged: Forecasting a Comprehensive Energy Demand of Bangladesh', presents a detailed projection of Bangladesh's energy demand up to 2040. Utilising a Vector Error Correction Model (VECM) that incorporates variables such as GDP growth, population dynamics, energy prices, and CO_2 emissions, CPD offers an alternative forecast to existing national plans as shown in Table 8.

Table 8 **On-grid and off-grid electricity demand projections as per CPD study**

Year	On-grid electricity			Captive power	Off-grid	Total Projected Demand (on grid and off grid)
	Power Demand (TWh)	Average Demand (MW)	Peak Demand (MW) With 25 per cent Reserve Margin	From captive power (MW)	From off-grid RE (MW)	
2030	136	15,478	19,348	2,800	554	**22,702**
2035	161	18,338	22,923	2,800	554	**26,277**
2040	185	21,125	26,407	2,800	554	**29,761**

Source: Author's Calculation Based on Moazzem & Quaiyyum (2024).

Although average electricity demand can be estimated using standard modeling techniques, such estimates do not fully capture the country's total electricity requirements, as they neither reflect peak demand nor account for electricity generated through captive power and off-grid renewable energy sources. In Bangladesh, captive power generation initially emerged as an industrial response to frequent load-shedding and unreliable grid electricity. Its use expanded rapidly in the 2000s, particularly among industries seeking dependable and cost-effective energy solutions through gas-fired captive plants. By the 2010s, captive power had become a structural component of the industrial energy mix, largely due to the widespread availability of low-cost natural gas. Currently, the industrial sector produces approximately 2,800 megawatts (MW) of electricity independently from the grid, consuming around 100 million cubic feet of gas per day (Rahman, 2024) (BPDB, 2025; IEEFA, 2024).

To develop a more accurate projection of total electricity demand, it is essential to incorporate three additional components: peak demand, captive power, and off-grid renewable energy consumption. In line with the established assumptions, peak demand is addressed by applying a 25 per cent reserve margin to accommodate seasonal surges and ensure grid reliability. However, as both captive power generation and off-grid renewable energy have shown little or no significant growth over the projection period, their contributions have been treated as constant across the forecasted years (Table 8).

After all the adjustments, incorporating the 25 per cent reserve margin for peak demand, and adding the fixed contributions from captive power generation and off-grid renewable energy, the total electricity demand projected by CPD stands at **22,702 MW in 2030, 26,277 MW in 2035, and 29,761 MW in 2040**.

7

Required Installed Capacity to Meet Target

7.1. Renewable Requirements

Building on the interim demand projections discussed in the previous section, this analysis estimates the installed generation capacity required to achieve Bangladesh's renewable energy targets. Specifically, reaching a 30 per cent share of renewable energy in the national electricity mix by 2040. These calculations incorporate total projected demand figures (including a 25 per cent reserve margin), plant factors for renewables, and the targeted share of electricity to be supplied from renewable sources (Table 9).

Table 9 Required generation capacity to fulfil 30 per cent by 2040 renewable target

Year	Total projected demand (on grid and off grid)	Expected share of renewable electricity (per cent)	Expected electricity demand from renewables in MW (calculated)	Required renewable capacity (plant factor 0.25)
2030	22,702	**20**	4,540	***18,162***
2035	26,277	**24.5**	6,438	***25,751***
2040	29,761	**30**	8,928	***35,713***

Source: Authors' calculations.

In 2030, the total projected electricity demand, comprising both on-grid and off-grid consumption, is estimated at 22,702 MW. Achieving a 20 per cent share of this demand through renewable energy implies that approximately 4,540 MW must be supplied by renewables. Given an assumed plant factor of 0.25 for renewable technologies, the country would need to install around 18,162 MW of renewable energy capacity.

Similarly, by 2035, electricity demand is expected to rise to 26,277 MW. With a target of 24.5 per cent renewable energy, around 6,438 MW must be supplied from renewable sources. This would require an installed renewable capacity of approximately 25,751 MW, again assuming a plant factor of 0.25.

Lastly, in 2040, total electricity demand is projected to reach 29,761 MW. To meet the 30 per cent renewable energy target, about 8,928 MW of this demand must come from renewable sources. This would necessitate an installed renewable generation capacity of 35,713 MW, maintaining the same plant factor assumption.

These calculations capture an important issue that the relatively low-capacity factor associated with renewable technologies implies a much larger installed capacity is needed to deliver a specific share of energy compared to thermal sources.

7.2. Fossil Fuel Requirements

Table 10 below estimates the required installed capacity for fossil fuels in 2030, 2035, and 2040. The projections are derived based on the assumed share of fossil fuels in the overall electricity generation mix and an average plant capacity factor of 0.61, which reflects the typical efficiency of fossil-based generation systems.

Table 10 Required fossil fuel capacity to meet demand [in MW]

Year	Total projected demand (on grid and off grid)	Expected share of fossil fuel-based electricity (per cent)	Expected electricity demand from fossil fuel-based electricity in MW (calculated)	Required fossil fuel-based electricity capacity (plant factor 0.61)
2030	22,702	**80.0**	18,162	***29,773***
2035	26,277	**75.5**	19,839	***32,523***
2040	29,761	**70.0**	20,832	***34,152***

Source: Authors' calculations.

In 2030, the total projected electricity demand is 22,702 MW. With an assumed 80 per cent of electricity to be supplied from fossil fuels, this translates into 18,162 MW of demand attributable to fossil-based sources. Given the plant factor of 0.61, the country would require approximately 29,773 MW of installed fossil fuel capacity to meet this demand reliably. By 2035, the total projected demand rises to 26,277 MW, with a reduced fossil fuel share of 75.5 per cent, equating to 19,839 MW of fossil-based electricity demand. This would necessitate an installed fossil fuel capacity of approximately 32,523 MW. Lastly, in 2040, with the total demand reaching 29,761 MW and a further decline in fossil fuel dependency to 70 per cent, the fossil-based demand would be 20,832 MW. To meet this level of demand, the installed fossil fuel capacity must reach approximately 34,152 MW.

8

Fuel Mix Scenario in 2030, 2035 and 2040

8.1. Energy Accounting for 2030, 2035 and 2040

This section provides a comparison between the required generation capacity, the total existing and planned capacity, and the additional capacity needed for both fossil and renewable energy sources for the years 2030, 2035, and 2040 (Table 11). For fossil fuels, the required capacities are projected to be 29,773 MW in 2030, 32,523 MW in 2035, and 34,152 MW in 2040. In contrast, the total existing and planned fossil capacity is expected to decline over time, from 36,336 MW in 2030 to 27,835 MW in 2040, if the phase-out plans are followed. In the initial years, there will be a surplus of 6,563 MW in 2030 but shortfalls of 579 MW in 2035 and 6,317 MW in 2040.

Based on CPD calculation, the required capacities from renewable will rise sharply from 18,162 MW in 2030 to 35,713 MW in 2040 (Table 11). However, the total existing and planned renewable capacity is kept constant at 1,967.36 MW across all years due to the absence of any long-term plan of RE-based plants available. The gaps between required versus existing and planned are substantial: 16,194.64 MW in 2030, 23,783.64 MW in 2035, and 33,745.64 MW in 2040. This highlights the significant need for new renewable capacity additions to meet future energy demand.

Table 11 **Year-wise capacity mismatch [in MW]**

Fuel Type	2030	2035	2040
Required Capacity			
Fossil	29,773	32,523	34,152
Renewable	18,162	25,751	35,713
Total Existing and Planned Generation Capacity			
Fossil	36,336	31,944	27,835
Renewable	19,67.36	1,967.36	1967.36
Addition Required			
Fossil	-6563	579	6,317
Renewable	16,194.64	23,783.64	33,745.64

Source: Authors' calculation based on BPDB.

Considering this scenario, it becomes evident that the government will face a strategic trade-off between two policy commitments. On one hand, if the renewable energy targets are pursued as planned, the issue of overcapacity is likely to persist, particularly in the initial years, resulting in substantial capacity payments for underutilised fossil fuel-based plants. On the other hand, avoiding overcapacity would require either a downward revision of renewable energy targets or a renegotiation of existing contracts with fossil fuel-based power plants, both of which may undermine the country's long-term energy transition objectives.

8.2. Fossil-based Fuel Mix in 2030, 2035, and 2040 as per Plan

With the required installed capacity now determined, this section proceeds to calculate the fossil fuel-based power generation mix for the years 2030, 2035, and 2040 as per the current plan (Table 12). Based on the contract expiration dates of existing plants, it is possible to estimate the phase-out capacity of fossil fuel-based power plants across different periods. Information on newly planned additions up to 2030 is available in the Bangladesh Power Development Board (BPDB) annual report (BPDB, 2023-24). Assuming that the government will refrain from further expanding fossil fuel-based power generation capacity beyond what is currently planned, the following table presents the fuel mix scenario as per the current plan. A detailed, time-specific phase-out schedule is provided in the annex.

Table 12 Fossil-based fuel mix in 2025, 2030, and 2040 as per the plan [in MW]

Fuel Type	Status	2030	2035	2040
Coal	• Continuing	5,683	8,174	8,174
	• Phase out as per plan	-	-	170
	• Addition as per plan	2491	0	0
	Total	**8,174**	**8,174**	**8,004**
Gas (including LNG)	• Continuing	11,947	13,692	13,111
	• Phase out as per plan	1,428	581	2,795
	• Addition as per plan	3,173	-	-
	Total	**13,692**	**13,111**	**10,316**
HSD	• Continuing	626	788	788
	• Phase out as per plan	-	-	230
	• Addition as per plan	162	-	-
	Total	**788**	**788**	**558**
HFO	• Continuing	5,741	5,326	1,515
	• Phase out as per plan	415	3811	914
	• Addition as per plan	-	-	-
	Total	**5,326**	**1,515**	**601**
Nuclear	• Continuing	-	2,400	2,400
	• Phase out as per plan	-	-	-
	• Addition as per plan	2,400	-	-
	Total	**2,400**	**2,400**	**2,400**
Import as per the existing plan	• Continuing	2,656	3,156	3,156
	• Addition as per plan	500	-	-
	Total	**3,156**	**3,156**	**3,156**
Captive Power		2,800	2,800	2,800
Total Planned Installed Capacity (Fossil)		**36,336**	**31,944**	**27,835**

Source: Authors' calculation based on data provided by BPDB.

As per the existing plan, coal capacity is projected to increase from 5,683 MW in 2030 to 8,174 MW in 2035, before slightly declining to 8,004 MW by 2040 due to the planned phase-out of 170 MW. For gas (including LNG), total capacity starts at 13,692 MW in 2030, slightly decreases to 13,111 MW in 2035, and then falls to 10,316 MW by 2040, reflecting a cumulative phase-out of 2,795 MW. High-Speed Diesel (HSD) capacity remains at 788 MW in both 2030 and 2035 but drops to 558 MW in 2040 with a 230 MW phase-out, and no new additions after 2030. Heavy Fuel Oil (HFO) capacity reduces from 5,326 MW in 2030 to 1,515 MW in 2035 and further down to 601 MW by 2040, indicating a major planned phase-out of this fuel type. In contrast, nuclear power enters the mix with 2,400 MW added in 2030 and retained through 2040. Additionally, electricity imports rise from 2,656MW to 3156MW in 2030 and remain steady through 2040, supported by a planned addition of 500 MW in 2030. Captive power generation is assumed to remain constant at 2,800 MW across all years. As a result, the total planned installed fossil fuel-based capacity declines from 36,336 MW in 2030 to 27,835 MW by 2040 (Table 12).

8.3. Recommended Renewable Energy-based Fuel Mix in 2030, 2035, and 2040

Table 13 presents the total volume of electricity that must be generated from various renewable energy sources to meet the target of 30 per cent renewable energy in the fuel mix by 2040. Achieving this goal will require the government to install additional solar and wind power plants in locations identified as having high generation potential. In support of this, several assessments have been carried out to evaluate the availability and feasibility of renewable energy sources, aligned with the objectives set in the Renewable Energy Policy 2025, Mujib Climate Prosperity Plan (MCPP) and the Integrated Energy and Power Master Plan (IEPMP). The MCPP sets specific targets, including the generation of 4,000 MW of wind power from the mangrove green belt and 2,000 MW of solar power from installations on government buildings. The government also intends to explore offshore wind resources, expand domestic energy storage capacity, and utilise tidal power potential from the Bay of Bengal. The figures in Table 13 are sourced from the study titled 'Achieving the Target of Renewable Energy based Power Generation by 2041: Scopes and Way-forward' (Moazzem and Shibly, 2024) and have been adjusted to reflect the requirements

Table 13 Fossil-based fuel mix in 2025, 2030, and 2040 as per the plan [in MW]

Fuel Type	Status	2030	2035	2041
Solar	• Continuing	702	6,332.43	12,023.91
	• Planned Addition	320.77		
	• Required Addition	5,309.66	5,691.48	5,205.27
	Total	**6,332.43**	**12,023.91**	**17,229.17**
Wind	• Continuing	60	4,520.1687	9,508.75
	• Planned Addition	57		
	• Required Addition	4,460.17	4,988.58	4,116.37
	Total	**4,520.17**	**9,508.75**	**13,625.11**
Hydro	• Continuing	230	1,504.87	2,489.51
	• Planned Addition	0		
	• Required Addition	1,274.87	984.64	1,077.56
	Total	**1,504.87**	**2,489.51**	**3,567.07**
Biogas	• Continuing	0.69	4.48	7.38
	• Required Addition	2.5	2.9	3
	Total	**4.48**	**7.38**	**10.38**

Table 13 contd.

Table 13 contd.

Fuel Type	Status	2030	2035	2041
Biomass	• Continuing	0.4	42.9	44.6
	• Planned Addition	42.5	1.7	1.8
	Total	**42.9**	**44.6**	**46.4**
Off-Grid RE	0	**554**	**554**	**554**
Import	• Continuing	40	40	40
	• Required Addition	5,203.15	1,122.86	680.86
	Total	**5,243.15**	**1,162.86**	**720.86**
Total	T	**18,202**	**25,791**	**35,753**

Source: Authors' analysis based on data from BPDB and SREDA.

To achieve the target of sourcing 30 per cent of electricity from renewable energy by 2040, Bangladesh must significantly scale up its renewable energy capacity across three key sources: solar, wind, and hydro, whilst making small contributions from biogas and biomass. As outlined in Table 14, the required total renewable energy-based electricity generation capacity stands at 18,202 MW by 2030, 25,791 MW by 2035, and 35,753 MW by 2040. Solar energy remains the cornerstone of the RE mix, with total capacity required to reach 6,332 MW by 2030 and rise further to 17,229 MW by 2040. This includes additional required capacity of 5,310 MW in 2030, 5,691 MW in 2035, and 5,205 MW in 2040, indicating the critical need for continuous solar installations beyond what is currently operating or planned. Wind energy must also expand rapidly, growing from just 60 MW at present to 13,625 MW by 2040. The table shows that to meet this goal, the country must add approximately 4,460 MW by 2030, 4,989 MW by 2035, and 4,116 MW by 2040. For hydropower, total capacity needs to reach 3,567 MW by 2040, which includes mandatory additions of 1,275 MW in 2030, 985 MW in 2035, and 1,078 MW in 2040, on top of the existing 230 MW. Biogas, although modest in scale, must grow from less than 1 MW to 10.38 MW by 2040, with required additions of 2.5 MW, 2.9 MW, and 3 MW across the three milestone years. Biomass shows a relatively stable growth trajectory, reaching 46.4 MW by 2040, supported by continuing operations and a small number of planned additions (e.g., 42.5 MW by 2030). Despite these expansions, in earlier years, there might be a need to import a significant portion to meet the target. However, with ongoing expansions, the amount will subdue.

8.3.1. Renewable Energy Potential by Source

This section presents projected electricity generation targets from various renewable energy sources for 2030, 2035, and 2040. The figures are sourced from the SREDA database and have been adjusted to reflect capacity requirements.

The largest share is allocated to solar energy, which is expected to reach 17,229.08 MW by 2041, given Bangladesh's high solar potential and land availability (Table 14). Utility-scale solar parks and rooftop installations are prioritised, along with decentralised systems such as solar irrigation and mini-grids, which support rural electrification. Wind energy needs to scale up to 13,625.04 MW by 2040, capitalising on viable coastal and offshore wind zones. Hydropower is targeted to contribute 3,567.05 MW, constrained by Bangladesh's limited domestic hydro resources. Smaller but important contributions are expected from biogas (10.38 MW) and biomass (46.4 MW), supporting energy diversification and waste reduction efforts. In total, the renewable electricity capacity is expected to grow from 18,202 MW in 2030 to 35,753 MW by 2040, with import-based renewable electricity helping to supplement the shortfall during the transition period.

Table 14 Scaled renewable energy source contribution

Renewable energy source	Technology	2030 (MW)	2035 (MW)	2040 (MW)
Solar	Solar Park	4,742.11	6,843.90	10,299.92
	Rooftop Solar with & without NEM	890.16	2,857.51	4,300.51
	Solar Irrigation	290.51	492.09	740.69
	Solar Minigrid	32.36	54.73	82.62
	Solar Microgrid	0.00	0.00	0.00
	Solar Nanogrid	0.00	0.00	0.00
	Solar Charging Station	1.53	2.66	3.87
	Solar Street Light	95.41	161.52	243.02
	Solar powered Telecom BTS	44.88	76.00	114.57
	Solar Drinking Water System	0.46	0.89	1.29
Total Solar		6,332.43	12,023.91	17,229.17
All Wind Projects		4,520.17	9,508.75	13,625.11
All Hydro Projects		1,504.87	2,489.51	3,567.07
All Biogas projects		4.48	7.38	10.38
All Biomass projects		42.9	44.6	46.4
Off-Grid renewable energy		554.00	554.00	554.00
Import		5,243.15	1,162.86	720.86
Total		**18,202**	**25,791**	**35,753**

Source: Authors' analysis based on data from BPDB and SREDA.

However, despite the planned expansion of domestic renewable energy capacity, a gap is expected to remain between the forecasted electricity demand and the installed capacity in the initial years. To bridge this shortfall, Bangladesh will need to explore opportunities for regional power import, particularly from renewable energy sources in neighbouring countries. In the initial phase, this may involve importing a limited amount of electricity through existing cross-border transmission infrastructure, whilst gradually expanding bilateral and multilateral cooperation for larger-scale renewable energy trade. Such regional integration could include tapping into surplus solar and hydroelectric power from countries like India, Bhutan, and Nepal.

The following section will provide an estimation of the investment requirements associated with the implementation of the proposed renewable energy projects across different technologies.

9

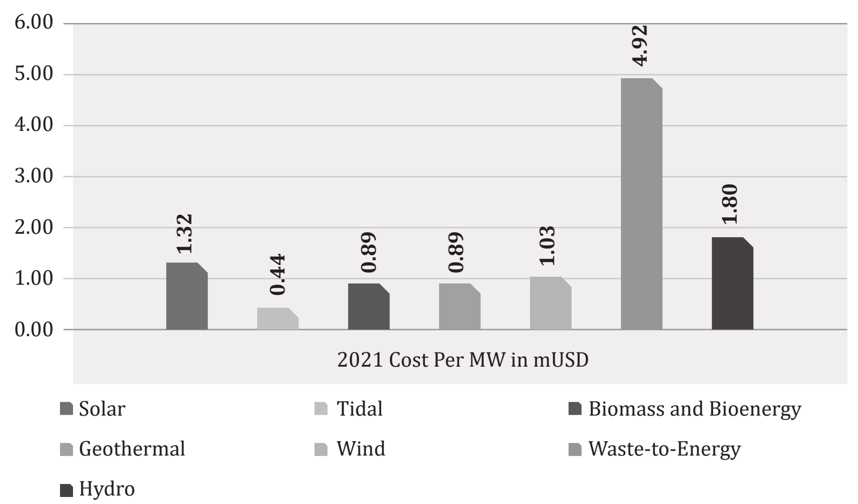
Investment Requirements Analysis for different years by Renewable sources

9.1. Cost trend for different years by renewable sources in MW scale (2021-2040)

Figure 2 presents the cost per megawatt (MW) for various renewable energy sources in Bangladesh, based on recalculated figures that incorporate technology-specific cost reductions. The initial per MW costs are obtained from (Alam et al., 2021), whilst projected declines up to 2030, 2035, and 2040 follow decreasing trends identified in GIZ (Synwoldt and Reis, 2011) and BloombergNEF (BloombergNEF, 2025) studies. Unlike inflation-based escalation, these models assume a realistic market-driven cost decline, particularly for solar and wind technologies, reflecting global cost competitiveness and learning curve effects.

The 2021 baseline cost per MW, when converted to USD using the April 2025 exchange rate (1 USD = BDT 122), shows notable variation across technologies. Solar PV, the most prominent RE source in Bangladesh, cost approximately USD 1.32 million per MW in 2021, whilst wind stood at around USD 1.03 million per MW. Biomass and geothermal were priced similarly at USD 0.89 million, and tidal energy cost about USD 0.44 million per MW. Waste-to-energy and hydropower were among the most capital-intensive options, costing approximately USD 4.92 million and USD 1.80 million per MW respectively. These initial values offer a comparative foundation to assess the impact of projected cost declines on future investment needs.

Figure 2 **Power plant cost per MW for different renewable energy sources in 2021 (**in million USD**)**



Source: Alam, 2021.

Table 15 illustrates the adjusted cost per MW in million USD terms for the years 2030, 2035, and 2040. These projections incorporate the global cost-reduction trajectories and market efficiencies associated with RE technology.

Table 15 Adjusted power plant cost per MW for different renewable energy sources

Source	Per MW cost				
	2021	2030		2035	2040
	Million BDT	Million BDT	Million USD	Million USD	Million USD
Solar	160.8	128.6	1.05	1.00	0.95
Waste	4.6	4.6	0.04	0.04	0.04
Tidal	53.2	53.2	0.44	0.04	0.04
Biomass and Bioenergy	108.9	108.9	0.89	0.89	0.89
Geothermal	108.9	108.9	0.89	0.89	0.89
Wind	125.4	119.2	0.98	0.93	0.88
Waste-to-Energy	600	600	4.92	4.92	4.92
Hydro	220	220	1.80	1.80	1.80

Source: Authors' analysis based on literature.

The analysis shows a consistent decline in solar and wind costs, whilst biomass and waste-to-energy maintain relatively stable or marginally reduced costs. This declining cost structure is informed by two landmark studies. The report titled 'Cost Trends of Renewable Energy Technologies for Power Generation' (Reis, 2011) provides electricity production cost trends up to 2030, indicating a 16.67 per cent decrease in photovoltaic (PV) costs, 26.67 per cent decrease for Concentrated Solar Power (CSP) with storage, 2.22 per cent decrease for onshore wind, and 9.09 per cent decrease for offshore wind compared to 2021 prices. Beyond 2030, insights from 'Global Cost of Renewables to Continue Falling in 2025 as China Extends Manufacturing Lead' (BloombergNEF, 2025) by BloombergNEF suggest a 5 per cent cost decline every five years for major renewable energy technologies. These global trajectories have been used as the basis for projecting the per MW investment cost of renewable energy technologies in Bangladesh for 2030, 2035, and 2040.

Building on these projections, the study calculates the technology-specific cost reductions for key renewable energy sources in Bangladesh between 2021 (Figure 2) and 2040, expressed in million USD. For solar PV, the cost per MW is projected to decline from USD 1.32 million in 2021 to USD 1.05 million in 2030, and further to USD 1.00 million in 2035 and USD 0.95 million in 2040.[3] Similarly, wind energy shows a downward trend from USD 1.03 million in 2021 to USD 0.98 million in 2030, USD 0.93 million in 2035, and USD 0.88 million in 2040. Costs for biomass, bioenergy, and geothermal remain relatively stable at USD 0.89 million per MW throughout the projection period. Tidal energy, initially estimated at USD 0.44 million per MW in 2030, is projected to drop to USD 0.04 million in both 2035 and 2040 due to technological maturity and reduced application scope. In contrast, waste-to-energy stands out as the most expensive option, maintaining a cost

3 However, based on KIIs and secondary literature (Md. Nayeem Hasan Mallick, 2024), rooftop solar systems costs in Bangladesh are estimated at USD 0.65m/MW, with a projected 5 per cent decline every five years falling to USD 0.62m (2030), USD 0.59m (2035), and USD 0.56m (2040). For investment calculations, utility-scale costs are considered since rooftop contribution remains comparatively lower.

of USD 4.92 million per MW through 2030, 2035, and 2040. Hydropower remains fixed at USD 1.80 million per MW across all the years. These cost projections derived from global trend analyses, serve as the foundation for estimating investment requirements for renewable energy expansion in Bangladesh and underscore the urgency of prioritising solar and wind investments to leverage falling technology costs.

Accordingly, the current study adopts this declining trend-based model to generate cost-adjusted investment estimates for solar, wind, hydro, biomass, and other renewable energy technologies. This approach offers a more grounded assessment of investment needs compared to inflation-based models, which may overestimate future costs. It also underscores the strategic importance of early, large-scale investment in solar and wind, where learning curve effects and technological diffusion offer significant cost savings. In contrast, waste-to-energy and hydropower, whilst essential for fuel mix diversification, will likely require selective prioritisation, concessional finance, and project-level tailoring to ensure cost-efficiency.

9.2. Investment requirements for different years by renewable sources in MW scale

Tables 16 and 17 below show a period-wise investment prediction required for establishing various kinds of renewable energy systems in Bangladesh for the years 2030, 2035, and 2040. Technology-specific cost reductions and the anticipated renewable energy capacity contribution from several sources form the basis of the investment projections.

Solar energy, the clear leader in Bangladesh's renewable mix, is key in this transition. Solar is predicted to draw the biggest proportion of investment USD 5.9 billion by 2030, USD 5.7 billion between 2031-2035, and USD 4.9 billion between 2036 and 2040 due to abundant sunlight and rapidly increasing demands. This increasing trend put emphasis not only on capacity development but also on national will to maximise distributed renewable energy.

Table 16 **Period-wise requirement of additional renewable energy-based electricity generation capacity**

Renewable energy source	Between 2025-2030	Between 2031-2035	Between 2036-2040
Total Solar	**5,630.40**	**5,691.50**	**5,205.30**
All Wind Projects	4,460.17	4,988.58	4,116.36
All Hydro Projects	1,274.87	984.64	1,077.56
All Biogas projects	3.79	2.90	3.00
All Biomass projects	42.50	1.70	1.80
Off-Grid renewable energy	0	0	0
Import	***5,243.20***	***1,162.90***	***720.86***
Total	**16,654.90**	**12,832.20**	**11,124.80**

Source: Authors' Calculation based on Available Data.

Table 17 Period-wise investment requirement for renewable energy

Energy Source	Between 2025-2030	Between 2031-2035	Between 2036-2040
Solar	5,938.4	5,702.7	4,954.7
Wind	4,357.7	4,630.3	3,629.7
Hydro	2,299.9	1,772.4	1,939.6
Biogas	3.4	2.6	2.7
Biomass	38.0	1.5	1.6
Off-grid renewable energy	0	0	0
Import	5,530.0	1,165.1	686.2
Total (million USD)	**18,167.4**	**13,274.6**	**11,214.5**
Total (without import) (million USD)	**12,637.4**	**12,109.5**	**10,528.3**
Total (without import) (billion USD)	**12.6**	**12.1**	**10.5**

Source: Authors' Calculation based on Available Data.

Alongside the solar, wind energy begins to gather real momentum. With expanding interest in coastal and offshore wind corridors, investment in this sector is predicted at USD 4.4 billion by 2030, USD 4.6 billion between 2031 and 2035, and USD 3.6 billion between 2026-2040. These numbers imply a rising importance for wind in balancing power portfolios and enhancing grid resilience.

Flowing in unison is hydropower, a consistent yet essential addition to the renewable mix. Investments begin at USD 2.3 billion by 2030, USD 1.8 billion between 2031 and 2035, and USD 1.9 billion between 2036 and 2040. Hydro is projected to assist base-load generation and diversify renewable energy supply, whether derived from regional collaboration or domestic small-scale projects.

On a modest but vital level, biomass and biogas nevertheless hold their place, particularly in rural and agro-based economies. Biogas investment is expected to be USD 3.4 million by 2030, USD 2.6 billion between 2031 and 2035 and USD 2.7 million between 2036 and 2040; biomass-based investment would require USD 38 million by 2030, USD 1.5 million between 2031 and 2035 and USD 1.6 million between 2036 and 2040. Their consistent expansion points to a continuous drive towards distributed energy access and waste valorisation.

Since there is no off-grid based projection made by BPDB in future renewable energy-based power generation, no additional investment is estimated targeting off-grid based electricity. Meanwhile, waste-to-energy was not reported separately in this round of projections but is assumed to be part of biomass and urban renewable energy strategies.

One very noteworthy element is the distribution for 'Import/Additional Needs'. This category represents the dynamic nature of energy planning and includes anticipated costs for imported systems, unforeseen capacity expansion, or technological upgrades. Starting at USD 5.53 billion by 2030, it falls drastically to USD 1.2 billion between 2031 and 2035 and USD 686 million between 2036 and 2040, a likely indication of growing self-reliance, better foresight, or localisation of clean technologies.

Overall, to cater to the domestic need as well as to meet the long-term target of renewable energy-based power generation, Bangladesh needs a total investment within the range of USD 35.2 billion to USD 42.6 billion.[4] If we assume that regional energy trade would be carried out from the existing regional surplus of renewable energy-based electricity, then Bangladesh needs a domestic level investment of USD 35.2 billion. A major part of this investment will be required between 2025-2030 (USD 12.4 billion) and 2031-2035 (USD 12.1 billion) periods. These figures are not merely financial targets; they represent a strategic vision for a cleaner, more resilient Bangladesh powered by natural resources, shaped by innovation, and guided by thoughtful, forward-looking investment.

4 There are six key factors explaining why the CPD study projects higher investment requirements compared to the IEEFA study. Firstly, CPD uses an independent, research-based electricity demand forecast developed through the Vector Error Correction Model (VECM) rather than relying on IEPMP projections. Secondly, it adopts the Renewable Energy Policy 2025 targets of 20 per cent by 2030 and 30 per cent by 2040, which set a higher benchmark for renewable capacity needs. Thirdly, CPD disaggregates the energy mix across multiple technologies (solar, wind, biomass, waste-to-energy, etc.), rather than focusing mainly on solar and wind. Fourthly, it incorporates plant capacity factors, reserve margins, and output considerations, ensuring projections reflect realistic generation potential. Fifthly, this approach results in significantly higher projected RE capacity needs, 16,655 MW for 2025–2030 and 23,957 MW for 2031–2040, compared to IEEFA's IEPMP-based assumptions of 5,831 MW by 2030 and 16,506 MW by 2040. Finally, although per-MW investment estimates are broadly similar between the two studies, CPD's larger capacity requirement drives a higher total investment projection of USD 40.98 billion by 2040, versus IEEFA's USD 23–24 billion by 2040.

10

Suggestions and Recommendations

I. Set a Legally Binding and Unified Renewable Energy Target

To eliminate inconsistencies across policy instruments and address the growing mismatch between fossil overcapacity and insufficient renewable generation, Bangladesh must finalise and adopt a legally binding and unified renewable energy target, such as achieving a 30 per cent renewable energy share in electricity generation by 2040. This target should be consistently reflected in all strategic frameworks—including the Integrated Energy and Power Master Plan (IEPMP), Mujib Climate Prosperity Plan (MCPP), and the revised Renewable Energy Policy—to strengthen policy coherence, boost investor confidence, and enhance the country's credibility with development partners and climate financiers. At the same time, the IEPMP must be revised to reflect realistic demand projections and energy transition needs, incorporating a year-wise capacity addition and retirement schedule that aligns with renewable energy milestones of 20 per cent by 2030, 30 per cent by 2040, and beyond.

II. Develop a SMART Renewable Energy Roadmap

A SMART (Specific, Measurable, Achievable, Realistic, and Time-bound) roadmap is crucial for operationalising Bangladesh's renewable energy target. This roadmap should lay out technology-specific targets for 2030, 2035, and 2040, with detailed implementation pathways for solar, wind, hydro, and distributed energy systems. It must also address grid integration, RE forecasting, storage, and flexible generation planning, enabling regular monitoring, accountability, and timely course correction aligned with the national energy transition strategy. In addition, spatial mapping of renewable resource potential and grid integration feasibility should be incorporated to strategically guide project siting and transmission infrastructure upgrades. For instance, Vietnam's Power Development Plan-8 (PDP8) offers a best-practice example by integrating phased fossil fuel retirement with a renewable scale-up trajectory, helping to avoid stranded assets such as underutilised coal and gas plants that could otherwise lose economic value before the end of their expected lifespans. A similar approach in Bangladesh would send a strong policy signal to investors and development partners, bolstering confidence and encouraging long-term investment in the renewable energy sector.

III. Enhance Regional Cooperation for Renewable Energy-based Electricity Investment, Transmission and Distribution

To achieve renewable energy-based power generation within a short period of time especially between 2030 and 2035, government needs to enhance partnership with regional countries including India, Nepal and Bhutan for receiving electricity to be generated through renewable energy including hydro (Nepal and Bhutan), solar and wind (India) which Bangladesh will procure at market rate and will be transmitted using regional grids. Export-oriented companies may take the opportunity for such electricity markets through merchant power purchase agreements to comply with their decarbonisation targets for 2030 and 2050.

Bangladeshi investors could be encouraged to make investment in regional renewable energy market with the condition of transmitting the generated electricity in Bangladesh.

IV. Fossil Fuel Phase-Out Through Binding Mechanisms

The government should adopt a legally binding fossil fuel phase-out roadmap that is closely linked to renewable energy addition targets. This includes placing a moratorium on new fossil fuel plants beyond current contracts and prioritising the retirement of inefficient or underutilised plants by 2030–2035. Financial mechanisms such as carbon pricing and ***Just Energy Transition Funds*** can be used to support this transition.

V. Mobilise Multilateral and Climate Finance Through Targeted Engagement

Given the estimated investment requirement of USD 35.2 billion by 2040, Bangladesh must strategically engage with Multilateral Development Banks (MDBs) such as ADB, AIIB, World Bank, and Green Climate Fund. A dedicated Renewable Energy Investment Strategy should be developed to align national goals with the MDB financing windows, climate finance mechanisms, and blended finance tools. The MDBs can offer concessional loans, risk guarantees, and technical assistance to crowd-in private capital and de-risk large-scale infrastructure investments.

VI. Establish a Dedicated Renewable Energy Financing Facility

To streamline financing, Bangladesh should create a centralised Renewable Energy Financing Facility, either embedded within SREDA or in partnership with IDCOL. This facility should be designed to mobilise both domestic and international resources, providing low-interest loans, credit guarantees, and results-based financing, particularly in solar, wind, and waste-to-energy sectors. The facility should also enable co-financing arrangements with MDBs, enabling inclusive financing access for the small and medium enterprises (SMEs), cooperatives, and local entrepreneurs.

VII. Invest in Storage Infrastructure and Grid Modernisation

Bangladesh's transmission and distribution network must be upgraded to accommodate variable RE, especially as solar and wind deployment scales up. Priorities should include Battery storage systems, Digital monitoring tools, Smart grid technologies, also Distributed energy management systems. The MDB support should be sought for major infrastructure investments and regional grid interconnectivity to enhance resilience, cross-border trade, and renewable balancing.

VIII. Scale Up Distributed Renewable Energy Systems

Beyond grid-tied utility-scale projects, Bangladesh must scale up distributed RE solutions such as solar irrigation, rooftop solar (NEM and off-grid), microgrids, and electric vehicle (EV) charging stations. These systems are vital for enhancing energy access in rural and peri-urban regions. Policy measures should include expanding net-metering frameworks, provide concessional loans and subsidies and offer technical and financial support to SMEs and households. This will decentralise generation, reduce grid pressure, and build broader public ownership of the transition.

IX. Enhance Regulatory Clarity and Institutional Capacity

Strong regulatory oversight is essential for scaling renewable energy. Institutions such as SREDA, BPDB, and BERC must be equipped with technical expertise, operational independence, and policy continuity.

Regulatory actions such as tariff-setting, procurement approvals, and PPA enforcement must be transparent, timely, and consistent with global Environmental, Social, and Governance (ESG)and MDB compliance standards. This will build long-term market stability and investment readiness.

X. Create a National Renewable Energy Investment Forum

Bangladesh should establish a National Renewable Energy Investment and Partnership Forum, convened annually and led by the Power Division in collaboration with SREDA and Economic Relations Division (ERD). The forum should bring together MDBs, private developers, financiers, research institutes, and policymakers to: Track progress on investment pipelines, identify bottlenecks and reform needs, promote co-financing partnerships, and facilitate regional and global collaboration. This will institutionalise stakeholder dialogue and drive coordinated, timely action on Bangladesh's renewable energy transition.

11

Conclusion

At a turning point in its path of energy transformation, although national policies and planning materials have set high targets for renewable energy, real implementation on the ground has lagged. This analysis underlines that ensuring long-term energy security, economic resilience, and environmental sustainability depends on reaching a 30 per cent share of renewable energy in power generation by 2040. Not only possible but also necessary for only bold policy realignment, significant and consistent investment, and coordinated effort across institutions and sectors will help us to realise this aim, nevertheless.

The study indicates that the nation has to build about 35,753 MW of renewable energy capacity by 2040, which calls for overall USD 35.2 billion to USD 42.6 billion investment. With complementary contributions from hydropower, biomass, biogas, and waste-to-energy, solar and wind energy are likely to be front and centre in this change. Although this shift will not be without difficulties, particularly in terms of financing, infrastructure preparation, and policy execution, these can be surmounted with timely, focused, orderly interventions.

Future integration of all national energy policies and objectives under a single, legally enforceable renewable energy framework is vital. Not less significant are the modernisation of the electricity grid, the increase of distributed energy solutions, and improved institutional capacity to control RE integration. To overcome the investment gap, multilateral development banks and climate finance institutions have to be actively involved in mobilising concessional funds, technical support, and risk-reducing instruments.

Bangladesh's change to a renewable energy future must ultimately go from vision to reality. With the correct mix of policy consistency, strategic investment, and participatory governance, the year 2040 can become more than a target, it can represent a transforming milestone towards a cleaner, more egalitarian, and resilient energy system that benefits all populations.

References

Alam et al. (2021). Cost Analysis for the Renewable Energy Generation to meet the Energy Security in Bangladesh. *Journal of Alternative and Renewable Energy Sources, 7*(3).

Bhattacharyya, S. C. (2011). *Energy economics: Concepts, issues, markets and governance* (pp.121–145). Springer. https://doi.org/10.1007/978-0-85729-268-1

BloombergNEF. (2025). *Global Cost of Renewables to Continue Falling in 2025 as China Extends Manufacturing Lead*. Retrieved from https://about.bnef.com/insights/clean-energy/global-cost-of-renewables-to-continue-falling-in-2025-as-china-extends-manufacturing-lead-bloombergnef/

BPDB. (2025). *MISC Report*. Retrieved from https://misc.bpdb.gov.bd/power-generation-unit?: https://misc.bpdb.gov.bd/power-generation-unit?

BPDB. (2023-24). *Annual Report*. Retrieved from https://drive.google.com/file/d/1HIDtQmLmHL3EziZF8Rmezv3neEsLOUDn/view

Chris Trimble et al., (2016). *Financial Viability of Electricity Sectors in Sub-Saharan Africa*. Retrieved from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://documents1.worldbank.org/curated/en/182071470748085038/pdf/WPS7788.pdf

Chattopadhyay, D. (2011). Scale efficient network extension to support renewable generation development. *IEEE Transactions on Sustainable Energy*, *2*(2), 123–130. https://doi.org/10.1109/TSTE.2011.2108653

Hertern, L. M. v., and Schepers, L. J. Gunning. (2000). Targets as a tool in health policy: Part I: lessons learned. *Health Policy, 53*(1), 1-11. https://doi.org/10.1016/S0168-8510(00)00081-6

International Energy Agency. (2018). *World Energy Outlook 2018*. https://www.iea.org/reports/world-energy-outlook-2018

Rietbergen, MG., and Blok K. (2010). Setting SMART targets for indust rial energy use and industrial energy efficiency. *Energy Policy, 38*(8), 4339-4354. Retrieved from https://ideas.repec.org/a/eee/enepol/v38y2010i8p4339-4354.html

Moazzem, K. G. and Shibly, A. S. M. S. A. (2024). *Achieving the Target of Renewable Energy based Power Generation by 2041: Scopes and Way-forward*. Centre for Policy Dialogue (CPD). Retrieved from https://cpd.org.bd/resources/2024/08/Achieving-the-Target-of-Renewable-Energy-based-Power-Generation-by-2041-Scopes-and-Way-forward.pdf

Moazzem, K. G., and Quaiyyum, F. (2024) *The future unplugged: Forecasting a comprehensive energy demand of Bangladesh – A long-run error correction model* [Working paper]. Centre for Policy Dialogue (CPD). Retrived from:

https://cpd.org.bd/publication/the-future-unplugged-forecasting-a-comprehensive-energy-demand-of-bangladesh/

Mondal A. et al,. (2010). Assessment of renewable energy resources potential for electricity generation in Bangladesh. *Renewable and Sustainable Energy Reviews, 14*(8), 2401-2413. doi:https://ui.adsabs.harvard.edu/link_gateway/2010RSERv..14.2401M/doi:10.1016/j.rser.2010.05.006

Natanael Bolson et al. (2022). *Capacity factors for electrical power generation from renewable and nonrenewable sources*. PNAS. doi:https://doi.org/10.1073/pnas.2205429119

Pfenninger et al. (2014). Energy systems modeling for twenty-first century energy challenges. *Renewable and Sustainable Energy Reviews*, 74–86. doi:https://doi.org/10.1016/j.rser.2014.02.003

Synwoldt, C., and Reis, A. (2011). *Cost trends of Renewable Energy Technologies for the Power Generation*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Retrieved from https://energypedia.info/images/c/cc/Cost_Trends_of_Renewable_Energy_Technologies_for_the_Power_Generation.pdf

Sustainable and Renewable Energy Development Authority [SREDA]. (2023). *Renewable Energy Policy 2025* [Policy document]. Government of Bangladesh. https://sreda.gov.bd/site/notices/5b0fd377-c400-4a16-bfcd-16e23a3e48cb/নব্যায়নযোগ্য-জ্বালানি-নীতিমালা-২০২৩

Rahman, A. (2024, December 05). Reliance on captive power weakens PDB. *The Daily Star*. Retrieved from https://www.thedailystar.net/business/news/reliance-captive-power-weakens-pdb-3768671

Toby Couture, G. K. (2015). *Setting Renewable Energy Targets*. IRENA. Retrieved from https://www.researchgate.net/publication/322420240_Setting_Renewable_Energy_Targets

Annexure

Annex Table 1 **Power plants to be phased out by 2030**

Plant Name	Ownership	Fuel Type	Retirement Date	Capacity (MW)
Ashuganj 50 MW Engine (APSCL)	Public	Gas	29-04-2026	45
Ghorashal PP Unit-5	Public	Gas	14-06-2027	175
Meghnaghat Power Lrd. (MPL) 450 MW PP	Private	Gas	16-08-2026	450
Summit_Chandina_2nd Phase(REB)	Private	Gas	14-11-2026	14
Summit_Madubdi_2nd Phase(REB)	Private	Gas	15-12-2026	24
Summit_Ashulia_2nd Phase(REB)	Private	Gas	3-12-2027	34
Tongi 105 MW PP (BPDB SBU)	Public	Gas	29-11-2028	105
Shahjahanullah Power Com. Ltd. (REB, Merchant)	Private	Gas	31-10-2028	25
Ashuganj 51 MW IPP (Midland)	Private	Gas	6-12-2028	51
Baraka-Potenga 50 MW PP	Private	HFO	3-05-2029	50
Natore, Rajshahi 50 MW PP (Raj Lanka)	Private	HFO	23-01-2029	52
Gagnagar 102 MW PP (Digital Power)	Private	HFO	8-06-2029	102
RPCL (Mymensingh) 210 MW	Private	Gas	18-07-2029	202
Ghorashal 108 MW IPP (Regent Power)	Private	Gas	15-07-2029	108
Ashuganj 195 MW Modular PP (United)	Private	Gas	7-05-2030	195
Katpotti, Munshiganj 50 MW (Sinha peoples)	Private	HFO	19-02-2030	51
Jangalia, Cumilla 52 MW (Lakdhanavi Bangla)	Private	HFO	27-12-2029	52
Potiya, Chattogram 108 MW (ECPV)	Private	HFO	13-01-2030	108
Total planned phasing out capacity (by 2030)				**1,843**

Source: BPDB, 2025.

Annex Table 2 **Power plants to be phased out by 2030**

Plant Name	Ownership	Fuel Type	Retirement Date	Capacity (MW)
Modonganj 55 MW PP (Summit)	Private	HFO	28-02-2031	55
Nababganj 55 MW PP (Southern)	Private	HFO	16-06-2031	55
Barishal 110 MW PP (Summit)	Private	HFO	4-04-2031	110
Baghabari 71 MW GT	Public	Gas	29-11-2031	69
Baghabari 100 MW GTPP (BPDB SBU)	Public	Gas	29-11-2031	97
Manikganj 55 MW PP (Northern)	Private	HFO	16-08-2031	55
Jamalpur 95 MW PP (Power Pac)	Private	HFO	28-11-2031	95
Bosila 108 MW PP (CLC)	Private	HFO	21-02-2032	108
Raozan 25 MW PP (RPCL)	Public	HFO	2-05-2033	26
Gazipur 52 MW PP (RPCL)	Public	HFO	6-07-2032	52
Kamalaghat 54 MW PP (Banco Energy)	Private	HFO	21-11-2032	54
Mymenshingh 200 MW PP (United)	Private	HFO	15-06-2033	200
Kodda, Gazipur 300 MW PP (Summit) (U-2)	Private	HFO	9-05-2033	300
Shiddhirganj 2x120 MW GTPP (EGCB)	Public	Gas	4-02-2034	210
Gazipur 100 MW PP (RPCL)	Public	HFO	24-05-2034	105
Madhumati, Bagerhat 100 MW PP (NWPGCL)	Public	HFO	16-04-2034	105
Julda, Chattogram 100 MW PP (Bangla Track) (U-3)	Private	HFO	8-11-2033	100
Shikalbaha 105 MW PP (Baraka-Royal Homes)	Private	HFO	24-05-2034	105
Jamalpur 115 MW PP (United)	Private	HFO	20-02-2034	115
Kodda, Gazipur 149 MW PP (Summit) (U-1)	Private	HFO	11-07-2033	149
Ashuganj 150 MW PP (Midland)	Private	HFO	26-11-2033	150
Chandpur 200 MW PP (Desh Energy)	Private	HFO	8-11-2033	200
Rupsha, Khulna 105 MW PP (Orion)	Private	HFO	13-10-2033	105
Bogura 113 MW PP (Unit-2) (Confidence)	Private	HFO	29-03-2034	113
Anowara, Chattogram 300 MW PP (United Enterprise)	Private	HFO	21-06-2034	300
Shiddhirganj 210 MW PP (BPDB SBU)	Public	Gas	29-11-2034	115
Potia, Chattogram 54 MW PP (Zodiac Power)	Private	HFO	30-08-2034	54
Julda, Chattogram 100 MW PP (Acorn Infra) (U-2)	Private	HFO	19-03-2035	100

Annex Table 2 contd.

Annex Table 2 contd.

Plant Name	Ownership	Fuel Type	Retirement Date	Capacity (MW)
Meghnaghat 104 MW PP (OPSL)	Private	HFO	29-06-2035	104
Shikalbaha 110 MW PP (Kornofuli Power)	Private	HFO	11-08-2034	110
Chowmuhoni, Noakhali 113 MW PP (HF Power)	Private	HFO	30-12-2034	113
Feni 114 MW PP (Lakdhanavi)	Private	HFO	23-11-2034	114
Bogura 100 MW PP (Unit-1) (Confidence)	Private	HFO	16-11-2034	113
Rangpur 113 MW PP (Confidence)	Private	HFO	19-08-2034	113
Fenchuganj 104 MW CCPP (Unit-2) (BPDB SBU)	Public	Gas	29-11-2035	90
Kodda Gazipur 149 MW (B-R Powergen)	Public	HFO	15-08-2035	149
Tangail 22 MW PP (TPPGL)	Private	HFO	19-12-2035	22
Manikganj 162 MW PP (MPGCL)	Private	HFO	30-11-2035	162
Total planned phasing out capacity (by 2035)				**4,392**

Source: BPDB, 2025.

Annex Table 3 Power plants to be phased out by 2041

Plant Name	Ownership	Fuel Type	Retirement Date	Capacity (MW)
Barapukuria 250 MW (1st & 2nd Unit) (BPDB SBU)	Public	Coal	29-03-2036	170
Shikalbaha 150 MW PPP (BPDB SBU)	Public	Gas	9-04-2036	127
Bhairob 54 MW PP (Bhairob Power)	Private	HFO	7-03-2036	55
Potiya 116 MW PP (Anlima Energy)	Private	HFO	3-01-2036	116
Potuakhali 150 MW PP (United Payra)	Private	HFO	17-01-2036	150
Titas (Daudkandi) 50 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	47
Hathazari 100 MW PPP (BPDB SBU)	Public	HFO	6-12-2036	94
Baghabari 50 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	47
Faridpur 50 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	50
Bera 70 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	66
Sangu, Dohazari 100 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	98
Gopalganj 100 MW PPP (BPDB SBU)	Public	HFO	29-11-2036	100
Sirajganj 214 MW CCPP (1st Unit) (NWPGCL)	Public	Gas	13-07-2036	210
Meghnaghat 335 MW (Summit)	Private	Gas	31-05-2037	335
Santahar 50 MW PPP (BPDB SBU)	Public	HFO	29-11-2037	46
Katakhali 50 MW PPP (BPDB SBU)	Public	HFO	29-11-2037	45
Chandpur 150 MW CCPP (BPDB SBU)	Public	Gas	30-07-2037	163
Bhola 225 MW CCPP (BPDB SBU)	Public	Gas	23-12-2037	193
Bibiyana-II 341 MW CCPP (Summit)	Private	Gas	25-12-2037	341
Haripur 412 MW CCPP (EGCB)	Public	Gas	5-04-2039	412
Khulna 225 MW (NWPGCL)	Public	HSD	24-06-2039	230
Sirajgonj 225 MW CCPP (2nd Unit) (NWPGCL)	Public	Gas	4-02-2040	220
Bheramara 360 MW CCPP (NWPGCL)	Public	Gas	13-12-2039	410
Kusiara 163 MW CCPP	Private	Gas	26-04-2040	163
Ashuganj 225 MW CCPP (APSCL)	Public	Gas	9-12-2040	221
Total planned phasing out capacity (by 2041)				4,109

Source: BPDB, 2025.

Bangladesh's power sector is at a crossroads. While national policies envision an ambitious shift towards renewable energy, progress on the ground has remained slow and fragmented. This study provides a timely and evidence-based roadmap to address these challenges by reassessing demand projections and proposing a realistic fuel mix for 2030, 2035, and 2040.

The analysis finds that achieving a 30 per cent renewable energy share by 2040 will require nearly 35,753 MW of new capacity, led by solar and wind, with supporting contributions from hydro, biomass, and biogas. Meeting this goal will demand an estimated USD 35.2–42.6 billion in investment, most of which must be mobilised within the next decade.

Beyond the investment figures, the study stresses the need for policy coherence, legally binding renewable energy targets, fossil fuel phase-out mechanisms, regional energy trade, and expanded access to climate finance. It offers practical recommendations for policymakers, financiers, and development partners, charting a SMART, achievable, and inclusive pathway for Bangladesh's transition towards a cleaner and more resilient energy future.

CENTRE FOR POLICY DIALOGUE

Centre for Policy Dialogue (CPD)
House 40/C, Road No 11 (new)
Dhanmondi, Dhaka – 1209, Bangladesh
Phone: (+88 02) 41021780-2
E-mail: info@cpd.org.bd
Website: www.cpd.org.bd