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ENABLING RENEWABLE ENERGY GROWTH IN WEST BENGAL

Focus on Policies and Institutions

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List of Abbreviations

CEO	Chief executive officer
CSR	Corporate social responsibility
CSS	Cross-subsidy surcharge
DDG	Decentralised distributed generation
DIC	Designated ISTS consumers
DRE	Distributed renewable energy
DT	Distribution transformer
EV	Electric vehicle
GCRTSPV	Grid-connected rooftop solar photovoltaic
GH2	Green hydrogen
ISTS	Inter-state transmission system
IT	Information technology
MIS	management information system
MNRE	Ministry of New and Renewable Energy
MU	Million units
MW	Megawatt
O&M	Operation & maintenance
OA	Open access
PCGERSE	Policy on Cogeneration and Generation of Electricity from Renewable Sources of Energy
PM-KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan
PNES	Power and Nonconventional Energy Sources
PSP	Pumped storage project
PV	Photovoltaic
R&D	Research & development
RE	Renewable energy
REDA	Renewable Energy Development Agency
RMS	Real-time monitoring systems
RPO	Renewable purchase obligations
RTM	Regulated tariff mechanism
RTS	Rooftop solar
SECI	Solar Energy Company of India
SEZ	Special economic zone
SLDC	State load despatch centre
SOP	Standard operating procedure
WBERC	West Bengal Electricity Regulatory Commission
WBGEDCL	West Bengal Green Energy Development Corporation Limited
WBPDCL	West Bengal Power Development Corporation Limited
WBREDA	West Bengal Renewable Energy Development Agency
WBSEDCL	West Bengal State Electricity Distribution Company Limited

Executive summary

West Bengal was at the forefront of renewable energy (RE) resource development during its early days. The state was the first to implement mini-grid projects in the 1990s to ensure energy access in the Sunderban delta region and later to implement innovative RE projects like the Jamuria grid-connected solar plant, the 900 MW purulia pumped storage project, and the tidal energy power plant at the Durgaduani Creek. However, despite initial achievements, West Bengal could not emerge as a major RE state.

As per the Ministry of New and Renewable Energy (MNRE), the installed RE capacity in the state was 640 MW in April 2024, representing only 0.4 per cent of the country's total RE installed capacity. The growth has been minimal, with only 132 MW capacity added since 2019. Even in the distributed renewable energy (DRE) segment, progress remained largely stagnant, with no additions made to the number of solar streetlights, solar water pumps, or solar off-grid capacity. The state also lagged in RE procurements, with its renewable purchase obligations (RPOs) compliance in 2022-23 standing at 15.9 per cent, lower than most major states.

The low contribution of West Bengal to India's RE growth has been because, since the announcement of the National Solar Mission in 2010, the RE growth momentum has been concentrated in the western and southern regions. This was partly due to the design and the national policies (favouring states with relatively better solar resources and more extensive availability of consolidated wasteland patches) and partly due to other states' internal policies and institutional inertia.

In recent years, the West Bengal government and agencies have been steadily working to enhance the role of RE in the state's energy mix, which presently remains dominated by coal-based power plants. For instance, state and central PSUs have regularly floated tenders for rooftop installations on government buildings. The state has also initiated the process of setting up another 900 MW pumped hydro storage project.

On the policy front, state officials have shared a vision in public forums of enhancing the share of RE in the energy mix to 20 per cent by 2020 (though it has yet to be officially specified). Last year, strong incentives were introduced for commercial and industrial consumers under the new green open access rules to boost RE procurements. Further, indicating the state government's strong commitment to green economy development, four new policies were introduced in 2023 in the key areas of bioenergy, green hydrogen, electric vehicles, and RE manufacturing.

While these incremental moves hold significance, a transformation change is required at this point to boost intra-state RE capacity in West Bengal. This is because of the following demand and supply side factors:

- **On the demand side**, the electricity demand of West Bengal is poised for strong growth – projected at 5 per cent for the utility sector and 19 per cent for the captive segment over the next two to three decades. Meanwhile, under the new RPO trajectory notified by the central law, the procurement of electricity from RE sources is mandated to rise from 29.9 per cent in 2024-25 to 43.3 per cent in 2029-30. These two factors combined are estimated to increase the RE procurement requirement for the state of West Bengal to 15.4 GW by 2026-27 and 24.3 GW by 2031-32.

- **On the supply side**, the opportunities for meeting the enhanced RE capacity through intra-state projects are significant. The current installed capacity is only 6.1 per cent of the state's estimated potential (10,484 MW) by the MNRE. Meanwhile, independent studies and assessments point to the actual potential of the state being several times higher than the official estimates. This points to a significant untapped technical RE generation potential in the state. On the commercial front, the competitiveness of intra-state RE projects will become a lot more competitive with the ongoing waiver on inter-state transmission system (ISTS) losses and charges scheduled to be phased out by 2025-28. This is because, according to iFOREST estimates, the ISTS charges for West Bengal are as high as 90 paise per unit.

With these changing demand-supply dynamics, the state government must take proactive measures to capitalize on the opportunity by addressing ongoing project development challenges and facilitating investments. At present, land availability and acquisition have been a key concern for the development of ground-mounted solar projects. Meanwhile, private sector involvement in the RE sector has been limited to an EPC supplier role.

At present, there is a policy gap in the sector as the Policy on Cogeneration and Generation of Electricity from Renewable Sources of Energy, 2012, lapsed in 2022. Further, like most 'low-RE' states, the institutional set-up in West Bengal lacks the required organizational strength to develop the RE sector effectively. West Bengal Renewable Energy Development Agency (WBREDA) and the West Bengal Green Energy Development Corporation Limited (WBGEDCL), the nodal agencies for RE policy, lack the experience and capacity to conceptualize large projects, engage investors/developers and run bid processes independently.

A 'transformation change' in the RE sector requires a comprehensive approach from the state government. This entails a policy framework that outlines a clear and ambitious vision for the state's RE sector and prioritizes investment promotion, particularly in high-potential RE segments. It would also require strong state institutions with adequate capacity and capabilities to act as growth facilitators and anchors.

West Bengal needs a new RE policy to provide a structured and proactive framework for RE investment promotion.

With the PCGERSE policy now over a decade old, there is a timely opportunity to develop and implement a new policy framework for promoting renewable energy and creating green jobs in the state. The new policy should send clear signals by setting bold targets, offering tailored solutions for different technologies, and providing a comprehensive support system for both developers and investors. The aim should be to build an ecosystem conducive to RE investments, focused on removing barriers and establishing frameworks that facilitate project development. Additionally, the new policy will generate job opportunities and position West Bengal as a leading hub for renewable energy investments. The new policy framework must address the following:

- Establish clear and ambitious RE capacity targets that reflect the projected growth in state electricity demand and the national RE goals.
- Develop a comprehensive policy that covers all utility-scale and DRE technologies. Technology-specific guidelines for high-potential segments can be then developed under one overarching policy.

- Create a clear division of responsibilities among nodal agencies – WBGEDCL for utility-scale RE and WBREDA for DRE. Policy should provide for adequate time, and resources and plan to build the capacity within both these agencies to effectively deliver on respective roles.
- As part of the implementation mechanism, the role of unsolicited projects can be enhanced to support technologies in the 'take-off' stage of development. For instance, an initial capacity can be identified for allocation through feed-in-tariffs to promote investments. Further, for bidding-based projects, WBGEDCL should be mandated to coordinate and manage procurement bids for intra-state projects, with yearly capacity targets.
- Project approval processes should be simplified through a digitized, single-window facility for investors; and clearly defined standard operating procedures (SOPs) should be introduced with defined timelines for each clearance stage.
- The technology-specific mechanisms for project implementation should focus on all high-potential segments, to address the specific challenges of that technology segment. For instance, for the solar PV segment, a resource centre should be created to identify land and water resources for development and to develop suitable business models. For wind, the private sector must be encouraged to undertake ground-level resource assessment and project development through a first-come-first-serve model for initial capacity.
- The incentive for utility and industrial procurements from intra-state projects must be strengthened and aligned with the prevailing cost differential with interstate projects.
- Stimulate demand through mechanisms like green power tariffs and designated green zones (SEZs, cities, villages etc.).
- Mobilize skill development infrastructure for RE sector workforce and R&D initiatives in the state, to develop potential workforce for the nationally booming RE market.

Institutional reforms and capacity enhancements are imperative for developing local RE resources.

Strong state-level institutions are vital for the effective implementation of RE policies and plans in West Bengal. The state can continue with the two nodal agency model where WBGEDCL dedicatedly works for the utility-scale RE segment, while WBREDA focuses on DRE. This is because facilitating investments in these segments requires varying approaches and institutional set-ups. Both agencies must play an active role in identifying and implementing solutions tailored to local needs and challenges. For respective segments, the agencies need to identify investment opportunities, build a strong case for investments by identifying appropriate technology and business models, facilitate ease of investments, cultivate a robust vendor ecosystem, build collaboration and explore new avenues of growth.

Additionally, strengthening the capacity of both WBREDA and WBGEDCL is essential to provide them with the resources and tools necessary to succeed in their new, more focused roles. This would entail:

- Ensuring effective leadership dedicated to advancing RE growth
- Ensuring adequate and strategic staffing for meeting stated objectives
- Incorporating IT-driven tools for project management and asset monitoring
- Developing structured training and capacity-building programme

- Engaging technical support agencies for collaborations
- Identifying avenues for financial independence

Overall, West Bengal must prioritise RE sector growth as a win-win solution. This will not only help contribute to the global climate change mitigation goals but also create local employment opportunities and foster economic growth. This is also crucial from a just energy transition perspective as significant existing thermal capacity in the state is over 20 years old. A transformation change in the RE sector growth trajectory requires the state government to adopt a progressive RE policy that facilitates investments and to develop an institutional structure that ensures effective implementation.

CHAPTER 1

Introduction

West Bengal's energy mix has remained largely constant over the past decade. Coal-based power generation capacity has increased from 7,466 MW in March 2014 to 8,683 MW in March 2024. In the large hydro category only 100 MW has been added in the same period, bringing its installed capacity to 1,396 MW. Finally, renewable energy (RE) has grown from 397 MW to 640 MW[1]. The energy generation capacity of West Bengal remains primarily thermal – as it was a decade ago.

In the same decade, RE has grown massively in India. Nearly 110,000 MW of RE capacity has been added in India since 2014[2]. Further, RE has overtaken thermal as the fastest-growing segment in the energy mix. Since 2017, the installed capacity of RE has expanded by 87,000 MW in comparison to the 24,000 MW of thermal[3] – the rate of RE growth is almost four times that of thermal.

West Bengal also lags from an RE procurement perspective – in 2022-23, the state's renewable purchase obligations (RPOs) compliance stood at 15.9 per cent which is lower than most major states in the country. Given the low installed capacities within the state, RE procurements are largely driven by imports. In 2022-23, the state's discoms procured 8,396.7 MU of electricity from RE sources externally (87 per cent of the total). Notably, roughly 30 per cent of external purchases were carried out through energy exchanges[4].

Why has an energy transition not taken place in West Bengal? The current installed capacity is only 6.1 per cent of the total estimated potential (10,484 MW) of the state by the Ministry of New and Renewable Energy (MNRE)[5], which itself is an under representation of the actual potential. Despite being one of the first to develop applications of RE at a large scale (Purulia pumped storage project and Jamuria solar plant), West Bengal has not been part of India's RE growth story. Policy stagnation and limited institutional capacity at the state-level are key factors behind this outcome.

The Government of West Bengal introduced the Policy on Cogeneration and Generation of Electricity from Renewable Sources of Energy (PCGERSE) in 2012. While it was forward-thinking for its time, the policy was created before the significant techno-commercial advancements of the mid-2010s, which made RE more affordable. Additionally, it was implemented prior to the national framework shift that followed the 175 GW by 2022 target announcement in 2015. As a result, the policy quickly fell short of the requirements of the evolving energy landscape.

Further, the institutional set-up in West Bengal lacks the organizational strength to effectively develop RE in the state. This is not an issue unique to the state – renewable energy development agencies (REDAs) across most states in India have struggled to play the growing number of roles required to develop the swiftly changing RE ecosystem. In West Bengal, implementers of the RE policy – West Bengal Renewable Energy Development Agency (WBREDA) and the West Bengal Green Energy Development Corporation Limited (WBGEDCL) – are yet to develop the organizational structures or level of specialisation required to excel in their field. As a result, they have struggled to facilitate private investments in the RE sector – crucial for large-scale growth.

The present report engages with these state-level policy and institutional concerns. It is organized as follows: Chapter 2 presents an overview of the RE sector in West Bengal (Including the policy and regulatory landscape), Chapter 3 discusses emerging imperatives for RE growth, Chapter 4 is an in-depth exploration of the institutional set-up, and Chapter 5 draws on the preceding analyses to provide an extensive list of policy recommendations.

Crucially, the Government of West Bengal is developing a new RE policy for the state. The policy recommendations included aim to assist in this endeavour by providing inputs on key areas. In particular, this discussion paper seeks to highlight the importance of strengthening implementing agencies – a prerequisite for effective translation of policy to practice.

CHAPTER 2

State of the RE sector

The renewable energy (RE) sector of West Bengal is a curious case of unrealised potential. In 2009, India's first grid-connected solar plant was commissioned in the state's Jamuria district, with a capacity of 2 MW serving roughly 5,000 families[1]. Prior to this in 2007, the 900 MW Purulia pumped storage project (PSP) developed by the West Bengal State Electricity Distribution Company Limited (WBSEDCL) had commenced operations as the biggest PSP project in the nation[2]. Shortly after, in 2012, the Government of West Bengal notified an RE policy – making it one of the first subnational governments of India to do so.

Despite these initial achievements, West Bengal could not emerge as an RE state. The growth of RE in India, which largely took place since 2017, did not see much capacity come up in the state. Of the 66,601 MW added in the period across the country, only 163.3 MW came up in West Bengal, a mere 0.24 per cent of the total[3]. The minimal increase in installed capacity relative to the substantial observed national expansion of RE suggests that clean energy growth in the state is yet to be unlocked.

Table 2.1: Growth of installed capacity of RE in West Bengal and India, 2017 to 2023

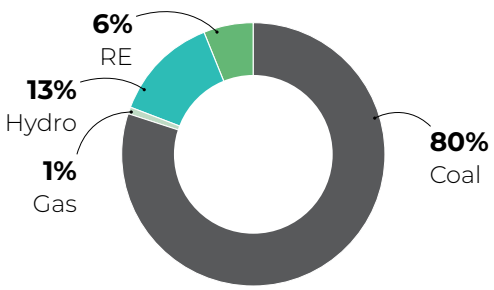
Year	West Bengal (MW)	India (MW)	West Bengal relative to India
2017	458.2	58,558.10	0.78 %
2019	508	79,412	0.63 %
2021	582.2	95,803.30	0.60 %
2023	621.5	1,25,159.80	0.49 %

Source: MNRE

2.1 Installed capacity

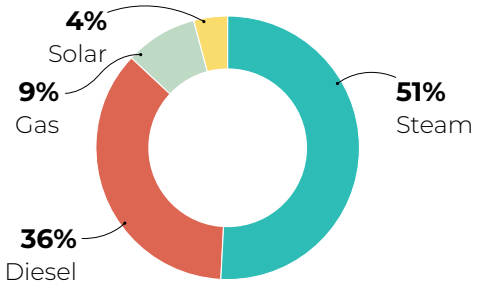
West Bengal has a total installed capacity of 10,800 MW, as of April 2024[4], of which 80 per cent accrues to coal-based power plants. The remaining 20 per cent is divided between large hydro (13 per cent), renewable energy (RE) (6 per cent) and gas (1 per cent) projects. In addition, 346 industrial units have a captive power generation capacity of 1,874 MW. Steam (coal-based) generation comprises 51 per cent of this figure. The next largest is diesel-based generation with 36 per cent of the captive installed capacity, then gas-based (9 per cent) and, solar-based (4 per cent)[5].

Figure 2.1: Installed utility capacity in West Bengal



Note: Installed capacity of 10,800 MW as of April 2024
Source: CEA

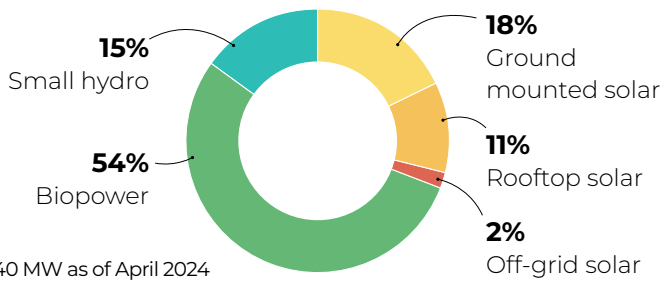
Figure 2.2: Installed captive power generation capacity in West Bengal



Note: Installed capacity of 1,874 MW as of March 2022; only includes captive plants greater than 0.5 MW
Source: CEA

The 640 MW of installed capacity of RE projects in West Bengal, is less than 1 per cent of India's total which stands at 144,751 MW (as of April 2024[6]). Source-wise, the RE capacity consists of 54 per cent biopower, 18 per cent ground-mounted solar, 15 per cent small hydro, 11 per cent solar rooftop, and 2 per cent off-grid solar (Figure 3). The biopower capacity of 348.3 MW, consists largely of biomass/bagasse cogeneration (300 MW).

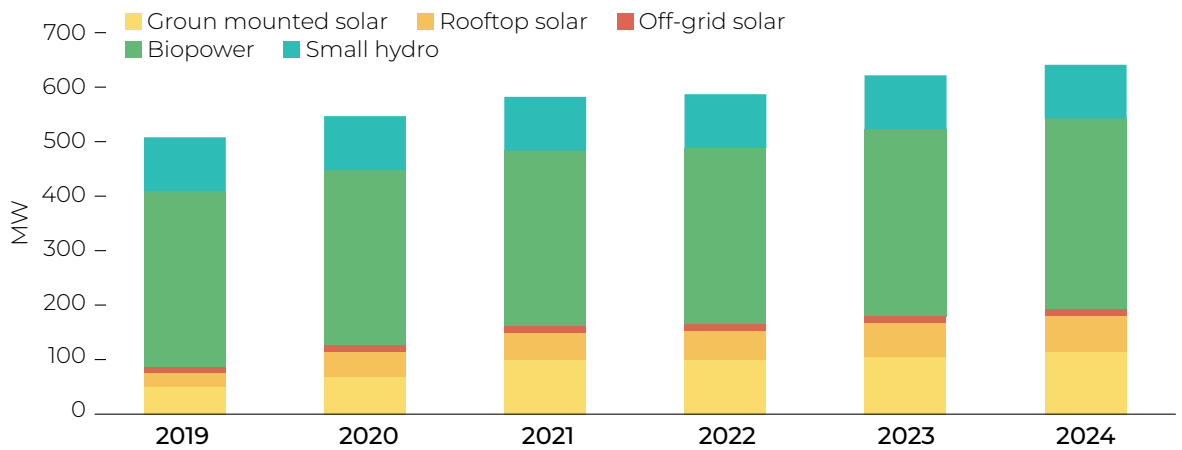
Figure 2.3: Source-wise installed RE capacity in West Bengal



Note: Installed capacity of 640 MW as of April 2024
Source: MNRE

Since 2019, 132 MW of RE capacity has been added in the state[7]. The ground-mounted solar and biomass/non-bagasse cogeneration capacities have grown by more than double from 50 MW to 113.8 MW and 19.9 MW to 43.5 MW. Similarly, the rooftop solar capacity has grown almost three times from 25.9 MW to 67.1 MW. However little growth has been registered in the off-grid solar segment, and small hydro and biomass/bagasse cogeneration capacities have stagnated.

Figure 2.4: Growth in installed RE capacity in West Bengal since 2019



Source: MNRE

A closer look at the off-grid and distributed RE (DRE) segment reveals installations remained largely stagnant in West Bengal. Between December 2018 and 2022, no additions were made to the number of solar streetlights or solar water pumps, and no solar off-grid capacity was added. The only segment which grew was solar streetlights which increased in number from 8,726 to 18,203[8].

Table 2.2: Growth in off-grid and DRE installations in West Bengal

Year	Solar home lights (number)	Solar streetlights (number)	Solar water pumps (number)	Solar power plants (MW)
Dec-18	145,332	8,726	653	1.7
Dec-19	145,332	8,726	653	1.7
Dec-20	145,332	15,302	653	1.7
Dec-21	145,332	17,750	653	1.7
Dec-22	145,332	18,203	653	1.7

Source: MNRE

The installations of RE in West Bengal thus far have barely scratched the surface in terms of the state's potential. According to assessments by the Ministry of New and Renewable Energy, the state has an estimated RE potential of 10,484 MW, about 0.5 per cent of the nation's total. Most of this potential accrues to solar energy (6,260 MW), followed by biomass (1,742 MW) and wind (1,281 MW)[9]. Note that, aside from the potential of wind, these figures were calculated by an assessment in 2014. A potential re-assessment utilizing updated methodologies (considering, for example, the increased per kWh efficiency of the latest solar modules), updated datasets (for wasteland categories and areas, for example) and a granular approach (looking at local resource characteristics) may result in an upward revision of these figures.

Table 2.3: Estimated source-wise potential of RE in West Bengal

RE source	Estimated potential (MW)
Wind (at 150m agl)	1,281
Small hydro power	392
Biomass power	1,742
Cogeneration-bagasse	-
Solar energy	6,260
Large hydro	809
Total	**10,484**

Source: MNRE (via MOSPI)

2.2 Policy landscape

The Policy on Co-generation and Generation of Electricity from Renewable Sources of Energy (PCGERSE) by the erstwhile Department of Power and Nonconventional Energy Sources, Government of West Bengal was published in June 2012[10]. The key features of the PCGERSE are discussed below:

Objectives

The PCGERSE, 2012 seeks to promote and facilitate the development of RE sources in the state. Over the long term, it aims to increase electricity generation from RE sources and drive private investment in the sector. The policy's short-term objectives are to identify key 'thrust' areas (technologies) and chart a course for their scale-up in line with renewable purchase obligations (RPOs), including through pilot projects. Lastly, the policy seeks to develop regulatory and administrative frameworks conducive for the RE sector.

Growth targets

The policy set targets for the end of the 12th and 13th plan periods ending in 2017 and 2022, respectively. The cumulative target for 2017 was set at 1,040 MW, including 100 MW of solar, 645 MW of biopower, 220 MW of small hydro and 75 MW of wind. By 2022, the state targeted 2,706 MW of total installed capacity of RE sources.

Table 2.4: Source-wise installed capacity targets as per the PCGERSE, 2012

RE source	Target installed capacity (MW)	
	2017 (end of the 12th plan)	2022 (end of the 13th plan)
Wind	75	450
Small hydro	220	394
Co-generation	355	600
Biomass	240	662
Waste to energy	50	100
Solar	100	500
Total	**1,040**	**2,706**

Source: Department of Power & Nonconventional Sources of Energy (erstwhile)

Technology-specific measures

Large RE (grid connected)

The policy puts forward a series of measures for project development for a wide range of renewable energy technologies:

Table 2.5: Technology-specific measures for large RE under PCGERSE, 2012

Technology	Measures
Wind	· Nodal agency to undertake comprehensive wind resource assessments and offer potential sites for development. · Government-owned wasteland with mean wind power density of 200 watt/m2 at 50 m hub height using new wind turbine generators will be offered for development. · Nodal agency to assist developers in obtaining benefits from the Clean Development Mechanism.
Small, mini and micro hydel	· Nodal agency to prepare detailed project reports for small hydro projects and subsequently offer identified sites for project development. · Pico/micro-hydel projects to be identified by the nodal agency in fast-track mode. · Central financial assistance available for pico/micro-hydel projects to be passed on to eligible beneficiaries.
Biomass	· Energy plantations to be promoted on barren government land, wasteland and degraded forest land. · Potential sites for these plantations to be identified by the nodal agency based on PPP mode. · Feed-in-tariff to be reviewed, and possibility of two-part tariff to be explored · WBGEDCL to classify zones in the state based on the level of rice production. The nodal agency to allocate projects in command areas within these zones. · The nodal to assist the developer in obtaining clearances for project development. · Rice-husk-based gasifier systems to be established to meet the captive power demand of rice mills. By 2017, the development of 1,000 such systems is targeted.
Waste-to-energy	· Municipal corporations to identify sites for waste-to-energy projects, preferably in current landfill areas. · Two or three municipal corporations using the same dumping ground to be considered for setting up waste for large plants. · Garbage segregation at source to be made mandatory for industries, large commercial complexes and large housing societies.
Co-generation	· Iron and steel, fertilizer and chemical industries with a connected load of over 2,000 kVA required to produce at least five per cent of their requirement through co-generation.
Solar PV	· Development of solar power to be encouraged through favourable atmosphere and suitable regulations. · The reactive power charges as well as unscheduled interchange charges to be borne by developers/distribution licensee/consumers.
Rooftop	· Building codes to be revised to install rooftop PV devices. · Byelaws to be amended with mandatory provisions for providing solar energy infrastructure for residential and commercial categories. · Commercial and business establishments having more than 1.5 MW of contract demand to be required to install solar rooftop systems to meet at least 2 per cent of their total electrical load. · Rooftop solar to be mandated for all the existing and upcoming schools and colleges, hospitals, large housing societies and government establishments with contract demand of more than 500 kW · All industrial infrastructure coming under government initiatives to mandatorily employ the usage of the rooftop PV to meet partial energy load.

Source: Department of Power & Nonconventional Sources of Energy (erstwhile)

Small and distributed RE (off-grid)

In addition to the measures outlined for utility-scale projects, the policy also notifies measures for decentralised distributed generation (DDG). These projects to be utilized to ensure energy access to unelectrified villages, and are to be conceptualized and implemented based on guidelines put forth by the Ministry of Power under the Rajiv Gandhi Grameen Vidyutikaran Yojana.

Implementation mechanism

Projects of 2 MW and above capacity to be allotted through solicited process following the competitive bidding route, while small projects (below 2 MW) to allotted on an unsolicited basis.

The process of competitive award is identified as:

- Nodal Agency to invite prospective developers to submit their proposals through a notified RfP that will include pre-qualification criteria, preliminary feasibility report & evaluation methodology.
- Competitive bidding process to be followed by the respective DISCOMs for procurement. Developer offering highest discount on the West Bengal Electricity Regulatory Commission (WBERC) ceiling tariff for the concerned RE technology to be invited to negotiate for signing the PPA and implementation agreement.

The process of unsolicited allotment is identified as:

- Nodal Agency to ascertain developer's technical and financial capabilities, as well as social and economic benefits of the project, based on its pre-feasibility report.
- For mini-solar project (<=150 kW), the development to be done under the DDG model. These projects are to be identified by Nodal Agency for remote/off-grid areas and are to be owned by the State Government. These will be community managed installations through the revenue generated from these projects.

Incentives and support

To promote the growth of clean energy, the policy offers the following incentives and support measures to the developers establishing instate capacity of RE:

Table 2.6: Incentives under the PCGERSE, 2012:

Incentive	Description
Evacuation infrastructure	· Required evacuation infrastructure for renewable energy projects to be created jointly by state transco and discom. · More than five pooling stations identified to be created to address medium term requirement for solar, SHP and wind projects · Cost of evacuation infrastructure cost beyond the inter-connection point to be recovered from the consumers; cost of interfacing equipment to recovered by developers · Co-generation and renewable energy sources (except rooftop) to be connected at 132 kV to 6 kV; rooftop (100 kW – 2 MW) to be connected to 11 kV. · For SHP, if an evacuation line for over 5 km is required, the transco/discom to bear extra connectivity cost.
Land	· In case of available government land, the permission for use to be given for 30 years · Developer to arrange for land through direct purchase · RE projects to not require conversion of agricultural land
Statutory clearances	· Nodal Agency to act as a Single Window for obtaining assistance from all line departments. For this, standard formats to be developed and made available on website. · Nodal Agency to coordinate and pursue with all the concerned Departments for speedy approvals and clearances within 90 days (other than MoEF clearances for which the deadline is 120 days). · Clearances/approvals not accorded within the specified period to be dealt with Single Window Empowered Committee
Green Energy Fund	· Green Energy Fund to be set up by the Nodal Agency, seeded by initial equity contribution by the state government and contributions from international donor agencies, and built through support charges and penalties.
Open access	· Open access charges to be levied as per state regulations · For RE power purchase from outside the State, the landed cost of the RE power on account of open access transaction at the State boundary cannot be more than the WBERC price cap.
Net metering	· Net metering facility to be extended to grid-connected rooftop solar, along with a separate meter to get a clear assessment of consumption and generation of electricity by the consumer.
Infrastructure support	· For RE plants set up in remote areas, infrastructural support such as roads to project sites to be developed by the state government.
Payment security mechanism	· Distribution utilities to provide a letter of credit from a nationalized bank as a payment security for all RE projects.
Registration fee	· All RE projects set up in the state to be exempt from paying fees for registration with the nodal agency.

Source: Department of Power & Nonconventional Sources of Energy (erstwhile)

Other provisions

Some of the other provisions highlighted in the policy are as follows:

- Developers to start project work within 6 months of getting clearance, and nodal agency to monitor project progress as per implementation agreement.
- Developer/Government acquiring land are to provide an amount up to 1 per cent of the project cost for rehabilitation and resettlement of the displaced persons and for local development activities.
- Developer to make suitable financial provisions for mitigation of adverse impacts according to the approved Environment Impact Assessment Plan and Environment Management Plan.
- Adaptive research is to be funded and encouraged for the development of RE sector.

Nodal agencies

The West Bengal Green Energy Development Corporation Limited (WBGEDCL) is identified as the nodal agency for the PCGERSE, 2012[11]. As the nodal agency, the following duties are assigned to the company:

- Promoting and facilitating private investment in grid-connected RE projects
- Assisting RE developers in obtaining applicable incentives
- Conducting the RE resource assessment studies
- Carrying out competitive bidding for proposed projects
- Allotting small RE projects based on evaluations (unsolicited projects)
- Identifying viable areas for RE projects and producing a publicly accessible land bank
- Acting as a coordinator between RE developers and line departments
- Monitoring the progress of in-development RE projects

In addition to this, the West Bengal Renewable Energy Development Agency (WBREDA) has also been assigned functions under the PCGERSE, 2012[12]. The roles and responsibilities assigned to WBREDA are:

- Setting up pilot projects for emerging RE technologies
- Promoting small-scale/off-grid solar and biomass/biogas projects
- Supporting developers in the design and implementation of projects
- Creating green skilling as well as R&D opportunities through establishing a Centre of Excellence and developing courses at ITIs and government engineering colleges.

2.3 Regulatory landscape

The regulatory landscape in West Bengal has kept abreast of the changes in the RE sector. Since 2020, the West Bengal Electricity Regulatory Commission (WBERC) has notified regulations covering subjects, such as RPOs, net metering and green open access.

In August 2022, the WBERC notified the West Bengal Electricity Regulatory Commission (Open Access) Regulations, 2022, which included a range of incentives for green open access consumers. First, consumers purchasing electricity from purely wind or solar sources would only be required to pay 25 per cent of the transmission and wheeling charges. Further, the additional surcharge has been entirely waived for green open access. The cross-subsidy surcharge (CSS) has also been waived when electricity is procured to produce green hydrogen and green ammonia. In other cases, the increase in CSS has been limited to 50 per cent of the initial charge for the first 12 years of operation[13].

More recently, in September 2023, the WBERC notified the West Bengal Electricity Regulatory Commission (Modalities of Tariff Determination) Regulations, 2023, which specified the framework

under which tariffs would be determined for RE projects. Specifically, the commission stated that a regulated tariff mechanism (RTM) would be used to determine tariffs for waste-to-energy, hydroelectric and pumped storage projects. Additionally, for RE projects with capacity below the minimum threshold for competitive bidding a ceiling tariff be specified[14]. A feed-in tariff of ₹3.2/kWh was subsequently specified for solar plants of less than 5 MW capacity by WBSEDCL[15]. For all other projects, tariffs are determined through competitive bidding.

Before this, in 2020, the WBERC notified the First Amendment to the West Bengal Electricity Regulatory Commission (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2013, wherein a framework for net-metering was established. The commission specified distribution transformer (DT) and rooftop capacity limits of 100 per cent of DT capacity and 5 kW, respectively. In addition, carry forward to the next billing period (month) has been capped at 90 per cent[16].

The same amendment also put forth a renewable purchase obligation (RPO) trajectory for distribution licensees and captive/open access consumers for the period 2020-21 to 2022-23. The specified total RPO increases from 12 to 17 per cent, lagging slightly behind the Ministry of Power trajectory, which had already crossed 21 per cent in 2021-22[17].

Table 2.7: RPO trajectory specified by WBERC for the period 2020-21 to 2022-23

Year	Minimum procurement of electricity from RE sources (%)		
	Solar	Non-solar	Total
2020-21	3.0	9.0	**12.0**
2021-22	4.5	10.0	**14.5**
2022-23	6.0	11.0	**17.0**

Source: WBERC

2.4 Recent development

Aside from recent policy and regulatory developments, the government of West Bengal has also been making efforts to scale up the state's utility-scale RE capacity. In the last three years, the West Bengal State Electricity Distribution Company Limited (WBSEDCL) has tendered 20 MW of grid-connected solar projects, in the ground-mounted and canal-top solar segment[18,19]. Other authorities, such as the Solar Energy Corporation of India (SECI) and the West Bengal Power Distribution Company Limited (WBPDCL), have also tendered land-neutral projects (floating solar) of 24 MW and 22.5 MW, respectively[20,21]. WBSEDCL has also raised tenders for EV charging and battery swapping stations at 252 locations across the state[22,23]. Lastly, the Department of Power, Government of West Bengal, has invited bids to develop and commission a new pumped storage hydro project of 900 MW at the Bandu reservoir (also in Purulia district)[24].

Table 2.8: Recent tenders for RE projects in West Bengal

RE segment	Tendering authority	Cumulative size (MW)
Ground mounted solar	WBSEDCL	10 MW
Canal top solar	WBSEDCL	10 MW
Floating solar	WBPDCL	22.5 MW
	SECI	24 MW
EV charging stations	WBSEDCL	252 locations
Pumped storage hydro	Department of Power	900 MW

*The list is indicative
Source: Mercom India

However, it is uncertain whether these tenders have translated into projects. According to the CEA's December 2023 and April 2024 quarterly reports on in-development and under-construction projects, there are no projects currently listed in West Bengal[25,26]. Of the listed projects tendered by the Government of West Bengal, only one has been awarded (the 22.5 MW floating solar project tendered by WBPDCL)[27].

Progress on national RE programmes and schemes has also been minimal thus far. As per MNRE, as of September 2022, no installations had been carried out under the Grid Connected Rooftop Solar – Phase II. Achievement is only marginally higher in PM-KUSUM, where no installations have been carried out in Components A and B, and only 20 pumps have been solarised under Component C, as of July 2024[28]. Note that the WBSEDCL is the state nodal agency for both programmes.

Table 2.9: Installations under the PM-KUSUM programme in West Bengal

Component	Total sanctioned	Total installed
Component A	-	-
Component B	10,000	-
Component C (IPS)	23,700	-
Component C (FLS)	-	-

Source: MNRE, July 2024
Note: IPS = Individual pump solarisation, FLS = Feeder level solarisation

2.5 Growth impediments

At the state level, a confluence of policy and capacity problems have resulted in a stunted growth of RE sources in West Bengal. The state's RE policy, the PCGERSE, 2012, is outdated and lacks incentive structures and modes of implementation for major RE technologies. The regulations, while responding to recent developments in the sector, have failed to unlock growth.

The PCGERSE was notified in 2012, before the techno-commercial advancements in solar and wind which would enable the efficient generation of cheap electricity by these means. For this reason, the policy offers no substantial incentives for these sources of RE. Further, the process and procedures to be followed for the development of large utility-scale projects are dependent on projects identification by nodal agency. As a result, the policy has failed to draw private RE developers to West Bengal.

Similarly, several key responsibilities assigned to the nodal agencies has not been delivered on, even after a year of the policy's notification, due to lack of prioritization by state government and capacity of the government agencies.

The RE capacity growth – as minimal as it is – has been enabled by the regulatory environment provided by the WBERC. However, there are issues here as well. First, competitive bidding tariffs are less favourable to private developers than feed-in tariff structures. This is why feed-in tariffs were initially employed by the SECI to support the development of solar capacity in India. Compare this with the neighbouring state of Odisha, where a feed-in tariff is being employed to set up the first 500 MW of wind capacity[29].

West Bengal's net metering regulations are also relatively unattractive. Unlike other states (such as Karnataka[30]), the state does not provide any compensation for the surplus injection of electricity to the grid. Together with the cap on the carry forward of electricity, the lack of compensation minimizes the financial benefits of installing solar – especially for domestic consumers who already receive cheap electricity.

However, the most crucial concern in the regulatory landscape is the ongoing matter regarding the WBERC's RPO regulations currently being presented before the Calcutta High Court. According

to a suo-moto order by the WBERC, Bengal Energy Limited and Tata Power Limited challenged the First Amendment to the West Bengal Electricity Regulatory Commission (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2013, notified in 2020, on whether fossil-fuel-based cogeneration should count towards RPOs. As of July 2024, the matter is still sub-judiced, and in the interim, the WBERC is unable to set a trajectory for the coming years. Instead, the RPO for the year 2022-23 shall continue until the matter is resolved[31].

As a result of the ongoing matter regarding RPOs, the demand for RE is in a precarious position in West Bengal. A constant RPO will be a headwind for the quantum of electricity from RE sources demanded by designated entities (relative to the alternative of RPOs that increase every year). A downward revision of demand will depress the supply of RE – further stifling the growth of local RE capacity.

2.6 Conclusion

The growth of RE capacity, across scales and technologies, has been stunted so far in West Bengal. There is a clear need to develop a new and comprehensive policy, and amending regulations to suit the current infancy of the RE sector in the state. In addition to issues identified in the policy and regulatory frameworks, there is also a need to review the institutional set-up for attracting and facilitating of RE investment. Without a capable implementing agency, the success of any new RE policy would be limited.

The urgency of persistent challenges is felt even more deeply as new imperatives for RE growth are emerging in India. The coming decade in India may see the maturation of green industries and the development of new centres for such growth. For states like West Bengal, there is a massive opportunity to revitalise their economy – or risk being left out of the Indian green growth story.

CHAPTER 3

New imperatives for RE growth

While the RE sector has largely remained stagnant in West Bengal, electricity demand is constantly rising. So far, the rising demand has been met largely through thermal energy generation – whether produced locally or interstate. This scenario is likely to change going forward due to the RPOs.

Renewable purchase obligations (RPOs) set by the Ministry of Power mandate a certain level of procurement of electricity generated from renewable energy (RE) sources. This serves as a powerful policy tool to ensure that states adopt RE, and that the nation remains on track to meet nationally determined contributions under the United Nations Framework Convention on Climate Change. In recent amendment, the RPO for designated agencies has been drastically increased to meet global commitment to clean energy development. In absence of projects developed within the state, the import dependence of West Bengal is likely to increase significantly.

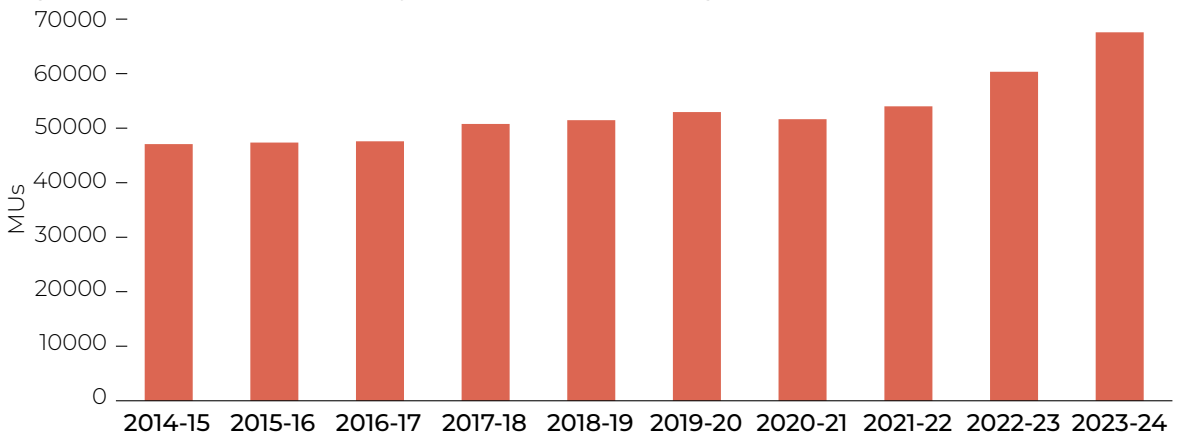
At the same time, the transition to electricity generated from RE sources offers an opportunity to substantially lower the cost of procurement – if the demand is met locally. This is because the waiver on transmission of electricity from RE sources via the ISTS is being phased out. In the newly emerging scenario, designated entities in West Bengal could either procure electricity internally – taking advantage of the low per kWh cost of solar and wind – or import it from other states, paying hefty transmission costs while doing so.

The development of RE capacity in West Bengal is also an opportunity to revitalise the state's industry, and establish it as a hub of green growth in India. For example, the provision of electricity from RE sources would enable the greening of the substantial steel industry located in the state. As it stands, West Bengal may lose out on this opportunity as states such as Karnataka and Tamil Nadu have begun to emerge as the hubs for green hydrogen, for which cheap electricity from RE sources is a key factor.

3.1 Expanding electricity demand

Electricity demand has been steadily increasing in West Bengal. Between 2014-15 and 2023-24, electricity demand rose from roughly 47,000 MUs to 67,000 MUs[1], growing by 4.3 per cent on average every year. Further, the pace of electricity demand growth has recently increased: for the most recent five-year period (2019 – 2024), it grew by 5.5 per cent on average, and registered an 11 per cent year-on-year growth between 2022-23 and 2023-24.

Figure 3.1: Year-wise electricity demand in West Bengal (utilities)

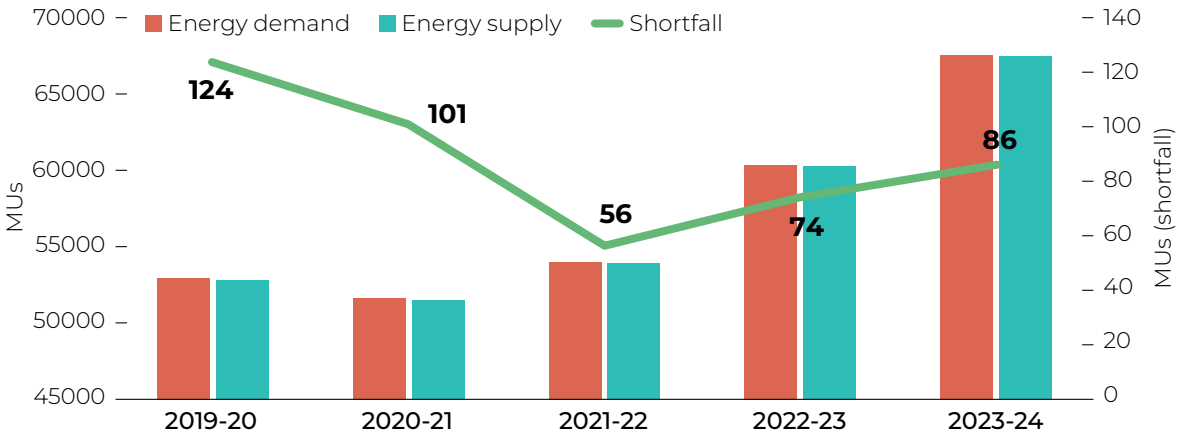


Note: Data for 2023-24 is only till Jan 2024
Source: CEA

The increased pace of demand has outstripped electricity supply in West Bengal. After falling to a low of 56 MUs in 2021-22, the shortfall of electrical energy has been rising again for the years 2022-23 and 2023-24. This deficit can also be observed in the peak power demand and supply position for

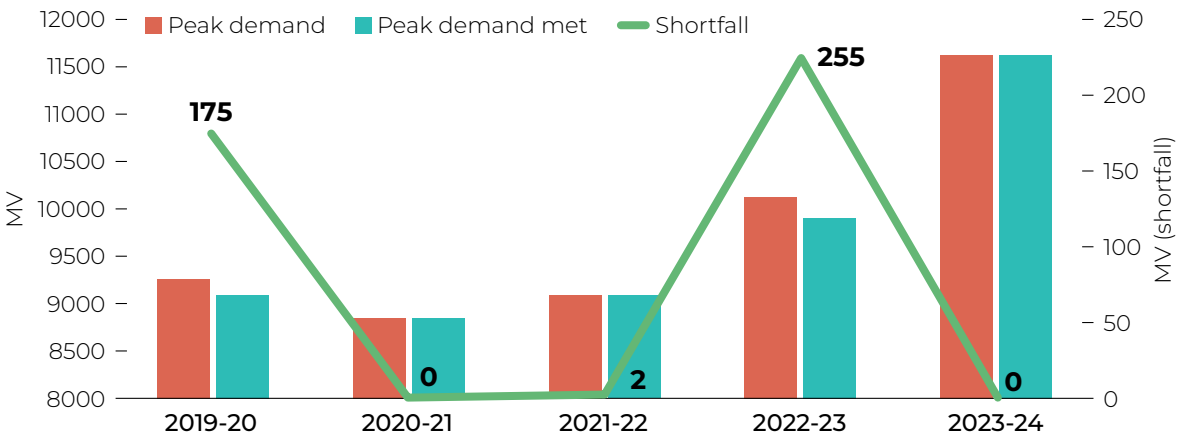
the past five years. In 2022-23, it led to a shortfall of 225 MW in peak power supply in West Bengal, crossing the previous five-year high of 175 MW[2].

Figure 3.2: Electricity demand-supply scenario in West Bengal (utilities)



Source: CEA

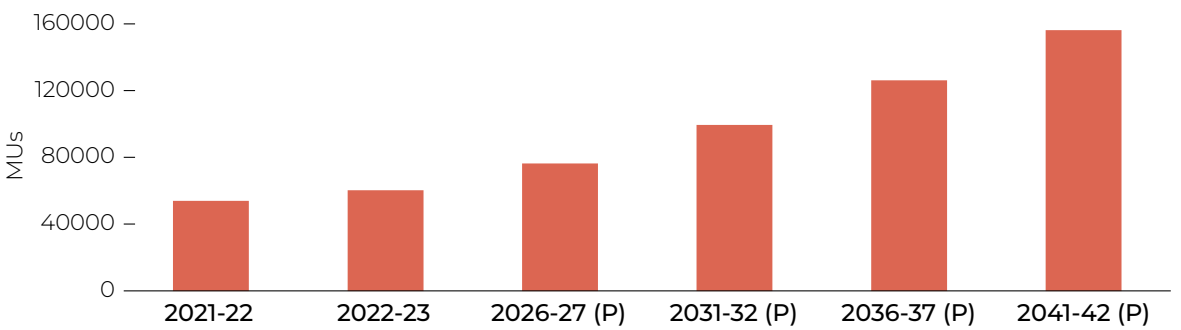
Figure 3.3: Peak electricity demand-supply scenario in West Bengal (utilities)



Source: CEA

The increased pace of growth is in line with electricity demand projections for the next fifteen years. According to CEA's 20th Electricity Power Survey of India, electricity demand is projected to grow at a compound annual growth rate (CAGR) of 5 per cent from 2022-23 to 2041-42. By 2041-42, West Bengal is expected to consume over 156,000 MUs of electricity[3].

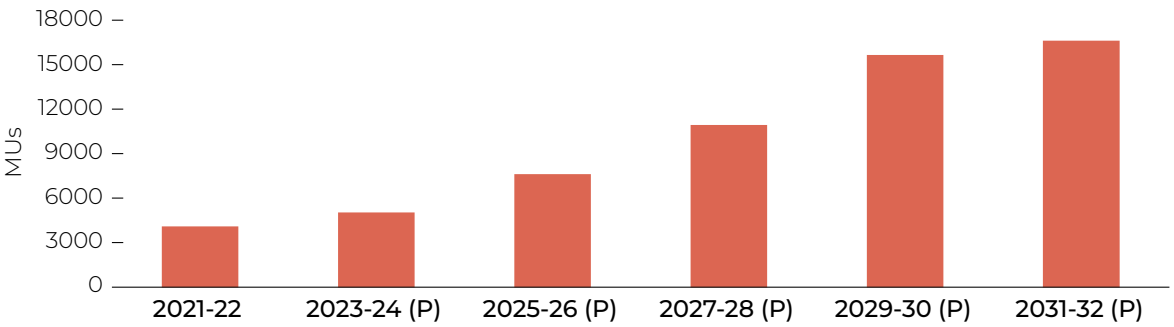
Figure 3.4: Projected electricity demand in West Bengal (utilities)



Source: CEA

Alongside the expected demand growth in utilities, West Bengal is also expected to witness a substantial rise in captive power consumption. The electricity consumption of captive power plants in West Bengal is projected to rise at a CAGR of 19 per cent for the decade between 2021-22 to 2031-32[4].

Figure 3.5: Projected electricity demand for captive use in West Bengal



Source: CEA

3.2 New RPO trajectory

The renewable purchase obligations (RPOs) set by the Ministry of Power provide a clear imperative to meet the rising demand through electricity generated from renewable energy (RE) sources. The most recent RPO trajectory, notified by the ministry in October 2023, for obligated entities (including discoms and captive power/open access consumers) entails an expansion of procurements as well as a widening of sources (to include distributed RE). Under the new trajectory, the procurement of electricity from RE sources is mandated to rise from 29.9 per cent in 2024-25 to 43.3 per cent in 2029-30[5].

Table 3.1: RPO trajectory notified by the Ministry of Power

Year	WPO	HPO	DRE	Other sources	Total
2024-25	0.67%	0.38%	1.50%	27.35%	**29.91%**
2025-26	1.45%	1.22%	2.10%	28.24%	**33.01%**
2026-27	1.97%	1.34%	2.70%	29.94%	**35.95%**
2027-28	2.45%	1.42%	3.30%	31.64%	**38.81%**
2028-29	2.95%	1.42%	3.90%	33.10%	**41.36%**
2029-30	3.48%	1.33%	4.50%	34.02%	**43.33%**

Note: WPO = Wind purchase obligation; HPO = Hydro purchase obligation; DRE = Distributed renewable energy
Source: Ministry of Power

Given the new trajectory of RPO and the projected demand growth for electricity, substantial demand for new RE capacity will emerge from West Bengal. This is estimated to lead to a new requirement of 15.4 GW of RE capacity by 2026-27, including 572 MW of new wind capacity, 195 MW of hydro capacity and 1,614 MW of DRE capacity. In addition, the requirement for new RE capacity to meet West Bengal's RPO targets entirely via generators within the state would require a local capacity of 24.4 GW by 2031-32.

Table 3.2: Additional RE capacity requirement corresponding to new RPO trajectory (MW)

Year	Wind	Hydro	DRE	Other RE	Total
2026-27	572.35	194.66	1,613.70	13,047.82	**15,428.53**
2031-32	1,316.83	251.63	3,502.88	19,309.65	**24,380.99**

Note: RPO for 2031-32 is assumed to be equal to 2029-30.
Source: iFOREST Assessment

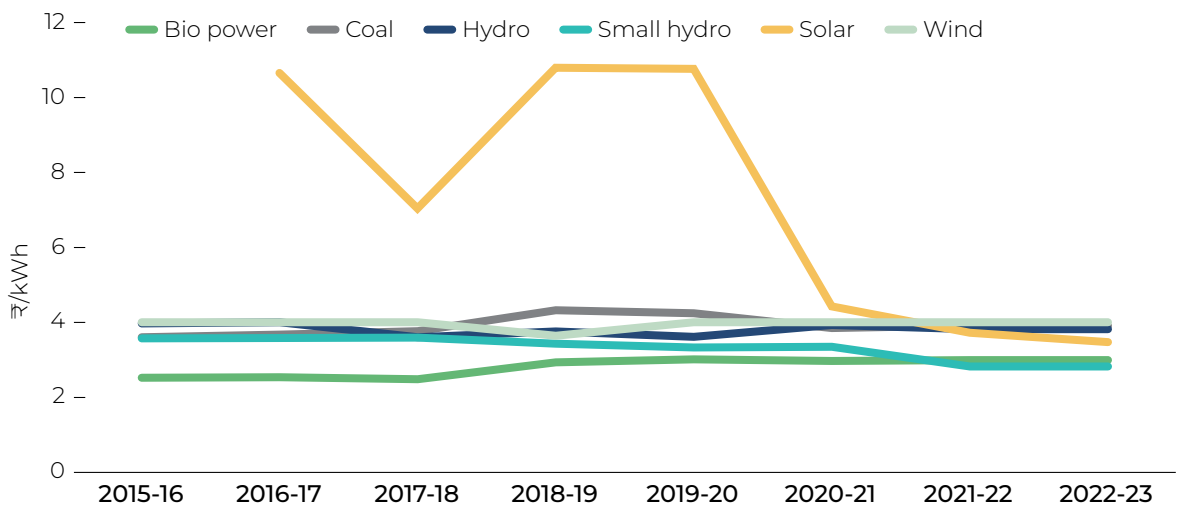
Should designated entities in West Bengal decide to meet this demand by importing electricity from generators in other states, procurement costs would be substantial (see the following section). Also, there would be substantial loss of green job/green economy opportunity for the state.

3.3 Economics of procurement

RE sources have been steadily making more financial sense. Electricity generated from coal constituted roughly 80 per cent of the total procurement of West Bengal in 2022-23. Given the rising electricity demand over time, savings can only be ensured if the cost of electricity decreases.

In case of the state, there has been a slight increase in the cost of procurement from 2015-16 levels when electricity generated from coal was procured at a rate of ₹3.6 per kWh to ₹3.9 per kWh in 2022-23[6]. In comparison, the cost of solar has fallen tremendously over the same period – registering a decrease of 68 per cent, from ₹10.6 per kWh in 2016-17 to ₹3.4 per kWh in 2022-23. The financial cost of procurement of electricity generated from coal in 2022-23 was roughly ₹157.3 billion. Had West Bengal procured the same levels of electricity generated from solar in the same year, the state would have saved roughly ₹17 billion.

Figure 3.6: Source-wise average cost of procurement of electricity in West Bengal (utilities)



Source: Niti Aayog, ICED dashboard

Meanwhile, there is a strong argument for setting up the RE capacities within the state in the coming years as the interstate transmission system (ISTS) charges and losses waiver is phased out. So far, West Bengal is heavily dependent on RE imports. In 2023-24, the main source of electricity for RE sources for WBSEDCL (the state discom) were projects tendered by the Solar Energy Company of India (SECI) which were procured via the ISTS.

Table 3.3: Electricity procurement via ISTS by the WBSEDCL

Component	MU (purchase admitted by WBERC)
NVVN bundled power solar	64
SECI – Wind	263
SECI – Hybrid	308
SECI – RTC	701
NHPC – Solar	125
Short term for non-solar RPO	611
Total	**2,072**

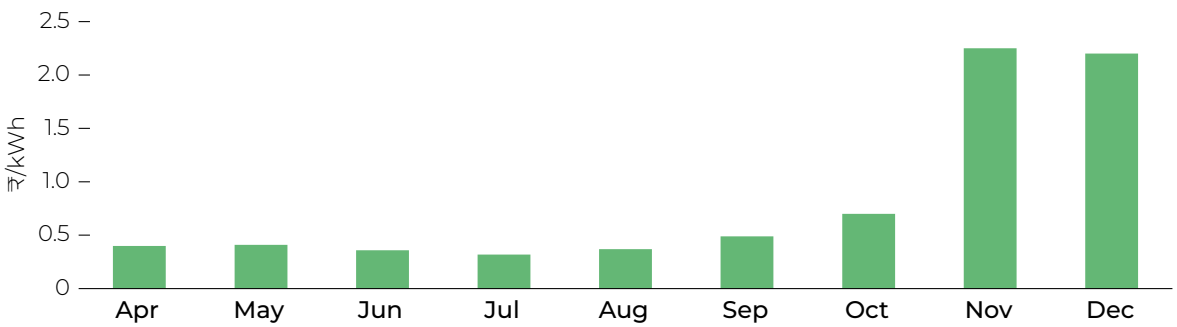
Source: WBERC

This trend has been partly due to the generation tariff differential between West Bengal and other states, and partly due to the ISTS charges and losses waiver available to solar and wind projects.

Generation tariff differential: West Bengal is moderately endowed with solar resources, where the operational efficiency of its solar installations is lower than the states of Rajasthan and Gujarat, but comparable with Karnataka. iFOREST estimates suggest that compared to Rajasthan, the tariffs of solar plants installed in West Bengal are about ₹0.29 per unit higher. Meanwhile, compared to Karnataka, the generation tariff is only ₹0.17 per unit higher.

ISTS charges and losses: At present, West Bengal discoms and industry consumers (designated ISTS consumers or DICs) pay an estimated ISTS charge of ₹0.86 per unit for power procurements through the ISTS network. This is estimated based on the charges paid in recent months against the units drawn. All RE transactions through the ISTS are currently exempted from these charges.

Figure 3.7: Month-wise estimated ISTS charges for DICs in West Bengal during 2023

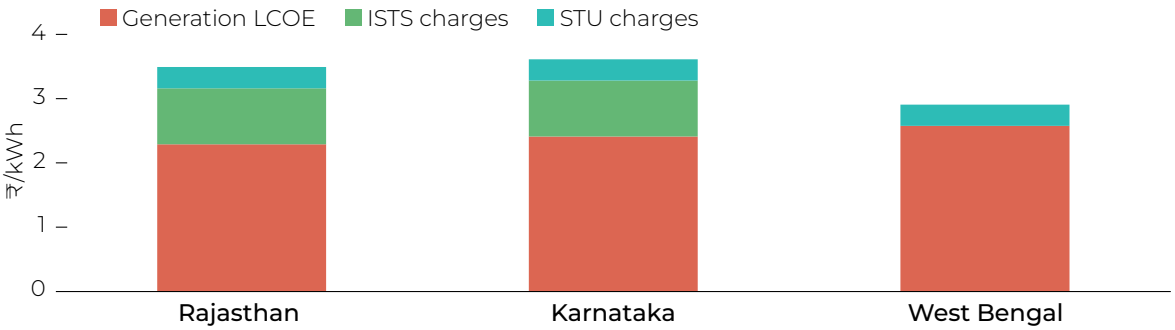


Source: iFOREST estimates based on POSOCO and ERLDC data

Given that the effective ISTS charges waivers for the state is about ₹0.90 per unit, while the generation differential can be up to ₹0.29 per unit, it acts as a significant market distortion driving up the demand for solar imports. In a scenario where state discom and industrial consumers have to pay the ISTS charges, procurement from projects located within the state would have been significantly cheaper than procurement from projects located in the so-called 'RE-rich'' states.

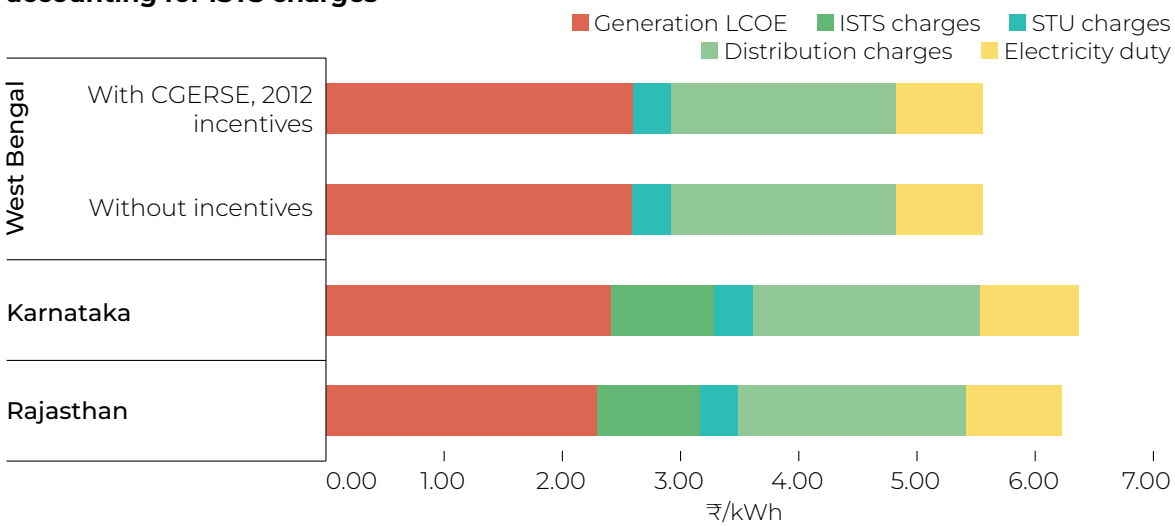
As per the current notification, the ISTS charges waiver on solar and wind project is planned to be progressively phased out from July 2025 onwards, with a complete phase out scheduled for July 2028.

Figure 3.8: Procurement cost of solar power for West Bengal discom accounting for ISTS charges



Source: iFOREST estimates

Figure 3.9: Procurement cost of solar power for OA consumers in West Bengal accounting for ISTS charges



Source: iFOREST estimates

3.4 Green jobs & green growth

The last decade of growth in RE installed capacity created substantial job opportunities in India. Between 2013-14 and 2018-19, nearly 80,000 jobs were created for utility-scale solar, wind and rooftop solar. Further, 30,000 jobs were created in just 2017-18, when India added 11.2 GW of capacity across the three segments[7]. However, these jobs largely accrued to just a handful of Indian states. For the same period (2013-14 to 2018-19), the total addition to installed capacity of RE was 43,563 MW in India. More than 70 per cent of this addition was localized to just six states – Rajasthan, Gujarat, Karnataka, Tamil Nadu, Maharashtra and Andhra Pradesh[8]. As the installations of RE projects were concentrated in these states, it follows that job creation was also highly concentrated therein.

Further, in the ongoing stage of green growth, job creation is likely to spread from energy to other sectors as well. According to a joint study by Sattva and Skill Council for Green Jobs, upto 35 million green jobs may be created in India by 2047. These jobs will be associated not only with energy but also waste management, electric vehicles, sustainable textiles and green construction[9].

Meanwhile, green industrial projects are being taken up in India as well. In 2022, the first green hydrogen hub of the country was announced in Karnataka[10]. More recently in 2024, a similar project has been announced in the state of Tamil Nadu. In the latter case, an investment of over ₹70 billion

in set to be invested in the state[11]. The Government of Tamil Nadu has also signed an agreement with Sembcorp for the development of a green hydrogen unit. The latter project is an investment of ₹36 billion, which is set to create more than 1,000 jobs in the Thoothukudi area[12].

For the state of West Bengal, there is an opportunity to be a part of the green growth story of India. Aside from electric vehicles, all other industrial sectors mentioned, as well as those already established within the state remain a viable means to generate green growth. In line with this, the Government of West Bengal has developed a green-hydrogen policy for the state.

The West Bengal Green Hydrogen Policy was notified by the Power Department in December 2023. The policy correctly identifies the immense potential for applications of green hydrogen (GH2) in the state's steel, fertiliser and sponge iron industries. To enable the production of local GH2, offers 100 per cent exemptions on land conversion fees, stamp duty and electricity duty to developers. To procure the electricity required for such production, developers can tie up with WBSEDCL, set-up captive power plants or utilise open access[13].

The incentives offered under the West Bengal Green Hydrogen Policy, welcome as they may be, are unlikely to have the desired effect as RE procurement remains an issue. While ISTS charges waiver remain available for green hydrogen till 2034, RE procurements for other green industries remains a concern.

3.5 Conclusion

Given the projected increase in electricity demand over the coming years, discoms in West Bengal face an upward-sloping cost curve. Further, procurement costs may rise steeply as RE procurement – mandated by RPOs – will be undertaken without the ISTS charges and losses waiver in the future. The rising cost of electricity will also complicate the greening of local large- and small-scale industries.

By transitioning to clean energy technologies for electricity generation, the Government of West Bengal will not only be able to meet rising electricity demand (and do so more cheaply), but it would also set the state on the path for green growth. A shift to sustainable industry would enable the state to capture a significant proportion of the green jobs expected to be generated in India in the next two decades – critical to ensuring the just transition of the state's workforce.

Thus far, West Bengal has been left out of the RE growth story of India. Now, there is an opportunity for the state to capitalise on its potential for generating electricity from RE sources and extensive industrial base to firmly plant itself as a leader in the next phase of RE growth in India.

CHAPTER 4

Institutional strengthening

The success of renewable energy (RE) policies, programmes and schemes devised by the Government of West Bengal will inevitably depend on the efficiency of its implementation. At present, the institutional set-up for supporting the renewable energy (RE) sector in West Bengal comprises the Department of Nonconventional and Renewable Energy Sources (NRES) and the two agencies functioning under it – the West Bengal Renewable Energy Development Agency (WBREDA) and the West Bengal Green Energy Development Corporation Limited (WBGEDCL).

In addition, the Department of Power continues to play an important role, through its two utilities. The West Bengal State Electricity Distribution Company Limited (WBSEDCL) is the nodal agency for the subsidy schemes of the central Ministry of New and Renewable Energy (MNRE), including rooftop scheme for domestic consumers and Component C of PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan) for solar water pumps. Further, the state generation company, West Bengal Power Development Corporation Limited also plays a crucial role by anchoring investments in utility-scale RE projects in the state.

The success of RE-related initiatives in West Bengal will depend on how effectively the responsibility is divided among these organizations, and how efficiently these roles are executed.

4.1 Existing institutional landscape

Under the Department of NRES, the division of responsibilities between WBREDA and WBGEDCL is governed by the Policy on Cogeneration and Generation of Electricity from Renewable Energy Sources (PCGERSE), 2012. Within the PGCERES, WBGEDCL is identified as the nodal agency, and given the responsibility of developing and facilitating the growth of grid-connected commercial RE projects in West Bengal. WBREDA is mandated to develop small, off-grid and distributed RE (DRE) installations in the state, while also playing a supplementary role as the developer of on-grid pilot projects for emerging technologies.

WBREDA

In 1993, WBREDA was established per the West Bengal Societies Registration Act, 1961, under the ambit of the Department of Science and Technology, Government of West Bengal[1]. As the RE technology advanced and the adoption grew, WBREDA was moved to the Department of Power and Nonconventional Energy Sources (PNES). Following the department's bifurcation in 2019, the Department of NRES took administrative control of WBREDA (and WBGEDCL)[2].

Most of the agency's work involves the implementation of rooftop solar (RTS), ground-mounted solar and biopower projects (either directly or indirectly) :

- In the RTS segment, WBREDA implements two programmes. The first is the solarization of public and public-aided schools in West Bengal. Here, they have succeeded in generating energy savings worth ₹100 million in the period 2012 to 2022[3]. In addition, like other REDAs, they also install RTS for government buildings in the state, which are undertaken on commission[4].
- WBREDA also directly developed ground-mounted solar capacity of roughly 10 MW between 2019 and 2021[5]. This capacity was developed under the Bhajanghat project in Nadia district, where two sub-systems of 5 MW each have been built. In 2022, the Bhajanghat project generated 14.1 MU of electricity for intrastate consumption.
- Between 2019 and 2021, WBREDA facilitated the development of roughly 50 MW of biomass-based cogeneration plants, under the National Bioenergy programme of the Ministry of New and Renewable Energy. Here the agency disbursed funds from the ministry to beneficiaries establishing bagasse cogeneration plants in West Bengal[6].

Table 4.1: Program-wise achievement of WBREDA

Programme	Achievement (MW)	Period
Grid-connected rooftop solar photovoltaic (GCRTSPV) systems for academic institutions	25.3	2012 to 2022
Ground mounted solar	10.2	2019 to 2021
Biopower (National Bioenergy programme)	47.7	2019 to 2021

Source: WBREDA

In addition to these three major domains, WBREDA has also worked on electrification, wind energy and DRE in the past. Between 1993 and 2012, the agency electrified over 487,000 households and installed nearly 30,000 solar streetlights in West Bengal[7]. WBREDA also developed the wind power station at Freserganj, which produced roughly 150,000 units of electricity annually until it was shut down in 2020 due to damages caused by cyclone Amphan[8]. In the DRE segment, the agency installed solar water heating stations in 82 hostels and homes developed by the Department of Backward Classes Welfare[9].

WBREDA has a Kolkata headquarters and one Siliguri district office. There is only one technical division in WBREDA, which oversees the implementation of all programmes. Aside from this, administration and accounts divisions support the agency's functioning. All three divisions are posted at the Kolkata headquarters[10].

To increase efficiency and ensure quality control, WBREDA has developed certain organisational practices. The agency has an SOP in place for RTS installations in academic institutions, which includes the establishment of district-level coordination committees consisting of stakeholders such as district authorities on education, school-level management and the area discom. In addition, the agency also provides training and orientation to the school management for primary diagnosis of plant faults. Lastly, WBREDA has developed an online mechanism for O&M of all installed assets that utilise remote monitoring systems[11].

WBREDA's funding comes almost entirely from government grants. In addition to state grants, the agency also generates some income of its own by undertaking RTS projects on commission. However, the contribution of this source of funds remains minimal[12]. In 2022-23, WBREDA received state grants of ₹654 million for programme expenditure[13].

WBGEDCL

In December 2007, WBGEDCL was established under the Companies Act, 1956 as a joint venture between the WBPDCL, WBSEDCL and WBREDA. The three organizations have an equity share of 45:35:20 in WBGEDCL. As of June 2024, the Department of NRES has administrative control of the corporation[14].

In the past five years, the WBGEDCL has largely been involved in undertaking small-scale projects. Like WBREDA, WBGEDCL has installed RTS systems for public and public-aided schools. In addition, it has also undertaken RTS projects in the residential, C&I and government segments. WBGEDCL has also installed roughly 650 solar streetlights and 20 solar masts[15].

Table 4.2: Activities undertaken by WBGEDCL between 2018 and 2024

Activity	Achievement (2018 – 2024)
Solar streetlights and high mast	643 streetlights + 20 high masts
Rooftop solar (Residential segment)	70 kW (1 project)
Rooftop solar (Govt and C&I segment)	100 kW + 30 kW under construction
Grid-connected rooftop solar photovoltaic (GCRTSPV) systems for academic institutions	2.25 MW

Source: WBGEDCL

Key concerns: A review of the activities undertaken by WBGEDCL and WBREDA indicates that the actual areas of operation of the two organisations differ significantly from those assigned to them under the PCGERSE, 2012. In practice, WBREDA carries out most RE-related responsibilities, while WBGEDCL implements RTS and DRE projects – which are largely also undertaken by WBREDA. It is unclear which agency is working as a 'think tank' for utility-scale project development and execution. The lack of clear demarcation in areas of operations prevents the development of specialised personnel (which has been critical to the development of capacity in leading RE states). Further, the organisational capacity across the two institutions remains limited, both in terms of adequate staffing and in terms of technical capability.

Table 4.3: Comparative analysis of the responsibilities of WBREDA and WBGEDCL

Organisation	Areas of operation under PCGERSE, 2012	Areas of operation, as reflected in activities
WBREDA	· Facilitation of DRE projects · Piloting emerging technologies · Facilitation of biopower projects · Establishment of green skilling pathways	· Facilitation of DRE projects · Piloting emerging technologies · Facilitation of biopower projects · Facilitation of utility-scale RE · Facilitation of RTS projects
WBGEDCL	· Facilitation of utility-scale RE · Potential evaluations · Development of a land bank · Monitoring project development · Coordinating with other line departments	· Facilitation of DRE projects · Facilitation of RTS projects

Source: iFOREST assessment

4.2 Strengthening institutional role and capacity

At the state level in India, the development of DRE and utility-scale RE has gone hand-in-hand with specialisation in the institutions that oversaw their growth. In states like Rajasthan and Karnataka, which lead in utility-scale development, REDAs are highly centralised and excel in the facilitation of private investment. In contrast, the RE agencies of Chhattisgarh and Maharashtra which have strong focus on DRE, have a more decentralised structure, with a vast district-level network that can efficiently carry out operations and maintenance of installed assets. In other words, where REDAs have succeeded, they have done so by evolving to suit the needs of the segment they work in.

At the same time, there are also commonalities: both categories of agencies have dedicated support for key segments. A recent study from iFOREST identifies the commonalities through case study of five REDAs from leading RE states and three REDAs from low RE states.[16] REDAs in leading states, such as Rajasthan and Karnataka, have successfully expanded their capacity by focusing on governance, human resources, financial autonomy, and asset management. Key success factors include strong leadership, clear division of roles, adequate staffing, regular board reviews, and use of digital tools for asset management and investment promotion. (Refer to Table 4.4 for key learnings concerning institutional characteristics of leading REDAs)

The preceding analysis on institutional capacity has clear implications for the institutional set-up in West Bengal. Large RE and DRE are two very different markets, with disparate financing mechanisms, business models, target consumers vendors and service providers. While a REDA can develop comprehensive capabilities to service both markets, typically REDAs in India seem to have a unilateral focus (either on large RE or DRE).

Table 4.4: Key learnings concerning institutional characteristics of leading REDAs

Parameter		Crucial characteristic
Organisational structure	Corporations vs. agencies	· Corporate structures tend to be more conducive for operational efficiency, due to the pressure of financial self-sufficiency
	Engagement of the governing body	· Strong and diversified board of directors/trustees, that engages regularly (at least quarterly) for performance review and strategic guidance
	Autonomy of operations	· Wide ranging autonomy for operational and strategic decision making
	Divisional responsibilities	· A clear & logical attribution of areas of operation to different divisions in the agency, typically in terms of specific RE resources
Human Resources	Leadership	· Dedicated and stable leadership to drive organization growth
	Staffing	· Staffing structure as per areas of operations – REDAs focusing on large RE tend to have a HQ heavy presence, while REDAs with DRE focus have a large and strong district presence
	Divisional target setting and review	· Annual planning, and targets at division level typically set on an annual basis and reviewed periodically
	Training and capacity building	· Formal training structures lack across all agencies but are identified as very crucial
Financing	Self-reliance	· Financial self-sufficiency (based on fees charged for services); low dependency on central and state government grants
	Regular review	· At least quarterly review of income and expenditure
Asset/Programme Management		· Formal programme management system clearly delineating responsibilities and ensuring regular check-ins · RMS systems for asset management

Based on the review of operational practices of eight REDAs (RRECL, KREDL, TSREDCO, CREDA, MEDA, OREDA, JREDA and WBREDA), the following crucial characteristics are identified for operational efficiency.
Source: iFROEST

Building on the two-organization set up pre-existing in the state, and the divergent requirement of DRE and large RE segments, it is prudent to rebuild WBREDA and WBGEDCL in the likeness of DRE and utility-scale-focused agencies, respectively. However, there needs to be a clear demarcation of responsibility, which is put into practice. Further, both organisations need to be reoriented to appropriately build the required capacity to deliver on the assigned responsibilities.

4.2.1 Role and capacity of WBGEDCL

WBGEDCL's role as the nodal agency for PCGERES or any following policy for RE promotion is crucial, and the organization should thus be assigned comprehensive responsibility of developing and facilitating the growth of grid-connected commercial RE projects in West Bengal. As such, the utility must be made responsible for stimulating, fostering, and anchoring sectoral growth. This requires both a responsibility and capability to assess and communicate opportunities, devise technology and policy solutions, engage with stakeholders and facilitate investments.

1. Anchor and facilitator of grid-connected utility-scale RE segment:

- **RE investment opportunities:** WBGEDCL must establish facilities capable of conducting comprehensive techno-economic assessments of the state's RE generation potential across various sources. This is crucial for shaping state policies/strategies, tailoring incentive packages, and building a repository of viable projects and sites for development. This is particularly important for West Bengal, where the availability of land remains constrained. The focus should not only be on identifying suitable land parcels for potential ground-mounted solar projects, as well as for land neural technologies like floating solar and canal-top solar, as well as for of utility-scale RE segments in wind energy, small hydro projects, pumped storage hydro, etc.

- **Build a strong investment case for RE projects:** Another key role for the nodal agency is to spearhead initiatives that support RE investments. This may involve developing business models that align with the techno-commercial feasibility of RE in the state, engaging with both state and central policymakers to establish a favourable policy and incentive framework, and collaborating with regulators to remove any regulatory barriers. Additionally, the nodal agency might need to design and execute pilot projects to demonstrate new technologies or business models, as well as coordinate with other agencies for project development and demand aggregation.

- **Facilitate ease of investment for developers:** To promote an investment-friendly climate, the nodal agency must focus on three key support areas for RE project development:
  - » Identifying suitable land parcels, particularly in states like Assam where land availability is a significant challenge.
  - » Assisting developers in obtaining necessary approvals (from discoms, transcos, SLDCs, electrical inspectors, etc.) promptly, ideally through an online single-window clearance system that simplifies and accelerates the approval process.
  - » Ensuring the planning and development of the required infrastructure to support RE projects.

- **Cultivate a robust developer ecosystem:** The nodal agency plays a vital role in engaging with RE developers and vendors, clearly communicating the investment potential and business case. This involves implementing a structured communication strategy, including investment conclaves and one-on-one meetings, to nurture relationships with developers.

- **Explore and promote new growth avenues through collaboration:** The nodal agency should take a forward-looking approach to RE development in the state, not just focusing on current trends but also on future opportunities. This can be achieved through collaborations with academic and technical institutions, think tanks, and policy research organizations to identify and foster new possibilities for growth.

2. Implementing institutional best practices to ensure operational efficiency

In line with the focused set of responsibilities revolving investment facilitation, a revision of WBGEDCL's business plan and organizational structure will be required. While the roles and responsibilities provide long-term guidance for the corporation, an aligned business plan will describe the immediate needs to achieve these objectives.

- **Effective leadership dedicated to advancing RE growth:** The appointment of a dedicated CEO of WBGEDCL would be crucial, along with the grant of sufficient autonomy to foster innovation and take swift action.
- **Adequate staffing for meeting stated objectives:** There should be a clear and logical division of departments, typically organized by priority technology types. This is necessary to assign specific responsibilities and enable consistent progress reviews.

- **Structured training and capacity-building programme:** This is required for both technical and non-technical skills. Given the rapidly evolving nature of RE technology and policy, WBGEDCL must stay informed about the latest developments and trends.
- **Engaging technical support agencies:** Collaborations can be built with specialized agencies (technical support partners) to help integrate best practices and sector-specific knowledge in the RE space.
- **Financial independence:** It is crucial to identify sustainable avenues for finance to support continued operations. Investment facilitation fees typically constitute the primary revenue for nodal agencies, which is completed by revenues generated by self-owned RE projects.

4.2.2 Role and capacity of WBREDA

The role and capacity of WBREDA must enhanced to serve as a cornerstone in addressing the unique demands of the Decentralized Renewable Energy (DRE) sector.

1. Anchor and facilitator of DRE and rural RE segment:

- **Clear delineation of responsibilities:** Besides energy access-related issues for certain focus segments, there are considerable opportunities to improve productivity using DRE-based solutions in agriculture and industries like tea, handloom/sericulture, bamboo, tourism, fisheries, and livestock etc. Further, new opportunities for rural transformation are emerging through new technologies like agri-PV and biofuels. While multiple agencies are involved in these deployment, institutionalizing this process through a body that provides cross-departmental technical support is vital. WBREDA is ideally positioned to take on this role. To revitalize WBREDA as a DRE and rural RE facilitator, the state government must clearly define its long-term mandate.

- **Development of a business plan:** WBREDA needs to create a strategic business plan for at least three years, based on market demands. This plan should outline which DRE interventions are most needed and can yield the highest impact. It should also define WBREDA's role as a DRE deployment facilitator. A thorough needs assessment or scoping analysis is essential to identify key DRE applications and technologies to focus on. The plan should aim to establish a sustainable ecosystem for DRE in West Bengal, incorporating aspects like consumer education, vendor development, IT-enabled monitoring, and efficient after-sales service delivery.

- **Facilitating DRE deployments:** WBREDA's role should evolve into becoming a key enabler of the DRE ecosystem in West Bengal, involving comprehensive engagement in designing, deploying, and managing DRE investments.
  - » Identify DRE deployment opportunities for both agricultural and non-agricultural uses, develop delivery models (both scheme-based and non-scheme-based) in collaboration with relevant state agencies, and secure funding sources through grants or low-cost loans.
  - » Drive demand creation through consumer awareness, education, and engagement, and stimulate supply by developing a robust vendor ecosystem, promoting local enterprise. Ensure that vendors deliver high-quality, timely installations.
  - » Oversee asset management through both online and offline tools, ensuring efficient after-sales services by coordinating with local technicians and vendors.

- **Achieving financial self-sufficiency:** WBREDA should aim for financial independence. A review of leading REDAs suggests potential revenue streams such as:
  - » Charging fees as the nodal agency for central government scheme implementations.
  - » Proposing state-level DRE schemes to secure state or development sector funding, creating a stable revenue stream through fees and implementation charges.

» Collaborating with relevant ministries to integrate DRE into existing rural schemes, charging for support services.

» Raising funds from philanthropic and corporate social responsibility (CSR) sources for community-driven DRE projects.

» Offering consultancy services for additional revenue.

2. Implementing institutional best practices for DRE scale up

WBREDA's institutional structure must be strategically revised to address the new requirements. Several REDAs in India have adopted a corporate structure to ensure efficiency. While both corporations and societies can generate revenue, corporations tend to face greater pressure to perform effectively due to the lack of direct budgetary support. Key institutional best practices, identified from a study of leading REDAs in DRE segment, include:

- **Dedicated leadership:** A leader focused exclusively on advancing DRE initiatives is essential for organizational success.
- **Robust governance:** Given the strong link between DRE and rural development, the governing board should include representatives from key state departments. The board must play an active role, conducting quarterly performance reviews and offering strategic guidance.
- **Strategic staffing:** WBREDA should establish a strong district-level presence to ensure effective project execution and asset management, supported by a well-resourced headquarters focused on business development and innovation.
- **Training and development:** A comprehensive training program should be developed to align with staff roles and responsibilities, ensuring continual skill enhancement.
- **IT-driven project management:** A formal, IT-backed program management system should be implemented to clearly assign responsibilities and facilitate regular progress tracking.
- **IT-based asset monitoring:** Real-time monitoring systems (RMS) should be mandatory for all DRE installations, with management information system (MIS) reports regularly reviewed by headquarters.
- **Collaboration with technical agencies:** Collaborations and engagement with specialized agencies and technical support partners would be crucial to integrate best practices and sector-specific knowledge.

4.3 Conclusion

Strong state-level institutions are crucial for RE scale-up – states like Chhattisgarh have managed to achieve significant progress in RE deployment despite moderate policy incentives due to the dedicated intervention of state REDA. While the institutional structure for the development of RE in West Bengal has changed over time, the sector has yet to achieve its true potential. Meanwhile, the roles assigned to WBREDA and WBGEDCL have blurred in recent years, and neither organisation is playing an investment anchor role in the state. Sector best practices provide the way forward, where the nodal agency is constantly working to identify and implement solutions aligned with local requirements and limitations. The reorganization of the institutional set-up in West Bengal would require the assignment of specific roles and responsibilities in line with the highest potential segments in West Bengal. Further, the institutional capacities of both agencies would need to be strengthened to equip them with the tools required to fulfil their new roles.

CHAPTER 5

Policy Strengthening

RE policies have been notified by nearly all states in India. These policies are aimed at supporting RE growth within respective states, with defined implementation mechanisms and incentives for investors. The West Bengal government notified the Policy on Cogeneration and Generation of Electricity from Renewable Sources of Energy, (PCGERSE) in 2012. The PCGERSE, 2012 was progressive for the time, with several important provisions for technology-specific expansion included. However, despite a modest policy aim of achieving 1,040 MW of capacity by 2017 and 2,706 MW by 2022, only 640 MW could be installed in the state till April 2024.

This can be partly attributed to gaps in implementation, as nodal agencies lacked effective capacity to implement policy provisions (as discussed in the previous chapter). More critically, the policy preceded the substantial techno-commercial advances and business model innovation of the mid-2010s in the RE sector. The support framework lacked modern approaches to investment promotion, while the technology-specific measures remained minimal in its approach. Further, due to a lack of clear operational guidelines to support policy implementation, several positive provisions were not operationalised.

At this juncture, when the previous policy has lapsed, a new policy framework must be designed for the state in a manner that fosters and facilitates investments in the various RE technologies, by building an enabling framework, providing adequate incentives, establishing ease of doing business and creating an ecosystem for manpower and entrepreneurship development.

5.1 New policy framework for RE scale-up

1. Establish ambitious growth targets for RE expansion

Clearly defined RE growth targets in terms of the capacity addition planned to be achieved through the policy are a crucial and fundamental feature of state RE policies. These are often, but not always, broken down in terms of technology-wise targets or year-wise targets, as well as in terms of the implications on investments and job creation. It is crucial however for the targets to be seen as ambitious and aligned to the national targets.

The new RE policy for West Bengal must also reflect a strong ambition towards scaling RE capacity as a part of its overall climate mitigation plan. It must position the state as an attractive destination for RE investment, after thoroughly evaluating state-specific opportunities and limitations with the twin objectives of scaling clean energy capacity and creating green jobs.

The new target for West Bengal can be rooted in the projected growth in state electricity demand, and the national RE goals which are also reflected in the new mandates for renewable procurement obligations (RPO). iFROEST estimates indicate that this is likely to lead to a new RE capacity requirement of 15.4 GW by 2026-27, and 24.4 GW by 2031-32 across the utility and captive segments (as discussed in section 3.2). RE policy can aim to meet at least half of this requirement through intra-state projects. This would help create a local ecosystem development for RE sector and support local job creation.

This target can be further broken down in terms of specific generation technologies, with due consideration of local generation potential and the technology-specific RPO requirements. Further, the target can also be broken in terms of the utility and captive segments. Given that captive energy requirements are likely to be 15 per cent of the total projected electricity demand in 2031-32, 10 to 15 per cent of the new target could be set for the captive industries.

2. Comprehensive scope of policy

The scope of RE policies varies significantly between states based on their unique strengths and areas of focus. The new RE policy for West Bengal should seek to be comprehensive, covering all high-potential technologies, across utility-scale technologies and DRE technologies (grid-connected or off-grid). The policy can provide a broad framework for their development, and provide guidance for

technology-specific policies/guidelines to be developed for high-potential segments such as pump storage hydro, floating solar, small hydro, or urban and rural distributed renewable energy DRE.

3. Clear division of responsibilities among nodal agencies

While most state RE policies identify one nodal agency. There are examples of two agencies being identified – one for oversight and one for execution (like in Gujarat) or one for utility-scale RE and one for DRE (like in Odisha). As for responsibility, the nodal agencies are typically responsible for overseeing, reviewing and registering projects, monitoring their implementation progress and certifying commissioning. Their role also includes facilitating clearance, though this is often limited to writing letters of recommendation to concerned authorities. Few agencies also engage in RE procurement facilitation on behalf of respective state discoms (like in Rajasthan).

In West Bengal, two agencies are already responsible for the development of RE. The model can be continued given that disparate institutional structures and visions are required to address the specific concerns of utility RE and DRE segments. As discussed in the previous chapter, the West Bengal Green Energy Development Corporation Limited (WBGEDCL) can be provided the detailed role of anchoring growth in the utility segment, while the West Bengal Renewable Energy Development Agency (WBREDA) can be assigned the same role in the DRE segment.

It is crucial however that the policy provides for explicit interventions and funding avenues to ensure that the capacity of the two organizations is adequately built to deliver the assigned responsibility.

4. Implementation mechanism

An overall capacity cap for solicited and unsolicited projects can be discontinued (in PCGERSE the limit is defined as 2 MW and above). This can be determined at varied levels for varied RE technologies. For promoting certain technology segments, the capacity cap for engaging developers on an award basis can be defined at higher limits. For instance, the first 500 MW of wind can be developed on a first-come-first-serve basis through a feed-in-tariff mechanism to promote wind energy installations in the state.

Further, WBGEDCL can be mandated to engage in procurement bids in coordination with and on behalf of state discoms, with set targets for bidding. For instance, procurement for 500 MW of RE capacity per year can be mandated for intrastate projects. This can be aligned with the expected increase in electricity demand in the state. The process of competitive award and unsolicited allotment can then be defined. For the ease of investors, project approvals must be granted at the department/agency level.

Further, the new policy must identify a clear standard operating procedure (SOP) for project registration, approval and execution to ensure timely execution of projects. Lastly, to improve the ease of doing business in the RE sector, a single-window facility should be introduced and digitized. A single-window facility operated by the implementing agency allows investors to fulfil all requirements associated with project development via one nodal agency. Digitizing this mechanism will improve access to updated information, and lower response times from the implementing body[1].

5. Create technology-specific mechanisms for project implementation

The technology-specific mechanisms often vary across state policies depending on local circumstances and state priorities. These typically identify the growth pathways for specified technologies and define the parameters of project development (in terms of what is allowed and what is not). This also reflects the state government's focus areas. To accurately respond to the differentiated needs of developers associated with each source, the new West Bengal RE policy must provide technology-wise frameworks.

For instance, for utility-scale solar PV development, the policy must address the challenges posed by land identification and procurement challenges. The nodal agency must be mandated to set up a resource center for identifying and creating a bank of investable solar projects that can be developed by PSUs through the award route or awarded to private developers through competitive bidding. The nodal agency must also identify and implement innovative models for project development that suit the fragmented and small size of land holdings in the state – such as land lease models and virtual parks. Special schemes can be designed for meeting state RPO requirements through intrastate solar projects. It would be crucial for the nodal agency to actively collaborate with the four national-level Renewable Energy Implementing Agencies (REIA) that are playing a vital role in RE capacity development in India.

For wind power development, wind potential assessment must be prioritized. The nodal agency can coordinate with the National Institute of Wind Energy or other technical agencies to set up ground monitoring systems and identify high-potential locations. Alternatively, the private sector can be encouraged to apply for wind resource assessment, with an incentive for the project to be awarded on a first-come-first-serve basis.

The policy must also address the critical need to enhance storage capacity through pump hydro projects and battery energy storage systems (BESS). Prioritizing RE projects with storage solutions is essential for reducing supply variability. Additionally, it should encourage the hybridization of existing thermal power plants and the co-firing of coal plants, as well as explore the bundling of thermal power with new solar projects.

6. Incentives for utility and industrial procurements

To establish West Bengal as the leading destination for RE investment, an incentive framework would need to be created within the RE policy to adjust the economics of project development. Given the solar resource quality of the state, iFOREST estimates the generation LCOE differential of a solar project located in West Bengal compared to a project located in Rajasthan to be Rs 0.40 per unit. In addition to this, comparative advantage of Rs 0.90 per unit is estimated to be gained from interstate procurements due to the existing waiver on ISTS charges and losses on solar and wind projects. The open-access regulations 2022 introduced a range of incentives for green open-access consumers to improve intrastate procurement economics. However, these incentives need to be strengthened aligned with actual cost differential and extended to all categories of power consumers (including captive and utility).

7. Infrastructure support

Infrastructure support, in the form of facilitating land acquisition/leasing and grid development, is often the most crucial element of RE policy support for developers. Typically, land acquisition/leasing is a developer's responsibility across all states. However, often government wastelands or water bodies are made available at a concessional rate to RE projects supplying power to state utilities (such as in states like Gujarat and Madhya Pradesh). Importantly, a deemed conversion of agricultural land is allowed for RE projects in most states. These best practices can also be adopted by the new West Bengal RE policy. Further, to accelerate project identification, the policy must call for a dedicated unit focused on resource identification and project development to be established at both nodal agencies – for utility-scale and DRE projects.

In terms of grid infrastructure development, typically developers are responsible for setting up the evacuation infrastructure in all states. The new RE policy must define SOP for expediting interconnection clearance. The policy must also emphasize development of comprehensive RE evacuation infrastructure development and integration of monitoring technologies for ensuring grid security.

8. Ecosystem creation

The RE policy must include sufficient provisions for demand creation. Demand can be stimulated through mechanisms such as green power tariffs for consumers seeking 100% RE power. Further, the policy can allow the purchase of RE power for an initial aggregate capacity cap at pre-fixed, levelized tariffs without a competitive bidding process. Further, provisions and incentives can also be created by the policy for the phased development of green zones (like SEZs), green cities, green villages and green government buildings in the state.

Moreover, the policy should develop mechanisms to build the RE workforce and research and development (R&D) capabilities. The policy should call for the mobilisation of existing skill development infrastructure to support RE skill-building initiatives. This would not only help meet the required demand for RE workers in the state but also outside the state (as the sector is booming).

5.2 Conclusion

The renewable energy sector in West Bengal has significant potential, but a strong policy framework is needed to harness this potential. Significant support is required to establish a dynamic and sustainable market for RE in West Bengal. There is an opportunity to design and implement a new policy framework for RE promotion in West Bengal, as PCGERSE is over a decade old. The new policy must provide the right signals by setting ambitious targets, offering technology-specific solutions, and establishing a comprehensive support system for developers and investors. The objective should be to develop an ecosystem for RE investments in the state focused on removing investment barriers and creating supportive project development frameworks. The new policy will also create opportunities for job growth and position the state as a competitive destination for renewable energy investments.

CHAPTER 6

Conclusion

West Bengal has been an early pioneer in renewable energy (RE) sector, initiating projects such as mini-grids in the Sunderban delta and the Jamuria solar plant. However, despite these early achievements, the state has lagged behind in RE development. By April 2024, its installed RE capacity stood at just 640 MW, accounting for a mere 0.4 per cent of India's total RE capacity. Progress has been slow, with minimal new capacity added since 2019, and the state has struggled to meet its renewable purchase obligations (RPOs), with compliance at just 15.9 per cent in 2022-23.

Several factors have contributed to West Bengal's limited RE growth, including the national policy design, which favoured states with better solar resources, and internal policy inertia. While the state remains reliant on coal-based power, recent steps have been taken to improve the role of RE in its energy mix, such as government tenders for rooftop solar installations and plans for a new 900 MW pumped hydro storage project. Additionally, new policies in bioenergy, green hydrogen, electric vehicles, and RE manufacturing were introduced in 2023.

Looking ahead, the demand for electricity in West Bengal is expected to grow by 5 per cent annually in the utility sector and 19 per cent in the captive segment over the coming decades. Meanwhile, the state's RPO target is set to increase from 29.9 per cent in 2024-25 to 43.3 per cent by 2029-30. These combined factors will drive an estimated RE capacity requirement of 15.4 GW by 2026-27 and 24.3 GW by 2031-32. Despite the low current installed capacity, the state has significant untapped RE potential, with estimates suggesting the actual generation potential is far higher than official projections.

However, challenges such as limited land availability and weak private-sector participation in project development remain. There is also a policy gap, as the 2012 Policy on Cogeneration and Generation of Electricity from Renewable Sources of Energy (PCGERSE) expired in 2022. Furthermore, key state agencies like the West Bengal Renewable Energy Development Agency (WBREDA) and the West Bengal Green Energy Development Corporation Limited (WBGEDCL) lack the capacity and experience needed to lead large-scale RE projects and engage with investors effectively.

To drive a transformational change in the RE sector, West Bengal needs a comprehensive policy framework that establishes clear targets, supports investment promotion, and strengthens institutional capacity. This policy should aim to position West Bengal as a competitive destination for RE investments, create job opportunities, and contribute to climate change mitigation efforts.

Institutional reforms are further essential to realizing West Bengal's RE potential. Both WBGEDCL and WBREDA need to play active roles in facilitating investments, identifying technology and business models, and promoting a robust vendor ecosystem. This will require a comprehensive set of measures to enhance the institutional capacity of these two organizations.

Overall, West Bengal must prioritize renewable energy growth to foster local employment, drive economic development, and support global climate goals. With much of the state's thermal capacity aging, a progressive RE policy and a strengthened institutional structure are critical to ensuring a just energy transition and tapping into the significant opportunities presented by the RE sector.

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Chapter 5. Policy strengthening

1. 1.For reference, see the Maharashtra Energy Development Agency’s (MEDA) single window portal: https://regridmeda.mahadiscom.in/swPortal/login

Notes

Notes

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International Forum for Environment, Sustainability & Technology (iFOREST) is an independent non-profit environmental research and innovation organisation. It seeks to find, promote and scale-up solutions for some of the most pressing environment–development challenges. It also endeavours to make environmental protection a peoples' movement by informing and engaging the citizenry on important issues and programs.

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