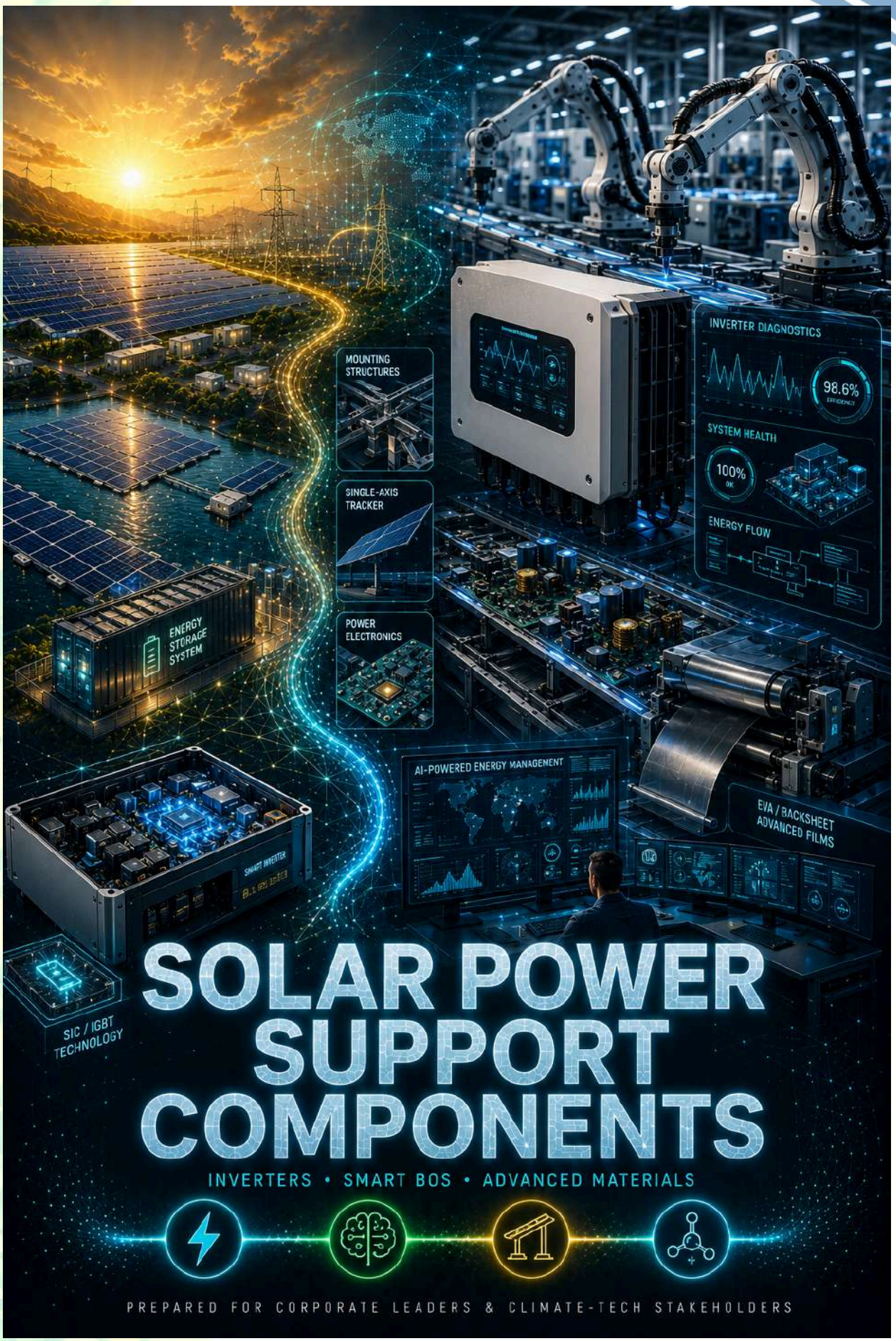
MOUNTING STRUCTURES
SINGLE-AXIS TRACKER
POWER ELECTRONICS
ENERGY STORAGE SYSTEM
INVERTER DIAGNOSTICS
98.6%
SYSTEM HEALTH
100%
ENERGY FLOW
AI-POWERED ENERGY MANAGEMENT
EVA / BACKSHEET ADVANCED FILMS
SMART INVERTER
SIC / IGBT TECHNOLOGY
SOLAR POWER SUPPORT COMPONENTS
INVERTERS • SMART BOS • ADVANCED MATERIALS
PREPARED FOR CORPORATE LEADERS & CLIMATE-TECH STAKEHOLDERS

Solar & Wind

Solar Power Support Components (Inverters, MMS, EVA & Backsheet)

This section provides key inputs on the Indian Solar Power Support Components Opportunities for corporate leaders.

Highlights

- Rapid localization opportunity driven by India's solar manufacturing push, import substitution policies, and growing domestic module + EPC demand for inverters, MMS, EVA, and backsheets
- Stable demand across the value chain, supported by utility-scale solar, rooftop expansion, hybrid projects, and storage-linked installations creating recurring component consumption
- Technology-driven differentiation potential, particularly in smart inverters, lightweight MMS designs, and high-durability encapsulation materials aligned with next-gen cell technologies
- Export potential emerging, as global developers seek diversified non-China supply chains and bankable alternative component manufacturers

Key recommendations for corporate leaders include:

- Build strategic partnerships with module makers, EPCs, and developers to secure anchor offtake, co-development pipelines, and predictable production scaling
- Differentiate through innovation — smart inverter software, corrosion-resistant MMS materials, high-efficiency EVA/backsheet formulations, and recycling-ready product design

Opportunity Snapshot: Solar Power Support Components

Manufactures key system components like inverters, structures, and cables for solar projects.

Market Signal

- **Strong Balance of System (BoS)** demand linkage as solar installations expected at 35-50 GW annually
- Increasing shift towards **domestic sourcing** (PLI+Localisation push)
- **Annual Market size by 2030:** 40,000-45,000 ₹ Cr

What Makes or Breaks It?

- **Cost competitiveness + scale manufacturing** (steel structures, cables, etc.)
- **Technology capability** (smart inverters, tracking systems)
- **Strong EPC/developer relationships** for consistent order pipeline

Why It Matters NOW?

- **Rapid solar capacity addition** driving immediate component demand
- **Import substitution opportunity** (especially inverters, trackers)
- Increasing demand for **high-efficiency components** (smart inverters, trackers)

Well Aligned Opportunity for

- **Electrical equipment manufacturers** (cables, switchgear, transformers)
- **Steel/industrial players** (mounting structures, trackers)
- **Power electronics companies** (inverters, control systems)

Key Challenges

- **Fragmented market** with high commoditization (price competition+ low differentiation)
- **Margin compression** due to EPC driven pricing pressure

Business Model

- Segment-focused entry (e.g., structures, cables, inverters)
- Partnerships/JVs for technology-heavy components (inverters, trackers)
- Integration with EPC/developers for assured demand

Introduction and Business Case

Beyond modules, the solar industry depends on a robust supply chain of inverters, module mounting structures (MMS), encapsulants (EVA) and backsheets. These components define system reliability, efficiency and lifetime economics.

India currently imports significant portions of many of these. However, domestic capacity is scaling for manufacturing many of these components.

With solar power capacity in India expected to exceed 300 GW by 2030, localising these components is both a strategic necessity and a multi-billion-dollar industrial opportunity.

Market Potential for Solar Power Support Components in India

The market size estimates represent the total for all prominent balances of system components, viz., inverters, mounting structure, junction boxes, electricals.

Year	Market Size (₹ Cr)	Drivers
2025	30,000-35,000	Domestic MMS and inverter demand; also increasing demand for locally made electricals such as junction boxes, cables etc.
2030	40,000-45,000	Integrated solar parks; localisation push under PLI; rising exports.
2040	65,000-70,000	Full localisation of sub components such as EVA/backsheets etc; India as global supply hub could increase demand from exports too

Market Segments and Applications

Most of the above components will be categorized around three main end use segments: Residential rooftop, commercial rooftop and ground-mounted solar power plants.
For each of these segments, there are variations for the above components on multiple dimensions such as: Capacity, specific technology or materials used and extent of customization needed, the last one especially for components such as module mounting structures when they are used for rooftop solar power plants.

Typical Project Capacities & Investments Required in India

Sub-sector	Typical Capacity	Indicative CapEx (₹ Cr)	Notes
String Inverters (1-250 kW)	1-3 GW/yr	80-160	SMT lines, power-stage assembly, burn-in/testing; firmware & certification heavy.
Central Inverters (500 kW-5 MW)	2-5 GW AC/yr	120-300	Power cabinets, transformers, heat management; grid-code compliance labs.
Module Mounting Structures (MMS)	0.3-0.8 MTPA steel/Al	60-150	Roll-forming, galvanising/Al extrusion, drill/punch lines; tracker-ready jigs add capex.
Single-Axis Trackers (mechanical + controllers)	1-3 GWp/yr	70-180	Torque tube forming, drives, controllers; wind-load engineering and field QA.
EVA/POE Encapsulant	10-30 KTPA	120-300	Polymerisation & coating lines; crosslinking consistency critical.
Backsheet (fluoro & non-fluoro)	5-15 KTPA	90-220	Co-extrusion/lamination; UV/hydrolysis resistance QA essential.
Junction Boxes, Cables, Connectors	5-15 GW BOM/yr	40-120	Injection moulding, crimping, testing; fast to localise.

Underlying Technologies & Processes

Element	Options	Key Traits
Inverters	String inverters, central inverters, hybrid inverters, microinverters	Control system efficiency, grid compliance, storage integration.
Module Mounting Structures (MMS)	Fixed tilt, single-axis trackers, rooftop racking	Defines yield; trackers boost energy by 15-20%.
Encapsulants (EVA/POE)	EVA sheets, POE (polyolefin elastomer)	Critical for module durability; EVA dominates, POE rising for bifacial.
Backsheets	PET, PVF, fluoropolymer, multilayer films	Key barrier layer protecting modules; fluoropolymer = premium durability.
Integration	BOS optimisation, digital O&M	Improves IRR and system reliability.
Circularity	Recyclable encapsulants, low-carbon MMS	Aligns with EPR and sustainability mandates.

Key Challenges

Challenge Area	Key Issues	Business Impact	India Specific	Strategic Implications
Supply Chain Dependence	Reliance on imported raw materials, electronics, polymers and upstream inputs; currency fluctuations; logistics risks	Margin volatility, lead-time uncertainty, working capital pressure	Domestic ecosystem still developing; strong dependence on China-led supply chains	Build local partnerships, diversify suppliers, strategic inventory planning
Pricing Pressure & Market Competition	Rapid manufacturing expansion, commoditization, global price declines, low-cost imports	Reduced margins, high competition, potential overcapacity	PLI-led capacity additions may exceed near-term demand	Move toward differentiated products, technology innovation, export diversification
Policy & Regulatory Volatility	Changes in duties, domestic content rules, ALMM eligibility, incentive structures	Investment uncertainty, project delays, procurement shifts	Market strongly influenced by government policies and trade measures	Maintain flexible sourcing models and policy-aligned manufacturing strategy
Demand Cyclicality & Off-taker Risk	DISCOM financial health, tender delays, grid readiness issues, financing challenges	Uneven order pipeline, delayed payments, utilization risk	Utility-scale projects dominate; execution varies by state	Diversify into C&I, rooftop and hybrid/storage markets to stabilize demand
Capital Intensity & Technology Transition	High capex requirements, rapid tech evolution (efficiency improvements, smart systems)	Long payback periods, risk of technology obsolescence	Scale disadvantage vs global leaders; fast-moving technology cycles	Strategic alliances, phased investments, focus on niche or high-value segments

Prominent Players in the Indian Market

Company / Entity	Focus Areas
Sungrow / SMA Solar / Delta / Fimer	Global inverter suppliers with strong manufacturing base in India
Su-vastika Systems/ Luminous / Statcon Energia/ Microtek International	Domestic inverter manufacturers scaling capacity.

Vishakha Renewables, Alishan Green Energy	EVA sheets and backsheet films manufacturing
Renewsys / Adani	Integrated cell & module makers backward integrating into encapsulant and backsheets
Pennar / Ganges Internationale / Tata Bluescope	MMS manufacturing for utility-scale projects

Innovation Perspectives

Innovation	**Business Opportunity**	**For Senior Management**
From components to performance platforms	Offer inverter + MMS + materials as performance bundles	Moves from product sales to solution revenue
Grid-forming & grid-supporting inverters	Premium grid-ready inverter platforms	Enables firm power & RTC projects
Storage-first BOS solutions	Inverter-PCS-EMS integrated offerings	Higher ASP & stickiness
Yield matters more than steel cost	AI-controlled trackers & fast-install MMS	Directly improves project IRR
Materials as bankability enablers	Ultra-durable EVA / backsheets	Preferred supplier status
Segment-specific product portfolios	Tailored BOS for utility, C&I, rooftop	Margin optimization
Digital BOS & data monetization	Smart inverters, trackers, digital twins	New recurring revenue
EPC-friendly, fast-deployment systems	Plug-and-play BOS kits	Faster project execution
Hybrid-ready BOS design	BOS optimized for hybrid layouts	Future-proof demand
OEM–EPC–IPP co-innovation	Joint development with EPCs, IPPs	Faster adoption

Concentric & Satellite Opportunities

- Advanced inverter OEMs and firmware developers: Concentric players designing SiC/IGBT-based, grid-interactive inverters with remote monitoring, predictive maintenance and compliance with Indian grid codes.
- High-strength MMS and tracker manufacturers: Local steel and aluminium fabricators producing corrosion-resistant, quick-install structures and torque-tube assemblies for coastal and high-wind zones.
- EVA/POE and backsheet polymer producers: Chemical firms developing high-temperature, UV-stable and non-fluorinated films aligned with Indian climatic stresses and recycling needs.
- Reliability and testing labs: Independent centres offering accelerated UV/PID/humidity testing and BIS/IEC qualification for domestic and export certification.
- Digital field-service & O&M networks: Satellite ventures providing mobile inverter diagnostics, spares logistics and real-time firmware updates to ensure high uptime.
- Circular materials alliances: Partnerships to collect and recycle steel, aluminium and polymer waste from manufacturing and decommissioned arrays, generating EPR credits.

Key Takeaway for Senior Management

Takeaway	Details
This is a technology + reliability business, not a commodity metal/plastics business	• Bankability is driven by long-term performance, certification, and failure rates — not just cost • *Examples:* grid-compliant smart inverters, corrosion-resistant MMS for coastal sites, UV-stable EVA/backsheet for desert climates • **Implication:** Tier-1 EPCs and IPPs prefer suppliers with certified, field-proven products and warranty credibility
Integration with module and system roadmaps is critical	• Support components must evolve alongside cell/module technologies (TOPCon, HJT, bifacial, larger formats) • *Examples:* EVA compatibility with high-temperature lamination, MMS designed for larger module sizes, inverters optimized for hybrid + storage systems • **Implication:** Suppliers that co-develop with module makers & EPCs/developers lock in long-term demand
Quality control and lifecycle performance are competitive moats	• Inline inspection, traceability, and predictive warranty analytics reduce failure risk and enhance trust • *Examples:* AI-based manufacturing quality assurance, serial-level component tracking, performance-linked supply contracts • **Implication:** Developers pay a premium for reduced operational risk and predictable asset performance
For corporates looking for super niches, recommended to explore sub-component and one level more granular opportunities	• Niche sub-component examples: Smart monitoring & embedded intelligence, solar cell silver paste & screens for the same, sealants used in solar panels, cleaning chemicals for wafers used to make solar cells etc. • Granular opportunities: Advanced alloys, nano-coatings, heat transfer materials, Material science additives, protective coatings, embedded IoT, predictive analytics modules. • **Implication:** Identifying super niches could require investing time and efforts into detailed market research
Ecosystem partnerships matter more than standalone manufacturing scale	• Strategic partnerships with module OEMs, EPC platforms, and IPPs create pipeline visibility and recurring revenue • *Examples:* Anchor supply agreements, bundled component packages, lifecycle support services • **Implication:** Winning players operate as integrated partners, not isolated factories, in the solar power ecosystem

Next Steps for Corporate Leaders

India's solar component ecosystem is entering a scale phase as module capacity expands and EPC demand localizes. While volumes are rising, the sector is quickly moving toward technology-led differentiation, bankability, and lifecycle reliability. Corporate investors who treat this as an advanced manufacturing + technology platform — not a commodity fabrication business — will capture the strongest margins.

This could be an attractive climate tech opportunity for industries and firms in specific sectors and industries keen on catering to this fast growing market.

Connect with Team EAI to know more about this opportunity and take your corporate's initial steps. Send a note to consult@eai.in or talk to Muthukrishnan - 9952910083