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CLEAN ENERGY
UNTAPPED POTENTIAL

A Research-based Recommendation Paper By
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29th May, 2026

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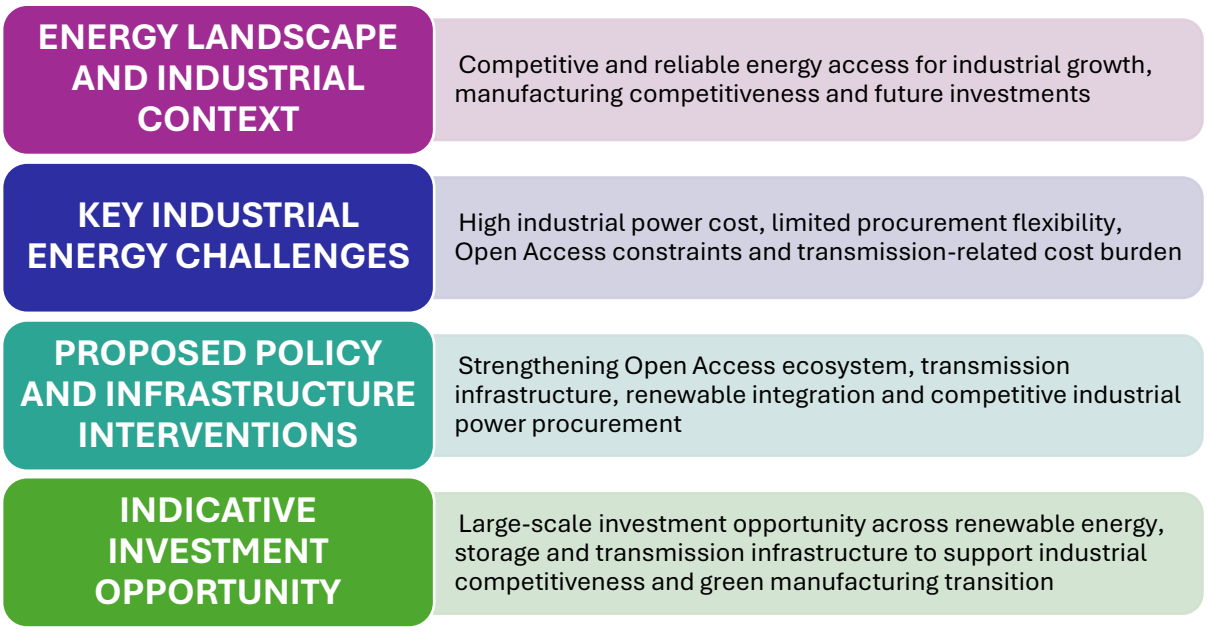
1. EXECUTIVE SUMMARY

West Bengal recorded a peak electricity demand of approximately 12,495 MW in 2025, reflecting increasing industrial and commercial power demand across major industrial regions including Haldia, Durgapur-Asansol, Dankuni, Howrah and Kharagpur. At the same time, industries continue to face challenges relating to high effective electricity cost, Open Access constraints, transmission-related charges and limited commercially viable renewable integration.

While several competing industrial states including Gujarat, Tamil Nadu, Karnataka and Maharashtra have strengthened industrial renewable competitiveness through Open Access reforms, renewable banking and transmission readiness, industrial consumers in West Bengal continue to face relatively higher landed renewable procurement cost due to interstate transmission charges, wheeling charges and other Open Access-related cost components.

In this context, BCC&I has prepared this volume examining the current industrial energy landscape of West Bengal, key structural challenges, comparative positioning of leading industrial states and targeted interventions required for strengthening industrial power competitiveness, renewable integration and long-term low-carbon industrial growth in the state.



2. ENERGY LANDSCAPE AND INDUSTRIAL CONTEXT

Competitive and reliable energy access is becoming increasingly important for industrial competitiveness and future manufacturing investments in West Bengal, particularly across major industrial regions including Haldia, Durgapur-Asansol, Dankuni, Howrah and Kharagpur.

West Bengal recorded a peak electricity demand of approximately 12,495 MW in 2025, reflecting increasing industrial and commercial power demand. At the same time, industrial consumers continue to face:

- High Industrial Electricity Cost
- Open Access Constraints
- Transmission and Wheeling Cost Burden
- Limited Access to Competitive Renewable Power

These factors are increasingly influencing manufacturing competitiveness, industrial expansion and long-term investment decisions. In this context, strengthening renewable integration and competitive power access is becoming increasingly important for the state's industrial ecosystem.

Renewable Energy Potential in West Bengal

West Bengal has an estimated renewable energy potential of 15,984 MW against an installed capacity of only 2,113 MW, indicating utilisation of nearly 13% of the available renewable energy resource potential. Despite significant opportunities across solar, pumped storage, biomass and hybrid systems, renewable energy deployment in the state remains substantially below potential.

RE Source	Estimated Potential (MW)	Installed Capacity (MW)	Utilisation %
Wind	1,281	0	0
Small Hydro	392	99	~25
Biomass & Waste-to-Energy	1,742	352	~20
Solar	6,260	321	~5
Large Hydro	809	441	~55
Pumped Storage	5,500	900	~16
Total	**15,984**	**2,113**	**~13**

Solar energy represents the largest untapped renewable opportunity with a gap of nearly 5,939 MW between estimated potential and installed capacity.

Pumped Storage Projects (PSPs) offer significant opportunity for:

- **Grid Balancing**
- **Peak Demand Management**
- **Renewable Integration**
- **Energy Storage**

Biomass and Waste-to-Energy systems also offer opportunity due to availability of agro-residue and municipal waste streams.

Despite this resource base, renewable integration across industrial power ecosystems remains limited compared to several competing industrial states. This has increased the importance of strengthening industrial renewable ecosystems, transmission readiness and competitive power procurement frameworks.

Emerging Industrial Energy Transition

Several industrial states including Gujarat, Tamil Nadu, Karnataka and Maharashtra have strengthened industrial renewable competitiveness through Open Access reforms, renewable banking and transmission readiness.

Strengthening renewable integration and competitive industrial power procurement will therefore become increasingly important for manufacturing competitiveness and future industrial investments in West Bengal.

3.KEY INDUSTRIAL ENERGY CHALLENGES

Challenge Area	Current Situation	Industrial Impact
High Industrial Power Cost	Industrial consumers continue to face high effective electricity cost due to interstate transmission charges, wheeling charges, Cross-Subsidy Surcharge (CSS), additional surcharge and other Open Access-related cost components under existing power procurement mechanisms.	Higher manufacturing cost and reduced industrial competitiveness
Limited Competitive Power Procurement Ecosystem	Despite implementation of the Green Open Access Rules by the Ministry of Power, industrial Open Access procurement remains commercially constrained due to high landed delivery cost and operational limitations affecting both renewable and conventional power procurement.	Limited procurement flexibility and continued dependence on utility-linked supply structures
Solar Deployment and Net Metering Constraints	State renewable energy assessments indicate solar potential of approximately **6,260 MW** in West Bengal. However, procedural delays, approval constraints and net metering limitations continue to affect industrial rooftop solar adoption and decentralised renewable integration.	Slower decentralised renewable adoption and higher industrial electricity expenditure
Underutilised Pumped Storage Potential	Central Electricity Authority (CEA) and Government of India hydropower assessments indicate pumped storage potential of approximately **5,500 MW** in West Bengal despite increasing renewable integration requirements. The existing Purulia Pumped Storage Project currently operates with installed capacity of **900 MW**.	Limited grid balancing capability and renewable integration capacity
Industrial Decarbonisation Challenge	Industries continue to face difficulty in transitioning towards low-carbon manufacturing ecosystems due to limited commercially viable access to renewable energy and storage-linked power systems.	Reduced readiness for emerging low-carbon manufacturing ecosystems
Export Competitiveness and CBAM Risk	Emerging trade mechanisms including the European Union's Carbon Border Adjustment Mechanism (CBAM) are expected to affect sectors including steel, aluminium, chemicals and engineering products.	Increased compliance burden and potential reduction in export competitiveness

Sources: Ministry of Power, Government of India; Ministry of New and Renewable Energy (MNRE); Central Electricity Authority (CEA); WBERC Tariff Orders; State Renewable Resource Assessments; Green Open Access Rules; Industry and Sectoral Energy Estimates.

Open Access and Industrial Power Procurement

Industrial consumers in West Bengal continue to face challenges in procuring competitively priced renewable power through Open Access mechanisms.

Key challenges include:

- Limited land availability, moderate solar irradiation and constrained wind potential restricting large-scale renewable generation within the state
- Rooftop solar adoption constraints due to rooftop limitations, net metering bottlenecks and approval-related challenges
- High interstate transmission charges, wheeling charges and other Open Access-related cost components affecting commercial viability of interstate renewable procurement

These factors continue to limit cost-effective renewable integration and industrial power competitiveness in West Bengal. However, the final landed cost for industries in West Bengal increases substantially because of:

Cost Component	Explanation	Industrial Impact
Interstate Transmission Charges	Charges for use of interstate transmission network across states	Increases delivered renewable power cost
Wheeling Charges	Charges for use of state transmission and distribution network	Adds per-unit procurement cost burden
Cross-Subsidy Surcharge	Compensation payable to distribution utilities for migration of industrial consumers under Open Access	Reduces Open Access competitiveness
Additional Surcharge	Recovery of stranded fixed power purchase costs of utilities	Further increases landed procurement cost
Banking Charges	Charges applicable for banking excess renewable power for later consumption	Reduces procurement flexibility
Scheduling and Balancing Charges	Charges related to grid balancing and variability management	Adds operational cost burden
Transmission Losses	Technical losses during long-distance transmission	Increases effective delivered power cost

As a result, renewable power procurement through Open Access frequently becomes commercially less viable despite lower renewable generation tariffs in renewable-rich states including Gujarat, Rajasthan, Karnataka and Tamil Nadu.

INDUSTRIAL POWER PROCUREMENT COMPETITIVENESS BENCHMARKING

Parameter Affecting Industrial Power Competitiveness	Gujarat	Tamil Nadu	Karnataka	Maharashtra
Renewable Banking Mechanism	Banking provisions available under Gujarat Electricity Regulatory Commission renewable and Open	Banking provisions available under Tamil Nadu Electricity Regulatory Commission regulations	Banking support available under state renewable procurement framework	Banking permitted for captive and Open Access consumers

	Access framework			
Open Access Renewable Procurement Ecosystem	Mature industrial Open Access ecosystem with significant industrial renewable adoption	Strong industrial renewable procurement ecosystem	Early renewable Open Access adoption ecosystem	Large industrial captive and Open Access market
Cross-Subsidy Surcharge and Additional Surcharge Ecosystem	Concessions and exemptions available under specific captive and renewable procurement categories	Renewable procurement support available under state Open Access framework	Renewable-linked procurement support mechanisms available	Captive renewable procurement ecosystem reduces effective surcharge burden
Transmission and Wheeling Ecosystem (Charges payable for transporting electricity through state transmission and distribution networks)	Strong renewable evacuation infrastructure and transmission readiness	Advanced renewable evacuation ecosystem	Developed renewable transmission ecosystem	Strong industrial renewable transmission support
Industrial Rooftop Solar Ecosystem	Large-scale commercial and industrial rooftop solar adoption	Strong industrial rooftop solar ecosystem	Mature industrial rooftop solar adoption	Large commercial and industrial rooftop market
Net Metering Ecosystem (Mechanism allowing rooftop solar consumers to export excess power to the grid and offset electricity consumption through billing adjustment)	Supportive rooftop solar and net metering framework	Net metering support available under state regulations	Industrial rooftop integration supported through net metering ecosystem	Large-scale rooftop integration ecosystem
Renewable Parks and Renewable Industrial Zones	Large solar and hybrid renewable	Wind-solar renewable	Utility-scale solar parks operational	Industrial renewable procurement

	parks operational	corridors operational		ecosystem developed
Storage Ecosystem (Pumped Storage Projects and Battery Energy Storage Systems)	Hybrid renewable and BESS (Battery Energy Storage System: Storage systems used to store excess renewable power and support grid balancing, peak demand management and reliable industrial power supply) ecosystem expanding	Pumped Storage Project expansion and storage-linked renewable integration underway	Storage-linked renewable integration ecosystem emerging	Utility-scale storage deployment growing
Industrial Renewable Procurement Ecosystem	Large-scale industrial renewable adoption across manufacturing sectors	Strong manufacturing-linked renewable procurement ecosystem	Significant industrial solar procurement ecosystem	Large industrial captive renewable procurement ecosystem

Sources: Gujarat Electricity Regulatory Commission Regulations; Tamil Nadu Electricity Regulatory Commission Open Access Regulations; Karnataka Electricity Regulatory Framework; Maharashtra Electricity Regulatory Commission Open Access Regulations; Ministry of Power Green Open Access Rules; Central Electricity Authority; State Renewable Energy Policies and Regulatory Frameworks.

Key Strategic Observations

- Gujarat, Tamil Nadu, Karnataka and Maharashtra have progressively strengthened renewable banking, Open Access ecosystems and industrial renewable procurement frameworks to improve renewable power competitiveness for industries.
- Competing industrial states have also strengthened renewable evacuation infrastructure, rooftop solar ecosystems, captive renewable procurement models, and storage-linked renewable integration.
- In comparison, industries in West Bengal continue to face relatively higher effective renewable procurement cost due to transmission and wheeling burden, surcharge structure, limited banking flexibility, and constrained Open Access competitiveness.
- These factors increasingly affect industrial electricity expenditure, renewable integration, manufacturing competitiveness, and low-carbon industrial transition

4. PROPOSED POLICY AND INFRASTRUCTURE INTERVENTIONS

Strengthening industrial energy competitiveness in West Bengal will require targeted policy and infrastructure interventions focused on reducing industrial electricity cost, improving procurement flexibility, strengthening renewable integration and enabling commercially viable access to renewable and conventional power for industries.

The following strategic interventions are proposed based on the key industrial energy challenges identified across Open Access procurement, renewable integration, transmission infrastructure and industrial power competitiveness.

Competitive Open Access and Industrial Power Procurement Reforms

- Rationalisation of wheeling charges for industrial Open Access consumers
- Rationalisation of Cross-Subsidy Surcharge and additional surcharge burden
- Competitive renewable Open Access framework for industries
- Competitive conventional Open Access ecosystem for industrial baseload demand
- Improved renewable banking flexibility for industrial consumers
- Simplified and commercially viable industrial net metering framework
- Time-bound and digital Open Access approval mechanism
- Promotion of group captive renewable procurement structures for industrial clusters

Renewable Transmission and Industrial Power Infrastructure

- Strengthening renewable evacuation infrastructure across industrial regions
- Development of industrial green power corridors for Haldia, Durgapur-Asansol and other industrial belts
- Strengthening transmission connectivity for industrial renewable procurement
- Grid modernisation for renewable integration and industrial reliability
- Transmission-ready renewable infrastructure for industrial growth zones

Pumped Storage, Battery Storage and Grid Stability

- Fast-track development of Pumped Storage Projects across identified locations including Purulia
- Deployment of Battery Energy Storage Systems for renewable balancing and peak demand management
- Promotion of storage-linked renewable procurement models
- Strengthening renewable balancing and grid stability infrastructure

Industrial Rooftop Solar and Decentralised Renewable Systems

- Simplified rooftop solar implementation framework for industries and warehouses
- Industrial net metering reforms for improving rooftop solar viability
- Promotion of captive and group captive rooftop solar systems
- Solarisation of industrial estates and utility infrastructure
- Expansion of decentralised renewable systems across MSME clusters

Interstate Renewable Procurement and Industrial Competitiveness

- Interstate renewable procurement partnerships with renewable-rich states
- Reduction of landed renewable power cost through transmission and procurement optimisation
- Institutional coordination framework for industrial renewable procurement
- Improved long-term access to competitively priced green power for industries
- Strengthening industrial competitiveness through lower-cost renewable procurement

Alignment with Central Government Initiatives

The following Central Government initiatives become strategically important in the context of this volume as they provide policy frameworks, financial support mechanisms and institutional support for strengthening renewable integration, storage infrastructure and industrial green power access.

Central Government Initiative	Key Incentive / Support Mechanism	Applicable Stakeholders
Green Open Access Rules Ministry of Power	Reduced eligibility threshold to 100 kW for renewable Open Access procurement and simplified renewable procurement framework.	Industries, commercial consumers, captive and group captive users
PM-KUSUM Ministry of New and Renewable Energy	Central Financial Assistance for feeder solarisation, decentralised solar plants and solar agricultural pumps.	Farmers, rural infrastructure developers and decentralised renewable developers
PM Surya Ghar Rooftop Solar Programme Ministry of New and Renewable Energy	Central Financial Assistance for rooftop solar systems.	Residential consumers, MSMEs and commercial establishments
Green Energy Corridor Programme Ministry of Power	Central support for renewable transmission and evacuation infrastructure.	Transmission utilities, renewable developers and industrial regions
Battery Energy Storage System Viability Gap Funding Scheme Ministry of Power	Viability Gap Funding support for grid-scale Battery Energy Storage System projects.	Storage developers, utilities and renewable energy companies
National Green Hydrogen Mission Ministry of New and Renewable Energy	Incentive support for green hydrogen production, electrolyser manufacturing and pilot projects.	Refineries, fertilisers, steel, petrochemicals and advanced manufacturing sectors
National Bioenergy Programme Ministry of New and Renewable Energy	Central Financial Assistance for biomass, biogas and waste-to-energy projects.	Biomass developers, agro-industries, municipal bodies and waste-to-energy developers
Production Linked Incentive Scheme for High Efficiency Solar Photovoltaic Modules Ministry of New and Renewable Energy	Incentive support for domestic solar photovoltaic manufacturing ecosystem.	Solar manufacturers, renewable equipment manufacturers and industrial investors

5. INDICATIVE INVESTMENT OPPORTUNITY

Strengthening industrial energy competitiveness and renewable integration in West Bengal will require large-scale investments across renewable generation, storage systems, transmission infrastructure and industrial green power ecosystems.

The following estimates are indicative in nature and represent broad investment potential across key energy transition segments relevant for industrial competitiveness, renewable integration and long-term manufacturing growth.

Indicative Investment Opportunity

Action Area	Benchmark Cost (₹ Cr./MW)	Estimated Investment Requirement (₹ Cr.)
Utility Scale Solar (5 GW)	4–4.4	20,000–22,000
Rooftop Solar (1 GW)	4–4.5	4,000–4,500
Pumped Storage Expansion	6.5–7.5	30,000–34,500
Biomass and Waste-to-Energy	5–5.5	7,000–7,500
Wind and Hybrid Projects	5–5.5	6,000–6,500
Transmission and Storage Infrastructure	—	10,000–12,000
Total Indicative Investment Opportunity		**₹77,000–87,000 Crore**

6. CONCLUSION

West Bengal possesses a substantial yet underutilized renewable energy base, with only around 13% of its estimated renewable potential currently developed. At a time when industrial competitiveness is increasingly linked to access to affordable, reliable and low-carbon power, the state's industries continue to face challenges arising from high effective electricity costs, Open Access-related charges and limited renewable procurement flexibility. While leading industrial states have leveraged regulatory reforms, transmission readiness and renewable integration to strengthen manufacturing competitiveness, West Bengal retains significant scope to improve its industrial energy ecosystem.

Targeted interventions focused on Open Access facilitation, renewable energy deployment, storage infrastructure, transmission strengthening and industrial green power access can unlock substantial economic benefits. With an indicative investment potential of ₹77,000–87,000 crore across renewable generation, storage and associated infrastructure, the energy transition presents a strategic opportunity to enhance industrial competitiveness, attract future manufacturing investments and support long-term sustainable industrial growth in West Bengal.

7. ANNEXURE

Sources

- Central Electricity Authority (CEA)
  Central Electricity Authority
- Ministry of Power, Government of India
  Ministry of Power
- Ministry of New and Renewable Energy (MNRE)
  Ministry of New and Renewable Energy
- Green Open Access Rules
  Green Open Access Rules
- West Bengal State Electricity Distribution Company Limited (WBSEDCL)
  WBSEDCL
- West Bengal Electricity Regulatory Commission (WBERC)
  WBERC
- Central Electricity Regulatory Commission (CERC)
  CERC
- PM-KUSUM Scheme
  PM-KUSUM Scheme
- PM Surya Ghar Rooftop Solar Programme
  PM Surya Ghar
- National Green Hydrogen Mission
  National Green Hydrogen Mission
- Green Energy Corridor Programme
  Green Energy Corridor Programme
- Battery Energy Storage System (BESS) Viability Gap Funding Scheme
  Battery Energy Storage System Scheme
- National Bioenergy Programme
  National Bioenergy Programme
- Production Linked Incentive Scheme for High Efficiency Solar PV Modules
  PLI Scheme for Solar PV Modules
- Gujarat Electricity Regulatory Commission (GERC)
  GERC
- Tamil Nadu Electricity Regulatory Commission (TNERC)
  TNERC
- Karnataka Electricity Regulatory Commission (KERC)
  KERC
- Maharashtra Electricity Regulatory Commission (MERC)
  MERC

ROYAL EXCHANGE