Industry Report
June 2026

Powering India's Textile Future

How Battery Energy Storage Systems (BESS) Can Reduce Electricity Costs for Textile Manufacturers in India

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Executive Summary & Key Takeaways

India's Textile Sector at a Glance

India's textile and apparel (T&A) exports rose **6.32%** to **USD 37.75 billion** in FY25, up from USD 35.87 billion in FY24. On a calendar-year basis (Jan–Dec 2025), T&A exports stood at USD 37.54 billion. T&A accounts for ~8.37% of India's total merchandise exports, making India the 6th largest global exporter with ~4% share in world textile trade. (Source: PIB, Ministry of Commerce)

Energy intensity across the textile value chain is rising. The ICRA ESG Ratings report (covering 19 major firms, FY23–FY25) found that energy intensity increased 6–8% over FY23 levels, with apparel segment energy intensity rising 28% and yarn & fabric up 8.5%. (Source: ICRA ESG Ratings, Dec 2025)

Renewable energy adoption is accelerating: the average RE share in total energy consumption rose from ~14% in FY23 to ~18% in FY25 for leading textile companies, with apparel companies at ~28% RE share. (Source: ICRA ESG Ratings)

Diesel gensets (DG), the traditional fallback for grid unreliability, now generate power at Rs 25–30 per kWh 2–3× the grid tariff. CPCB IV+ norms (effective July 2023) have increased DG capital costs by 20–40%, while NCR-region bans restrict DG use during severe air quality episodes. (Source: Power Line Magazine, CPCB)

What This Means for Textile Decision-Makers

Energy cost and reliability are now boardroom issues.
With industrial tariffs at Rs 7.38–9.04/unit across key textile states and electricity-related charges up over 60% since 2022 in clusters like Coimbatore–Tiruppur, power is no longer a fixed overhead it is a variable competitive factor.

Plants that reduce DG dependency and increase RE + storage will protect margins
in an environment where global buyers increasingly demand Scope 1 & 2 emission disclosures and % RE in the power mix.

Battery Energy Storage Systems (BESS)
are emerging as one of the key technologies to unlock cheaper, cleaner, and more reliable power by enabling peak shaving, DG runtime reduction, and RE firming.

India's Textile Industry Today: Structure, Scale & Geography

Current Size and Growth

India's textile manufacturing market was valued at approximately USD 133.6 billion in 2025, projected to reach USD 192 billion by 2034 at 3.99% CAGR (Source: IMARC Group). The broader textile market (including retail) is estimated at USD 152.4 billion. The sector provides direct employment to over 45 million people, making it the second-largest employer after agriculture (Source: PIB Year End Review 2024). Estimated employment generation reached 97.30 lakh persons in FY 2024-25 (Source: Ministry of Textiles).

FY25 Export Breakdown

Segment	Export Value (FY25)	YoY Growth
Apparel (RMG)	USD 15.99 billion	+10.03%
Cotton Yarn, Fabrics, Made-ups, Handloom	USD 12.06 billion	+3.19%
MMF Yarn, Fabrics, Made-ups	USD 4.87 billion	+4.07%
Carpets	USD 1.54 billion	+10.46%
Total T&A	USD 37.75 billion	+6.32%

Value-Chain Segmentation with Energy Lens

Sub-Sector	Primary Energy Type	Key Processes	Energy Intensity
Spinning	Electricity	Ring frames, compressors, HVAC	2.5–3.57 kWh/kg yarn; 34% of sector energy
Weaving/Knitting	Electricity	Power looms, shuttleless looms	23% of sector energy
Wet Processing	Fuel + Electricity	Steam boilers, jet dyeing, stentering	38–43% of sector energy; coal/biomass-heavy
Garmenting	Electricity	Cutting, stitching, digital printing	Lower per-unit but rising

Key Geographic Clusters and Grid Realities

Cluster	State	Key Segments	Typical Grid Issues
Tiruppur–Coimbatore	Tamil Nadu	Knitwear, spinning, dyeing	Historic load-shedding; charges up >60% since 2022
Surat–Vapi–Ankleshwar	Gujarat	Synthetic textiles, dyeing	Coal/lignite-heavy; Gujarat holds ~68% of textile coal use
Bhiwandi–Ichalkaranji	Maharashtra	Power loom, fabrics	High tariffs (₹8.32/unit); voltage fluctuations
Ludhiana–Panipat	Punjab/Haryana	Hosiery, blankets	DG-dependent; high winter demand
Delhi NCR–Manesar	Haryana/Delhi	Garment export	GRAP-driven DG bans; air quality restrictions

In such clusters, companies are increasingly experimenting with a mix of rooftop solar group captive RE, and advanced storage solutions to stabilize power costs and reliability.

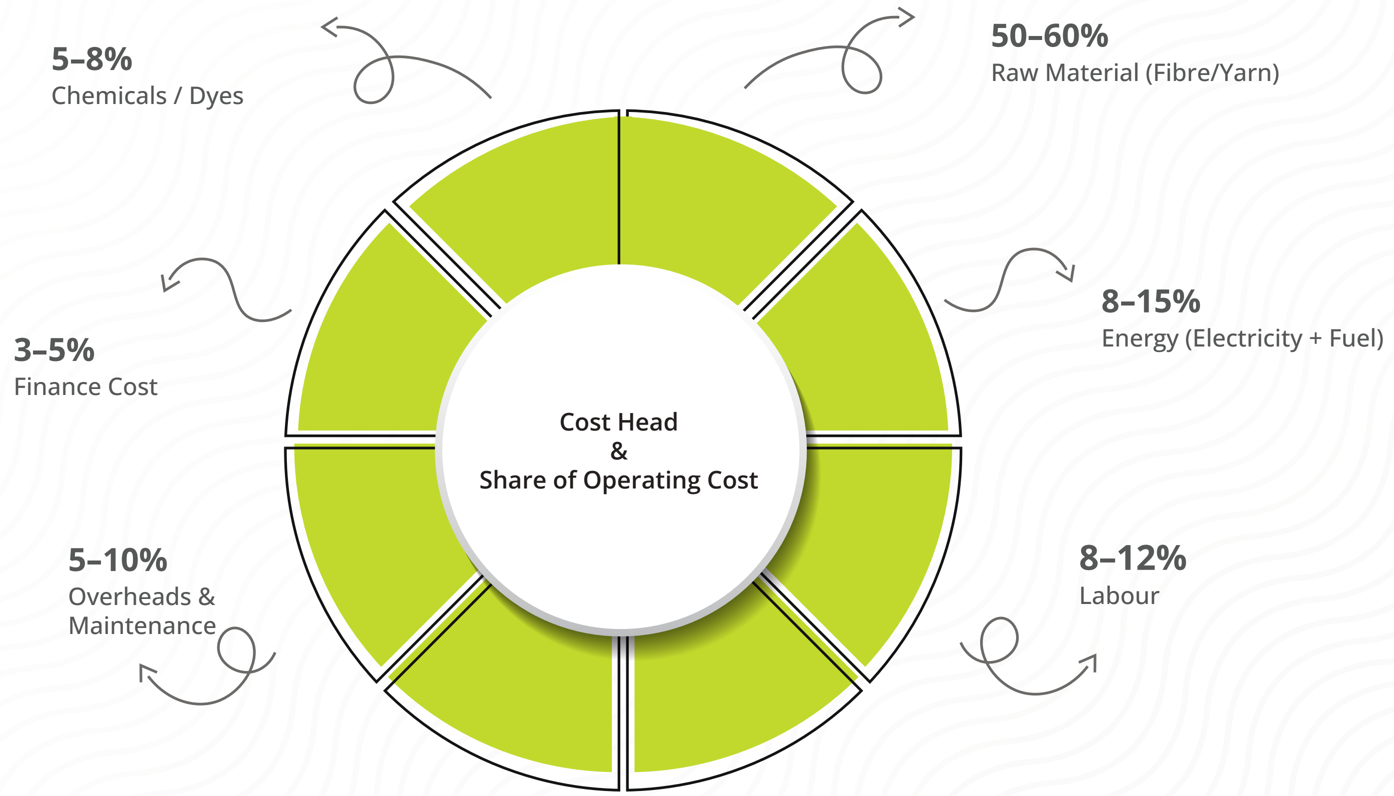
Did You Know?

India's textile sector has the highest penetration of wind-based captive power generation among all Indian industries, with wind power capacity reaching 1,477 MW. Meanwhile, coal-based captive power in textiles dropped 74% between FY 2018-19 and FY 2022-23

Margin Pressure & Cost Structure:
Why Energy Now Matters More

Cost Structure of a Typical Textile Unit

Energy typically constitutes 8–15% of total operating costs for textile manufacturers, varying significantly by sub-sector. For wet-processing/composite units, the share is higher, reaching 12–15% of manufacturing costs in clusters like Surat (Source: BEE Surat Cluster DPR).



Recent Macro Trends

The textile sector experienced a downturn in FY24, with total T&A exports declining 3.24% to USD 34.43 billion. Recovery commenced in FY25 (+6.32%), but the rebound has been uneven across segments. (Source: Fibre2Fashion) Global buyers have tightened sustainability requirements.Science Based Targets initiative (SBTi) data shows the apparel and footwear industry has achieved a 76% average completion rate on Scope 1 & 2 reduction targets. Brands increasingly require supplier scorecards covering % RE in power mix, emissions per kg of fabric/garment, and adherence to frameworks like ZDHC and Higg. (Source: Zero100, SBTi) Industrial power tariffs have remained elevated: Tamil Nadu at ₹9.04/unit, Gujarat at ₹8.98/unit, and Maharashtra at ₹8.32/unit (mid-2025). (Source: CM Fadnavis statement, July 2025)

The Energy Cost Squeeze-Cluster-Level View

In Coimbatore and Tiruppur India's largest spinning and knitwear hub more than 350 textile entrepreneurs protested in February 2026 against rising electricity-related charges, which have increased by over 60% since 2022. The Recycle Textile Federation demanded exemption from network charges for rooftop solar installations. (Source: Apparel Resources, Feb 2026)

Energy & Emissions Profile of Indian Textiles

Electricity vs. Thermal Energy Split

Based on Vasudha Foundation's analysis of Annual Survey of Industries (ASI) data for FY 2022-23, electricity accounts for 37% of final energy use in textile operations nationally. However, in fuel-intensive processes like finishing, electricity's share drops to just 10%. (Source: Vasudha Foundation) Wet processes-specifically finishing, dyeing, drying, and stentering -account for 43% of the sector's total energy consumption, dominated by coal, lignite, and biomass for steam generation. Gujarat alone consumes approximately 68% of the textile sector's total coal consumption. (Source: Vasudha Foundation) From FY 2009-10 to FY 2022-23, total textile sector energy use grew 25%, with coal consumption rising 86%-underscoring the sector's continued dependence on fossil fuels for thermal applications. (Source: Vasudha Foundation)

Energy Intensity Trends (FY23–FY25)

The ICRA ESG Ratings report 'Sustainability Unstitched' (December 2025), covering 19 major textile firms including Page Industries, Welspun Living, Arvind, and KPR Mill, revealed: (Source: ICRA ESG Ratings)

Segment	RE Share FY23	RE Share FY25	Energy Intensity Change (FY23-FY25)
Apparel	26%	28%	+28%
Yarn & Fabric	3%	8%	+8.5%
Integrated	17%	21%	+6%
Sector Average	14%	18%	+6–8%

Grid Tariff Snapshot: Key Textile States (2025)

State	Industrial Tariff (₹/unit)	Key Notes
Tamil Nadu	₹9.04	Highest among major textile states
Gujarat	₹8.98	High thermal energy reliance in Surat cluster
Maharashtra	₹8.32 (expected: ₹7.38)	New policy expected to reduce tariffs
Karnataka	₹7.75	Relatively competitive
Haryana	₹6.00+	Plus DG restrictions under GRAP in NCR

Did You Know?

India's textile sector energy demand is projected to triple by 2050, driven by demographic and economic growth. Yet electricity accounts for only 10% of energy use in fuel-intensive finishing processes presenting a massive electrification opportunity that will further increase electricity demand and the case for storage

The Diesel Genset Reality: Cost, Risk & Regulation

Diesel gensets became the default backup solution in Indian textile clusters due to their quick start capability, familiar technology, low upfront capital cost (capital cost constitutes just 6–7% of total lifetime cost), and ability to provide instant power during grid outages. (Source: Power Line Magazine, 2024)

DG Cost Economics Today

Parameter	Value	Source
Levelised cost of DG power	Rs 25–30/kWh (range: Rs 25–40)	Power Line Magazine, 2024
Fuel cost share of lifetime cost	75–80%	Power Line Magazine
Capital cost share	6–7% of lifetime cost	Power Line Magazine
DG cost vs grid tariff	2–3× grid tariff	Power Line Magazine
Diesel price (Delhi, June 2024)	Rs 87.62/litre	PPAC

- **Maintenance and overhauls:**
  Routine maintenance, lube oil changes, and periodic engine overhauls add substantially to lifecycle costs.

- **Noise and local air pollution:**
  Densely packed industrial clusters face worker health concerns and noise issues from continuous DG operation.

- **Space constraints:**
  DG sets occupy valuable floor area in congested industrial zones.

- **Production disruptions:**
  DG changeover time (even a few seconds) can cause end-breaks in spinning, shade variation in dyeing, and data loss in automated systems.

Regulatory and Policy Headwinds

CPCB IV+ emission norms (effective July 2023) represent a technological leap from the earlier CPCB II standards. These norms target approximately 90% reduction in particulate matter (PM) and NOx concentrations for gensets up to 800 kW, requiring advanced after-treatment systems (DOC, SCR, EGR, DPF) and ultra-low sulphur diesel. This has resulted in a 20–40% increase in DG capital costs. (Source: Jakson Group, ECMA India) GRAP restrictions in NCR: Under the Graded Response Action Plan, Stage 3 and Stage 4 impose complete bans on diesel generator use (except emergencies) in the Delhi-NCR region during severe air quality episodes. In December 2025, GRAP Stage 4 was enforced with AQI exceeding 600. (Source: AQI.in, NDTV, PIB)

Cost Comparison: DG vs Grid for a Textile Unit

Parameter	DG Power	Grid Power
Cost per kWh	Rs 28	Rs 9 (avg. industrial)
Annual energy cost (300 MWh)	Rs 84 lakh	Rs 27 lakh
Annual difference	—	Rs 57 lakh savings
CO_2 emissions (approx.)	250 tonnes/year	210 tonnes/year (grid avg.)

Decarbonisation & Buyer Pressure: What Global Brands Expect

Key Themes from Global Buyers

- **Science-Based Targets (SBTi):**
  The apparel and footwear industry leads all sectors with a 76% average completion rate on Scope 1 and 2 emission reduction targets. Companies like H&M, Tesco, and others have committed to 40–50% absolute emission reductions by 2030. (Source: Zero100, SBTi)

- **Supplier Scorecards:**
  Major buyers increasingly require suppliers to disclose % RE in power mix, energy consumption per kg of output, and adherence to frameworks including Higg Index, ZDHC, and SBTi-aligned targets. (Source: SBTi Apparel Guidance)

- **Scope 3 mandates:**
  If a company's Scope 3 emissions exceed 40% of total (Scopes 1+2+3), SBTi requires setting a Scope 3 target -placing upstream textile suppliers squarely in the compliance crosshair.

Indian Policy Backdrop

- 500 GW non-fossil capacity target by 2030. CEA estimates 411.4 GWh of energy storage needed by 2031-32. (Source: IEEFA)
- BESS VGF scheme: ₹94 billion programme for 4,000 MWh of BESS projects by 2030-31, with up to 40% capital cost support. (Source: PIB)
- Water and effluent norms pushing more energy-intensive ETP and ZLD systems, further increasing electricity consumption

How Leading Indian Players Respond

- Growing captive solar installations plus green PPAs: solar PPA rates range from ₹2.20–3.10/kWh across major textile states. (Source: Industry data)
- Energy efficiency projects: TERI estimates 8% energy savings possible in spinning (2,132 million kWh/year nationally), 5% in weaving, and 10% in processing. (Source: TERI)
- Early pilots using storage to reduce DG reliance and improve RE utilisation

* Storage is not yet mainstream in textiles, but in clusters where DG restrictions are severe and RE adoption is high, buyers increasingly ask whether plants can maintain uptime and power quality without defaulting to diesel.

Did You Know?

More than 350 textile entrepreneurs from Coimbatore and Tiruppur - India's largest knitwear export hub -staged a protest in February 2026 demanding relief from electricity-related charges that have risen over 60% since 2022, and seeking exemption from network charges for rooftop solar installations.

Where Storage Fits: Power & Reliability Challenges in Textile Units

Common Pain Points

- **Short but frequent outages**
  disrupt spinning operations, causing end-breaks, yarn waste, and quality issues. Even 5–10 minutes of power loss can lead to disproportionate quality loss and hours of rework.

- **Voltage dips and flicker**
  affect precision processes-dyeing/finishing consistency (shade variation), digital printing calibration, and automated cutting accuracy

- **Constraints on DG capacity addition:**
  Sensitive equipment including lab instruments, testing machines, IT systems, and automated cutting/sewing lines require zero-interruption power that DGs with 5–15 second changeover cannot provide.

Cluster-Specific Nuances

Delhi-NCR / Gurugram Garment Exporters: FA Home and Apparels Pvt. Ltd., a garment export unit in IMT Manesar, Gurugram, replaced its DG backup with a 50 KVA lithium BESS (LiFePO4 chemistry) providing over 3 hours of backup for critical lines. The principal challenge was the GRAP-driven ban on diesel generators in the NCR region. The BESS unit provided near-zero switchover time with running costs approximately one-third that of diesel generation. (Source: Suvastika Systems) South India Industrial Belts: Coimbatore and Tiruppur have historically faced 8–10 hours of load-shedding per day during severe periods, forcing units to run DG at Rs 18–19/unit against grid cost of Rs 6.50- a crippling cost differential for the knitwear industry. (Source: Business Standard)

How Plants Currently Cope

- Oversized UPS systems for critical loads (costly, limited runtime).
- Manual load shedding during peak tariff hours or outages-reducing production.
- Over-contracted demand from DISCOM to avoid penalties-increasing fixed charges.

BESS Defined: Battery Energy Storage Systems are battery-based systems that can store electricity (from grid or RE sources) and provide instant backup, peak shaving, and power quality support. Unlike DG sets, BESS offers near-zero switchover time, silent operation, zero on-site emissions, and can be charged from low-cost grid power or solar during off-peak hours.

BESS Use-Cases in Textile

Use Case 1: DG Runtime Reduction for Short Outages

For textile units experiencing frequent short-duration outages (10 minutes to 2 hours), BESS can serve as the primary backup, keeping DG as deep/extended backup only. This approach:

- Reduces diesel litres consumed per month significantly.
- Lowers maintenance costs and extends DG engine life.
- Provides instant switchover critical for spinning and dyeing processes.
- Enables quiet, emission-free operation particularly relevant in NCR and urban clusters with DG restric tions. (Source: PIB, Suvastika)

• Use Case 2: Solar-Plus-Storage for Daytime Operations

For units with rooftop solar or open access RE, BESS stores mid-day solar surplus for use during short grid outages, evening shoulder hours when ToD tariffs spike (peak tariff ≥1.20× normal for C&I consumers), and cloud-induced dips. This directly links to the sector's rising RE share - from 14% to 18% over FY23–FY25. With solar PPA rates at Rs 2.20–3.10/kWh across textile states, storing surplus solar for peak-hour use improves the financial case substantially. (Source: ICRA ESG, Ministry of Power ToD Rules)

• Use Case 3: Power Quality and Centralised UPS

BESS deployed as a centralised UPS for sensitive loads provides seamless, uninterrupted power for lab equipment, quality testing instruments, automated cutting lines, and IT/ERP systems. This reduces scrap, rework, and machine downtime from voltage fluctuations

• Use Case 4: Peak Shaving and Contract Demand Optimisation

In states with high demand charges (Maharashtra: ₹400–500/kVA; Karnataka: ₹200–250/kVA), BESS discharges stored energy during peak demand periods to reduce maximum grid draw. This can deliver 15–20% reduction in peak kVA and potentially 25–70% reduction in demand charges. (Source: PowerNext India, LinkedIn Industry Data)

Use case	Primary Benefit	Key Metric
DG runtime reduction	Diesel cost savings, compliance	Litres/month saved
Solar + Storage	RE utilisation, tariff arbitrage	% self-consumption, Rs/kWh saved
Power quality / UPS	Quality, uptime	Rework %, downtime hours
Peak shaving	Demand charge reduction	kVA reduction, Rs/month saved

Did You Know?

Battery Energy Storage System costs in India have declined approximately 80% over the past decade. The levelised storage cost for a 2-hour system fell from INR 7.9 million/MWh in 2015 to INR 1.7 million/MWh in 2024. Merchant BESS operations in India turned profitable for the first time in 2024

Economics Snapshot: DG vs Grid vs RE+Storage

Levelised Cost Comparison

The appropriate comparison framework for BESS economics is not BESS vs grid, but BESS vs the alternative you would otherwise use at those specific hours-typically DG or lost production.

Power Source	Typical Cost (Rs/kWh)	Key Notes
Diesel Genset	25–30 (range: 25–40)	75–80% fuel cost; 20–40% capex increase post-CPCB IV+
Grid (Industrial)-Tamil Nadu	~9.04	Highest among major textile states
Grid (Industrial)-Gujarat	~8.98	-
Grid (Industrial)-Maharashtra	~8.32 (₹7.38 expected)	Under new tariff policy
Grid (Industrial)-Karnataka	~7.75	-
Rooftop Solar (Captive)	3.00–4.50	Depends on state, capex model
Solar PPA (Open Access)	2.20–3.10	Gujarat lowest; Maharashtra /TN higher
Solar OA Landed Cost	5.00–8.00	Includes wheeling, CSS, transmission
RE + Storage (replacing top DG hours)	8–12 (effective)	Illustrative; site-specific modelling required

Illustrative Payback Example - Anonymous Textile Unit

Profile: A mid-size spinning mill running 500 kVA DG for ~2 hours/day, 300 days/year.

Parameter	Value
DG daily consumption	80 litres diesel × Rs 88/litre = Rs 7,040/day
Annual DG fuel cost (2 hrs/day, 300 days)	Rs 21.12 lakh
BESS replacing 70% of DG run-hours	-
Annual fuel savings (70%)	Rs 14.78 lakh
Additional savings (demand charge, maintenance)	Rs 3–5 lakh (estimated)
Total annual savings	Rs 17–20 lakh
Indicative BESS system cost (500 kVA, 2-hr)	Rs 60–80 lakh
Simple payback	3.5–4.5 years

Policy, Incentives & Compliance Landscape

Central Policy Framework

Policy/ Regulation	Key Provisions	Impact on Textiles
CPCB IV+ Emission Norms	~90% reduction in PM andNOx for gensets ≤800 kW; effective July 2023	20–40% higher DG capex; pushes alternatives
BESS VGF Scheme	₹94 billion programme; up to 40% VGF for 4,000 MWh BESS by 2030-31	Reduces BESS project costs; target LCoS Rs 5.50–6.60/kWh
ToD Tariff (2023 Amendment)	Peak: ≥1.20× normal for C&I; Solar hours: ≤80% normal	Creates arbitrage opportunity for storage
GRAP (NCR)	Stage 3/4: Complete DG ban during severe AQI	Forces NCR textile units to find non-DG backup
500 GW Non-Fossil Target	CEA estimates 411.4 GWh storage needed by 2031-32	Long-term direction towards RE + storage

State-Level RE & Open Access Policies

State	Captive Solar Wheeling	CSS Waiver (Captive)	Solar PPA Range (₹/kWh)	Key Feature
Gujarat	0% wheeling charges	100% waiver	2.20–2.80	Most OA-friendly for captive solar
Maharashtra	Standard charges	100% waiver (captive)	2.60–3.00	Highest landed OA cost
Tamil Nadu	50% wheeling/transmission	100% waiver (captive)	2.50–3.10	Strong solar resource
Haryana	0% wheeling charges	100% waiver (captive)	—	Relevant for NCR garment exporters

Financial Incentives

- Accelerated Depreciation: 40% depreciation in year 1 for solar assets under Income Tax Section 32.
- Green Loans & ESG-Linked Financing: Growing availability of credit lines for energy efficiency, RE, and storage projects.
- VGF for BESS: Amount decreased from ₹96 lakh/MWh (2023-24) to ₹46 lakh/MWh or 30% of capital cost in recent rounds, reflecting declining BESS costs.
- 20% domestic content requirement introduced for VGF-eligible BESS projects. (Source: Energy-Storage.news, Jan 2026)

Did You Know?

Between 2022 and May 2025, India auctioned approximately 12.8 GWh of BESS capacity-yet only 219 MWh was operational, highlighting a massive pipeline under construction. The hybrid RE (solar/wind + storage) share of India's total RE tenders increased from 12% in 2021 to over 49% in 2024.

Implementation Pathways: How Textile Units Typically Start

01 Energy & Load Audit

- The foundation of any optimisation initiative. A comprehensive audit identifies:
- Critical loads vs. non-critical loads across production lines.
- Actual DG run-hours, trigger events, and duration profiles.
- Grid outage patterns (frequency, duration, time of day).
- Current tariff structure, demand charges, and ToD applicability.
- Power quality issues (voltage dips, harmonics, flicker events).

02 No-Regret Efficiency Measures

- Motor and compressor efficiency: Energy-efficient motors and VFDs in spinning can save ~8% of energy (~2,132 million kWh/year nationally). (Source: TERI)
- Power factor correction: Reduce reactive power penalties.
- Process optimisation: Waste heat recovery in dyeing, automation of stenter controls.
- Lighting and HVAC upgrades: LED conversions, optimised HVAC in spinning halls.

03 RE Deployment

- Rooftop solar: Ideal for apparel and spinning units with large roof areas. Solar PPA rates: Rs 2.20–3.10/kWh.
- Group captive / open access RE: For larger loads (>1 MW). Landed costs vary: Rs 5–8/kWh.
- Green power PPAs: Leading integrated mills have driven RE share from 17% to 21% via bulk green power contracts.

04 Backup & Reliability Optimisation (BESS Enters Here)

- Right-size DG capacity based on actual (not assumed) requirements.
- Evaluate centralised BESS for critical loads vs. multiple distributed UPS.
- Design hybrid architectures: Grid + RE + BESS + DG (as deep backup only).
- Model scenarios: peak shaving savings, DG displacement, ToD arbitrage, power quality improvement.

05 Business Case Validation

- Develop site-specific financial model: capex vs. savings vs. downtime reduction vs. compliance value.
- Factor in non-financial benefits: buyer perception, ESG compliance, regulatory risk mitigation.
- Evaluate financing options: direct purchase, OPEX/leasing models, BESS-as-a-Service.

Mini Caselets

Caselet 1: Garment Exporter in NCR Cutting DG Usage Under Air Quality Restrictions

Context: FA Home and Apparels Pvt. Ltd., a garment and home textile exporter in IMT Manesar, Gurugram, faced a dual challenge: GRAP-driven bans on diesel generators during winter months and an existing online UPS offering only 10 minutes of backup. (Source: Suvastika Systems)
Solution: Installed a 50 KVA lithium BESS (LiFePO4 chemistry) with a battery bank providing over 3 hours of backup for critical embroidery and finishing lines.

Outcomes:

- DG eliminated for regular short outages; DG retained only as emergency deep backup.
- Running cost reduced to approximately one-third of diesel generation costs.
- Zero switchover time compared to DG's 5–15 second changeover.
- Compliance achieved with GRAP DG restrictions; improved perception with export buyers.
- Noise and emissions eliminated on-site during normal backup operations.

Caselet 2: Dyeing & Finishing Unit in Western India Firming Up Solar

Context: A medium-scale dyeing and finishing unit in the Surat–Vapi corridor, Gujarat, had invested in a 200 kWp rooftop solar system. Short cloud-induced dips destabilised jet dyeing machine temperature profiles, causing shade inconsistency and rework rates of 3–5%.
Solution: Added a BESS module sized to handle 15–20 minute dips, providing power smoothing for the solar-grid interface.

Outcomes:

- Process disruptions from solar intermittency reduced significantly.
- DG runtime for cloud-cover bridging reduced by an estimated 50–60%.
- More consistent shade/quality — lower rework rate.

Caselet 3: Spinning Mill-Optimising Contract Demand and Peak Use

Context: A 25,000-spindle ring spinning mill in Tamil Nadu, with a contracted demand of 2,000 kVA, observed that peak demand exceeded the contracted threshold for 2–3 hours daily during high-production shifts. Solution: Deployed BESS for peak shaving discharging during high-demand windows (typically 6 PM–10 PM under ToD peak pricing) and supporting critical spinning lines during brief outages.

Outcomes:

- Contracted demand optimised (reduced by ~15–20%), lowering monthly demand charges.
- ToD peak-hour grid draw reduced, cutting per-unit cost during expensive hours.
- Critical spinning lines protected reduction in end-breaks during brief outages.
- Annual estimated savings: Rs 12–18 lakh (demand charges + DG fuel + quality improvement).

Caselet 4: Integrated Textile Park Planning for Low-Carbon Energy

Context: A new integrated textile park (under PM MITRA model) planning phase. Seven PM MITRA parks are being established across India with a scheme outlay of ₹4,445 crore, targeting ₹70,000 crore in investments. (Source: PIB) Solution: Park-level common infrastructure design incorporating shared solar (ground-mount + rooftop), centralised BESS, and gas genset backup-minimising per-tenant DG dependence.

Projected Outcomes:

- Park-level RE share targeted at >30% from commissioning.
- Common BESS enables load balancing across tenants with different peak profiles.
- Individual tenants avoid capital outlay on DG and UPS systems.
- Attractive to ESG-conscious anchor tenants and export-oriented firms.

BESS Cost Simulation: Medium Textile Unit

Simulation Parameters

This simulation models a representative medium-scale composite textile unit to illustrate the potential economics of BESS deployment. All inputs are based on publicly available data sources as of 2024–25.

Unit Profile:

Parameter	Value
Type	Composite mill (spinning + dyeing)
Location	Tamil Nadu
Connected load	1,500 kVA
Contracted demand	1,200 kVA
Monthly grid consumption	3,60,000 kWh
Average grid tariff	Rs 9.00/kWh (industrial, TN)
DG capacity	500 kVA
Average DG runtime	2 hours/day, 300 days/year
DG fuel cost	Rs 28/kWh
Peak demand overshoot	200 kVA above contracted (2–3 hrs/day)

Current Annual Energy Cost (Without BESS)

Component	Calculation	Annual Cost
Grid energy	3,60,000 × 12 × Rs 9.00	Rs 3.89 crore
DG fuel	500 kVA × 2 hrs × 300 days × Rs 28/kWh	Rs 25.2 lakh
DG maintenance	Estimated	Rs 3.0 lakh
Demand charge overdrawal penalty	200 kVA × Rs 400/kVA × 12 months	Rs 9.6 lakh
Total	-	Rs 4.27 crore

BESS Intervention: 250 kW / 500 kWh System

BESS configuration: 250 kW / 500 kWh lithium-ion (LFP), used for peak shaving and DG replacement for short outages.

Savings Area	Mechanism	Estimated Annual Saving
DG fuel reduction (70%)	BESS replaces DG for short outages	Rs 17.6 lakh
DG maintenance reduction	Fewer run-hours, less wear	Rs 2.0 lakh
Demand charge optimisation	Peak shaving reduces overshoot by 150 kVA	Rs 7.2 lakh
ToD tariff arbitrage	Charge solar hrs (−20%), discharge peak (+20%)	Rs 3–5 lakh
Total estimated annual savings	–	Rs 29.8–31.8 lakh

Investment and Payback

Parameter	Value
BESS system cost (250 kW / 500 kWh, installed)	Rs 50 lac–1 crore (indicative, 2025 pricing)
Annual savings	Rs 20–25 lakh (indicative)
Simple payback	3.5–4.5 years (indicative)
System life (LFP, >10000 cycles)	20–25 years

Important: This simulation uses publicly available tariff, DG cost, and indicative BESS pricing data. Actual economics must be modelled for each specific site. Latest verified data available as of 2024–25

Annexures & Methodology

Category	Source
Textile exports and industry data	Ministry of Commerce (DGFT), PIB press releases, Fibre2-Fashion, Wazir Advisors Annual T&A Report 2025
Sector energy and emissions	Vasudha Foundation 'Electrifying the Textile Industry' (2025), BEE SME Programme cluster studies, ICRA ESG Ratings 'Sustainability Unstitched' (Dec 2025)
Industrial electricity tariffs	State DISCOM tariff orders, Maharashtra CM statement (July 2025), MERC orders
DG cost economics	Power Line Magazine (2024), PPAC diesel pricing, CPCB IV+ documentation
BESS market and economics	Ember 'India's Battery Storage' (2025), IEEFA (2026), Mordor Intelligence, CEEW-CEF
RE and open access	CEEW-CEF RE Open Access Waivers, Mercom India Q2 2025 Solar OA Report
Policy and regulatory	PIB (BESS VGF scheme), Ministry of Power (ToD tariff rules), CAQM (GRAP directions)
Textile cluster field data	Suvastika (FA Home caselet), TERI textile energy study, BEE Solapur/Surat cluster DPRs

Definitions and Assumptions

- **BESS:**

  Battery Energy Storage System a system using electrochemical batteries (typically LFP in Indian C&I applications) to store and discharge electrical energy.

- **Peak Shaving:**

  Using stored energy to reduce maximum power draw from the grid during peak demand or ToD peak tariff hours.

- **ToD Tariff:**

  Time-of-Day tariff structure where energy charges vary by time block peak hours (≥1.20× normal for C&I), solar hours (≤0.80× normal), and normal hours.

- **DG Run-Hours:**

  Total hours per year that a diesel genset operates; primary driver of DG fuel cost.

- **Contracted Demand:**
  The maximum power (kVA) a consumer has agreed with the DISCOM; overdrawal attracts penalties.
- **LCoS:**
  Using stored energy to reduce maximum power draw from the grid during peak demand or ToD peak tariff hours.

Disclaimer: This report provides indicative financial, operational, and sustainability insights for textile manufacturers evaluating Battery Energy Storage Systems (BESS), rooftop solar, and renewable energy integration, based on 2024–2026 market trends, policy developments, and industry analysis. Actual project performance, energy savings, payback periods, and operational outcomes may vary depending on plant size, production processes, energy consumption patterns, grid reliability, tariff structures, operating schedules, engineering design, regulatory approvals, and technology selection. India's textile and energy landscape is evolving rapidly; therefore, stakeholders should conduct independent technical, financial, and regulatory assessments before making investment decisions. The case studies, simulations, and cost estimates included in this report are illustrative in nature and intended for industry understanding purposes only. They do not represent guaranteed commercial outcomes or endorsements of specific technologies, vendors, or products.

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