



# EV MANUFACTURING

ENGINEERING THE FUTURE OF MOBILITY

PREPARED FOR CORPORATE LEADERS & CLIMATE-TECH STAKEHOLDERS

## ***Mobility EV Manufacturing***

*This section provides key inputs on EV Manufacturing Opportunities for corporate leaders.*

### **Highlights**

- Structural demand growth driven by electrification mandates, declining battery costs, urban air-quality regulations, and total cost of ownership advantages over ICE vehicles
- Value shifting from vehicles to platforms, where software, battery systems, power electronics, and vehicle architecture determine competitiveness more than assembly scale
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- Multiple segment opportunities across 2W/3W, passenger EVs, commercial fleets, and last-mile logistics, each with distinct economics and adoption curves

#### **Key recommendations for corporate leaders include:**

- Focus on platform-led vehicle architectures (skateboard platforms, modular components) to enable faster model rollout and cost efficiencies
- Build software and data capabilities across vehicle control, diagnostics, OTA updates, and fleet analytics
- Target fleet and B2B demand first (logistics, mobility, corporate fleets) to accelerate scale and utilization

## Opportunity Snapshot: EV Manufacturing

Manufacture electric vehicles (2W, 3W, 4W, buses) using battery-powered drivetrains

### Market Signal

- **India EV penetration rising rapidly: 2W/3W (>10–15%), 4W (still <5%)**
- Demand led by **fleet operators** (last-mile, e-commerce, ride-hailing)
- **Annual Market size by 2030:** 1,40,000 - 1,50,000 ₹ Cr



### What Makes or Breaks It?

- **Cost competitiveness;** Lower running cost vs ICE (~₹1–2/km vs ₹6–8/km)
- **Reliable battery sourcing & integration** (range, safety, lifecycle)
- Strong distribution and after-sales service network

### Why It Matters NOW?

- Operates at a **lower cost than ICE** vehicles
- **Improving affordability** due to falling battery costs
- Strong regulatory push (**FAME-II, state EV policies, PLI schemes**) towards e-mobility



### Well Aligned Opportunity for

- **Auto OEMs and EV startups**
- **Fleet operators integrating vehicles**
- **Electronics and component manufacturers**



### Key Challenges

- **Charging infrastructure gaps** (especially for 4W and buses)
- **Supply chain dependency** (cells, electronics)



### Business Model

- Focus on high-adoption segments (2W, 3W, commercial fleets)
- Localize components (battery packs, motors, controllers)
- Partner with fleet operators for assured demand

## Introduction and Business Case

India's EV manufacturing opportunity spans 2W, 3W, 4W, buses and commercial vehicles — the engines of the transport transition. With policy pushes (FAME-II, PLI), state incentives and rising consumer adoption, EV manufacturing is becoming a strategic industry for job creation, technology development and fossil fuel import reduction.

Localised EV production also enables India to build a strong export base for Asia and Africa, making it both a domestic growth story and a global supply chain opportunity.

## Market Potential for EV Manufacturing in India

Year	EV Sales (units)	Market Size (₹ Cr)	Drivers
2025	20-22 lakh	45,000-50,000	Dominated by 2W/3W; bus orders scaling.
2030	60-65 lakh	1,40,000-1,50,000	30% penetration target; 4W adoption accelerates.
2040	2-2.2 crore	5,00,000-5,50,000	Near-total penetration in 2W/3W; buses & CVs mainstream.

## Market Segments and Applications

Segment	Applications	Business Model	Key Drivers
Mass-market passenger EVs	Urban & suburban mobility	High-volume platform manufacturing + OEM sales	Regulatory mandates & total cost of ownership parity
Premium & performance EVs	Luxury, long-range personal mobility	Margin-led, software-enhanced vehicle sales	Consumer demand for performance, tech, and brand
Affordable / entry-level EVs	First-time EV buyers, emerging markets	Cost-optimized platforms + scale sourcing	Price sensitivity & urban electrification
Electric SUVs & crossovers	Family and multi-purpose vehicle	Platform sharing across segments	Global SUV demand + electrification
Electric pickup trucks	Personal and commercial hauling	Iconic model electrification	Fleet electrification + fuel savings

Electric commercial vans	Last-mile delivery, logistics	Fleet contracts + volume sales	E-commerce growth & city emission rules
EV platforms for multiple brands	Passenger & commercial vehicles	Modular skateboard platforms	Capex efficiency & faster model rollout
Software-defined EVs	Connected, autonomous-ready vehicles	Vehicle + software monetization	Digital features, OTA updates, data revenues
Vertically integrated EV manufacturing	EVs + batteries + power electronics	End-to-end value chain control	Cost reduction & supply-chain security
Regionally localized EV production	Domestic EV markets	Localized manufacturing & compliance	Trade policy, incentives, and supply resilience

### Typical Project Capacities & Investments Required in India

Project Type	Typical Capacity (annual)	Indicative CapEx (₹ Cr)	Notes
2W EV final assembly	0.3-1.0 million units	300-800	Stamping outsourcing common; in-house pack line boosts control.
3W EV assembly	50,000-200,000 units	80-250	Modular GA lines; swapping-ready variants for fleets.
Passenger car EV plant	50,000-200,000 units	1,200-3,000	Body shop, paint, GA; e-axle integration; vendor park adds 15-25% capex externally.
E-bus manufacturing	1,000-5,000 buses	300-900	Depot charging integration, stainless/aluminium bodies.
Battery pack line (captive)	1-3 GWh/yr	120-450	LFP/LMFP-first; AIS-156/038 compliance lab included.
e-Drive (motor+inverter)	100,000-300,000 units	250-600	SiC ramp readiness; dyno & EMC labs.

### Underlying Technologies & Processes

Element	Options	Key Traits
Vehicle platforms	2W, 3W, 4W, buses, CVs	Segment-specific designs; cost vs. range priorities.
Drivetrains	BLDC, PMSM motors; integrated e-axles	Defines efficiency, torque and cost.

Battery integration	LFP/NMC packs, swappable modules	Safety, performance and cost are critical.
Charging systems	AC onboard, DC fast, swapping interfaces	Interoperability and grid readiness.
Thermal management	Air/liquid cooling for packs & drivetrains	Ensures reliability in Indian climate.
Vehicle intelligence	Telematics, OTA updates, V2G features	Improves fleet economics and user experience.
Manufacturing processes	Stamping, welding, automation, final assembly	Localisation and lean supply chains cut costs.

### Key Challenges

Challenge Area	Key Issues	Business Impact	India Specific	Strategic Implications
Supply Chain Localization & Import Dependence	Heavy reliance on imported battery cells, semiconductors, and electronics	Cost volatility and production disruptions	Dependence on China and global supply chains; currency risks	Invest in local component ecosystem and strategic supplier partnerships
Cost Competitiveness & Profitability Pressure	High upfront vehicle costs compared to ICE vehicles	Margin pressure and slower consumer adoption	Price-sensitive Indian market; subsidy-dependent demand	Focus on platform optimization, localized manufacturing, and scale economies
Charging Infrastructure & Ecosystem Maturity	Limited charging network affecting adoption	Demand growth uncertainty impacting production planning	Uneven infrastructure development across states and cities	Align manufacturing strategy with infrastructure expansion and fleet segments
Policy Dependence & Regulatory Evolution	EV demand influenced by incentives and regulatory frameworks	Business model uncertainty with policy shifts	FAME schemes, state subsidies, and tax policies evolving	Diversify across segments and maintain flexible pricing strategies
Technology Transition & Competitive	Rapid innovation cycles in batteries,	Risk of technological obsolescence	Increasing competition from global OEMs	Invest in software differentiation, modular platforms,

Intensity	software, and vehicle platforms	and high R&D costs	and startups	and partnerships
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### Prominent Players in the Indian Market

Company / Entity	Focus Areas
Tata Motors	Market leader in EV 4Ws and buses; Nexon EV, Tigor EV; electric bus orders nationwide.
Mahindra Electric	Strong in 3W/4W EVs; scaling SUV EV platforms.
Ola Electric	Leading EV 2W manufacturer; expanding into 4Ws; giga-factory plans.
Ather Energy	Premium EV 2W maker with proprietary packs and software.
TVS Motor / Bajaj Auto	Rapidly scaling e-2W and e-3W platforms.
Hero Electric / Okinawa / Ampere	Volume players in affordable e-2Ws.
BYD India	Premium EV 4Ws, buses; local assembly with expansion plans.
Ashok Leyland (Switch Mobility)	Electric buses and light commercial EVs.

### Innovation Perspectives

Innovation	Business Opportunity	For Senior Management
Software-defined vehicles (SDVs)	Vehicle software platforms & subscriptions	Recurring revenues, faster feature evolution
Skateboard & modular EV platforms	Platform licensing & contract manufacturing	Capex efficiency and speed to market
Vertical integration of batteries	Integrated EV–battery ecosystems	Cost, supply security, performance
Cost-down through simplification	Ultra-low-cost EV platforms	Structural cost advantage
Fleet-first EV manufacturing	Fleet-dedicated EV programs	Guaranteed demand and fast scale
Regionalized EV	Replicable regional EV hubs	Incentive capture & supply

manufacturing		resilience
Vehicle-as-a-Service (VaaS)	EV subscription & leasing platforms	Higher lifetime value
Fast-charging–optimized EV design	Premium charging-enabled models	Superior user experience
EVs as grid assets (V2G)	V2G-enabled fleet solutions	Monetizable flexibility
Circular EV manufacturing	Circular mobility ecosystems	Regulatory and cost advantage

### Concentric & Satellite Opportunities

- Battery pack & drivetrain integration: Co-located facilities assembling packs, motors and inverters into modular vehicle architectures.
- Component and sub-system suppliers: Tier-1 and Tier-2 networks producing chassis, harnesses, sensors and control units aligned with Make-in-India goals.
- Testing & homologation centres: National labs providing AIS, EMC and safety certification to accelerate market readiness and exports.
- EV design & prototyping studios: Satellite R&D houses focusing on lightweight materials, aerodynamics and platform modularity.
- Financing & leasing innovations: Fleet-leasing, battery-as-a-service and green credit models enabling wider adoption and cash-flow stability.
- Charging, swapping & service infrastructure: End-to-end mobility ecosystems integrating depots, digital payments and predictive maintenance.
- Recycling & second-life battery ecosystems: Circular collaborations recovering metals, refurbishing packs and repurposing components into stationary storage.
- Structural adhesive dispensers: Automated robots applying high-strength glues replacing 70% welds; focusing on e-rickshaws and e-2 wheelers.

### Key Takeaway for Senior Management

Takeaway	Details
EV manufacturing is a platform and systems business, not a vehicle assembly business	<ul style="list-style-type: none"> <li>● Long-term winners are defined by control over <b>battery systems, power electronics, software, and vehicle architecture</b>, not just body-in-white and assembly scale</li> <li>● <b>Examples</b>: skateboard platforms, integrated e-axes, centralized vehicle control units (VCUs).</li> <li>● <b>Recommended innovation focus</b>: modular vehicle platforms and system-level integration</li> <li>● <b>Competitive advantage</b>: faster model launches, lower unit</li> </ul>

	costs, and higher platform reuse across segments
Battery strategy is the single biggest determinant of cost and differentiation	<ul style="list-style-type: none"> <li>● Battery pack design, sourcing, and lifecycle performance drive 30–40% of vehicle cost</li> <li>● <b>Sub-components:</b> cell chemistry selection, pack engineering, thermal management, BMS software</li> <li>● <b>Recommended innovation focus:</b> chemistry-agnostic pack platforms and advanced battery intelligence</li> </ul>
Software and data are becoming core value creators	<ul style="list-style-type: none"> <li>● EVs are software-defined products with ongoing monetization potential</li> <li>● <b>Examples:</b> OTA updates, remote diagnostics, energy optimization, fleet analytics</li> <li>● <b>Recommended innovation focus:</b> vehicle OS, cloud connectivity, and data-driven services</li> <li>● <b>Competitive advantage:</b> recurring revenue streams and long-term customer lock-in</li> </ul>
Fleet and B2B segments are the fastest path to scale and profitability	<ul style="list-style-type: none"> <li>● Fleet buyers value TCO, uptime, and analytics more than brand</li> <li>● <b>Examples:</b> last-mile logistics, corporate fleets, shared mobility</li> <li>● <b>Recommended innovation focus:</b> fleet-specific vehicle variants and digital fleet management tools</li> <li>● <b>Competitive advantage:</b> predictable demand, faster scale-up, and lower customer acquisition costs</li> </ul>
Localization and ecosystem partnerships are strategic, not tactical	<ul style="list-style-type: none"> <li>● Supply-chain resilience and localization affect margins and delivery reliability</li> <li>● <b>Examples:</b> local power electronics, motors, battery components, software partners</li> <li>● <b>Recommended innovation focus:</b> co-development partnerships and localized platform ecosystems</li> <li>● <b>Competitive advantage:</b> faster iteration cycles and supply security</li> </ul>

### Next Steps for Corporate Leaders

EV manufacturing in India is entering a scale-up phase as electrification accelerates across two-wheelers, three-wheelers, passenger vehicles, and commercial fleets. Policy incentives, falling battery costs, and fleet-led adoption are driving OEM activity and opening space for both incumbents and new entrants. This could be an attractive climate tech opportunity for industries and firms in specific sectors and industries keen on catering to this 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](mailto:consult@eai.in) or talk to Muthukrishnan - 9952910083**