

Battery Energy Storage System (BESS) Manufacturing Plant Setup, Feasibility Study, ROI Analysis and Business Plan

A Detailed DPR Covering CapEx, OpEx, Cell-to-System Assembly Process, ROI, Global Opportunity in Grid-Scale, Commercial, and Industrial Battery Storage system

BROOKLYN, NY, UNITED STATES, May 19, 2026 /EINPresswire.com/ -- Setting up a battery energy storage system manufacturing plant positions you at the intersection of two megatrends: the global renewable energy transition and the electrification of industrial and commercial power infrastructure.

Battery energy storage systems are no longer supplementary to grid design - they are structurally required. Solar and wind energy are intermittent by nature; storage is what converts variable generation into dispatchable, round-the-clock power. Governments, utilities, and industrial operators worldwide are deploying BESS at a pace that cell production capacity is struggling to match. India's 25% CAGR in the battery energy storage market - the highest of any major economy - makes domestic BESS manufacturing one of the most policy-aligned BESS plant investment opportunities in the energy sector.

IMARC Group's [Battery Energy Storage System Manufacturing Plant Project Report](https://www.imarcgroup.com/battery-storage-system-manufacturing-plant-project-report) is a complete DPR and battery energy storage manufacturing feasibility study for energy investors, electronics manufacturers, and project developers. It covers the full BESS manufacturing plant setup - from cell intake and testing through module assembly, rack integration, Power Conversion System installation, Energy Management System configuration, and Factory Acceptance Testing - with complete BESS plant CapEx and OpEx modelling and 10-year financial projections.



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Energy Storage Solutions for India's Growing Demand

Three forces are simultaneously driving BESS manufacturing investment globally and in India:

Policy Support: India's National Electricity Plan mandates storage requirements escalating from 82.37 GWh in 2026-27 to 411.4 GWh by 2031-32, and 2,380 GWh by 2047. The Energy Storage Obligation requires utilities to reach 4% of electricity demand in storage by 2030. As of early 2026, 92 GWh of BESS projects are in the active pipeline, with 69 new tenders totalling 102 GWh floated in the past twelve months. Grid-scale installed capacity is projected to jump from 507 MWh in 2025 to 5 GWh by end of 2026.

Financial Incentives: India's PLI for Advanced Chemistry Cell batteries commits Rs.18,100 crore to support 50 GWh of domestic capacity. Viability Gap Funding of Rs.91 billion subsidises BESS deployment, expanding the addressable market for manufacturers. ISTS charge waivers for co-located storage projects commissioned by June 2028 improve project economics. The 2026 Union Budget introduced customs duty exemptions for lithium-ion BESS manufacturing plant inputs.

Market Dynamics: Grid-scale auction tariffs in India fell 65% between 2022 and 2024, reflecting global LFP cell price deflation. LFP (Lithium Iron Phosphate) chemistry dominates Indian deployments due to superior thermal safety and long cycle life at high temperatures. As cell costs decline, the integration and BMS layer of a battery energy storage production plant becomes proportionally more valuable.

Key BESS Manufacturing Segments

A BESS manufacturing plant's product range spans several system configurations, each targeting a distinct customer segment:

- Utility-Scale:** Containerised systems for DISCOMs, NTPC, SECI, and IPPs for frequency regulation and renewable firming. Adani's 1,126 MW/3,530 MWh Khavda project (November 2025) will be among the world's largest single-location BESS. A grid scale battery storage manufacturing plant targeting this segment accesses the largest volume procurement channel.
- Commercial/Industrial:** For factories, data centres, and hospitals for peak shaving, backup power, and renewable self-consumption. Cummins India launched its modular LFP-based BESS in Pune in June 2025.
- Telecom/Data Centre:** Replacing diesel generators at telecom towers. India has 700,000+ towers with diesel backup, representing a large and distributed replacement market. Amara Raja's Giga Corridor in Telangana specifically targets telecom and data centre storage.

- **AC or DC-coupled storage with solar and wind plants for round-the-clock power contracts.** ISTS charge waivers make co-located configurations commercially superior for new project bids.
- **Complete power systems for remote mining, agricultural, and rural electrification applications.** Higher margin per kWh due to diesel displacement value and service intensity. Growing segment as India electrifies its last-mile infrastructure.

For more information on battery storage system manufacturing, visit our website:

<https://www.imarcgroup.com/battery-storage-system-manufacturing-plant-project-report>

BESS manufacturing is a precision electronics assembly and systems integration process. Unlike cell manufacturing, which is capital-intensive and chemistry-specific, BESS assembly is flexible and upgradeable as cell technology evolves:

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- **Li-ion cells (LFP or NMC, cylindrical, prismatic, or pouch format) are received and tested for open circuit voltage, internal resistance, and capacity.** Cells that fail specification are segregated. Cell quality at intake directly determines battery storage manufacturing unit cost, system lifetime, and warranty performance
- **Cells are sorted by capacity, internal resistance, and voltage characteristics into matched groups.** Consistent cell pairing within a module minimises capacity imbalance and extends cycle life. This step is critical for the BMS to manage cells at uniform state-of-charge
- **Matched cells are assembled into battery modules with cell interconnect busbars, temperature sensors, and the module-level BMS daughter board.** Module assembly requires controlled environment (temperature, humidity) to prevent cell contamination and electrolyte exposure
- **Each module undergoes charge-discharge cycling, capacity verification, and thermal profiling before rack assembly**
- **Modules are installed into battery racks with the master BMS, inter-module busbars, fusing, and communication harness.** Rack mechanical assembly must meet IP and vibration standards for the target installation environment
- **Racks are installed into steel containers or purpose-built enclosures with the Power Conversion System (PCS), Energy Management System (EMS),**

Thermal Management System (TMS/HVAC), and fire detection and suppression. Container-level DC and AC wiring, communication integration, and safety system connection are completed

- Full system charge-discharge test, BMS communication verification, EMS dispatch strategy programming, grid interconnection simulation, and fault injection testing. Round-trip efficiency, response time, and state-of-health baselines are established
- Customer witness testing covers full operational range, alarm and protection response, communication protocol compliance, and safety system activation. FAT sign-off triggers final packaging and logistics planning for site delivery

Manufacturing facility design and construction:

Key manufacturing facility requirements:

- The proposed manufacturing facility is designed with an annual production capacity ranging between 1 - 2 GWh, enabling economies of scale while maintaining operational flexibility

Manufacturing facility efficiency metrics:

- Energy efficiency: 20-30%
- Labor efficiency: 12-18% after financing costs, depreciation, and taxes

Manufacturing facility cost breakdown:

- Cell cost: 80-85% of total OpEx - cell cost is the dominant variable in BESS manufacturing unit economics
- Assembly and testing: 5-10% of OpEx - assembly and testing, not energy-intensive process manufacturing

Manufacturing facility equipment requirements:

- Cleanroom assembly hall, testing chamber, container integration bay, warehouse for cell inventory and finished systems
- Cell testing and sorting stations, module assembly jigs and torque tools, automated busbar welding, rack assembly fixtures, EMS configuration and testing computers
- Charge-discharge cycling equipment, thermal chamber, vibration

test rig, high-voltage safety test equipment, grid simulator for system-level FAT

- **Cell receiving and kitting conveyor, module and rack handling equipment, container loading crane or forklift infrastructure**

- **IEC 62619 and IEC 62933 certification, UL 9540 (US export), BIS registration, cell supply agreements, EMS software licensing, and initial cell inventory**

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Global Battery Energy Storage System Market

The global battery energy storage system market reached 273.22 GW in 2025 and is projected to reach 513.82 GW by 2034 at a CAGR of 7.3%. Asia Pacific leads global deployment, driven by China, India, Japan, South Korea, and Australia.

India: The India battery energy storage systems market reached USD 327.7 million in 2025 and is projected to reach USD 2,683.0 million by 2034 at a CAGR of 25.00%. Key investments include Waaree Energies' 16 GWh integrated Li-ion gigafactory in Andhra Pradesh (February 2026, INR 8,175 crore), Exide Energy Solutions' 12 GWh cell manufacturing facility (Phase 1 expected FY25-26), and Amara Raja's Giga Corridor in Telangana. NTPC's Ramagundam 33 MW/132 MWh project is India's largest operational BESS as of mid-2025. Rajasthan, Gujarat, and Maharashtra lead the state-level BESS deployment pipeline.

China: Dominates global BESS production through CATL, BYD Energy Storage, Sungrow, and Huawei. China's domestic grid storage deployment is the largest in the world. Chinese manufacturers supply the majority of cells used in global BESS projects, including India. In December 2025, China established a CNY 3 billion polysilicon consolidation platform, reflecting its strategy of managing domestic capacity across the clean energy supply chain.

USA: IRA Section 45X manufacturing credits are driving domestic BESS investment. AES, Fluence, Tesla Megapack, and Powin are active grid-scale integrators, with deployments accelerating across California, Texas, and the Northeast.

Europe: EU Net Zero Industry Act targets are driving deployment across the UK, Germany, and Ireland. C&I BESS for demand charge management is growing rapidly alongside grid-scale renewable firming projects.

Australia: One of the highest per-capita BESS deployment rates globally. South Australia's Hornsdale Power Reserve demonstrated large-scale BESS viability. Rooftop solar penetration is driving household and C&I storage adoption at scale.

Location Decisions for BESS Manufacturing Plant Setup

Location decisions for a BESS manufacturing plant setup are primarily driven by cell supply chain access and customer proximity:

- **Raw Material Cost and Logistics:** Li-ion cells account for 80-85% of raw material cost. Proximity to domestic cell gigafactories - Waaree in Andhra Pradesh, Exide in Bengaluru, Amara Raja in Telangana - reduces procurement lead time and logistics cost as Indian domestic cell production scales up. Until domestic cell supply matures, bonded warehouse and port access for cell imports is a key site requirement
- **Proximity to Deployment Clusters:** The largest BESS buyers are utility-scale solar and wind developers in Rajasthan, Gujarat, Tamil Nadu, and Andhra Pradesh. A plant within 500-1,000 km of these deployment clusters reduces project logistics cost and enables faster site commissioning support
- **Specialized Manufacturing Parks:** BESS assembly requires EMS and BMS software configuration expertise, power electronics integration, and cleanroom-standard assembly areas. Electronics manufacturing parks in Tamil Nadu, Karnataka, and Telangana provide talent, infrastructure, and supply chain co-location for power electronics components
- **Government Incentives:** India - PLI ACC scheme (Rs.18,100 crore for 50 GWh), VGF scheme for BESS deployment projects, ISTS charge waivers, 2026 Union Budget customs duty exemptions for BESS manufacturing inputs, state industrial subsidies in Gujarat, Andhra Pradesh, and Telangana. US - IRA Section 45X. EU - Net Zero Industry Act
- **Access to Export Markets:** BESS systems are containerised and heavy. Plants near major seaports - Mundra, Chennai, Visakhapatnam, Nhava Sheva - access export markets in Southeast Asia, the Middle East, and Africa where BESS demand is growing alongside renewable energy buildout

Key Considerations for BESS Plant Setup

IMARC Group's BESS Plant Project Report is a complete battery storage manufacturing business plan and technical reference:

- **Process Flow:** from cell intake through module, rack, container integration, EMS configuration, and FAT
- **Infrastructure:** assembly equipment, testing infrastructure, material handling, cleanroom construction
- **Operational Costs:** BESS plant OpEx covering cell procurement, BMS and EMS software, utilities, labour, and maintenance

- Financial metrics: BESS plant ROI, IRR, NPV, DSCR, break-even, and sensitivity tables across cell cost and system pricing scenarios
- LFP versus NMC comparison - thermal safety, cycle life, energy density, and cost profile for Indian climate conditions
- utility-scale versus C&I versus telecom - margin, customer type, and procurement channel comparison for a lithium-ion BESS manufacturing plant
- across 1 GWh and 2 GWh annual capacity configurations
- IEC 62619, IEC 62933, BIS IS 16270, PESO battery storage regulations, CEA BESS grid interconnection standards

The battery storage plant project report is built for energy and electronics investors evaluating a BESS manufacturing plant investment, renewable energy developers considering backward integration into storage manufacturing, and banks requiring a bankable battery energy storage manufacturing feasibility study for project financing.

Other project reports available:

- Silicon wafer manufacturing plant project report: <https://www.imarcgroup.com/silicon-wafer-manufacturing-plant-project-report>
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