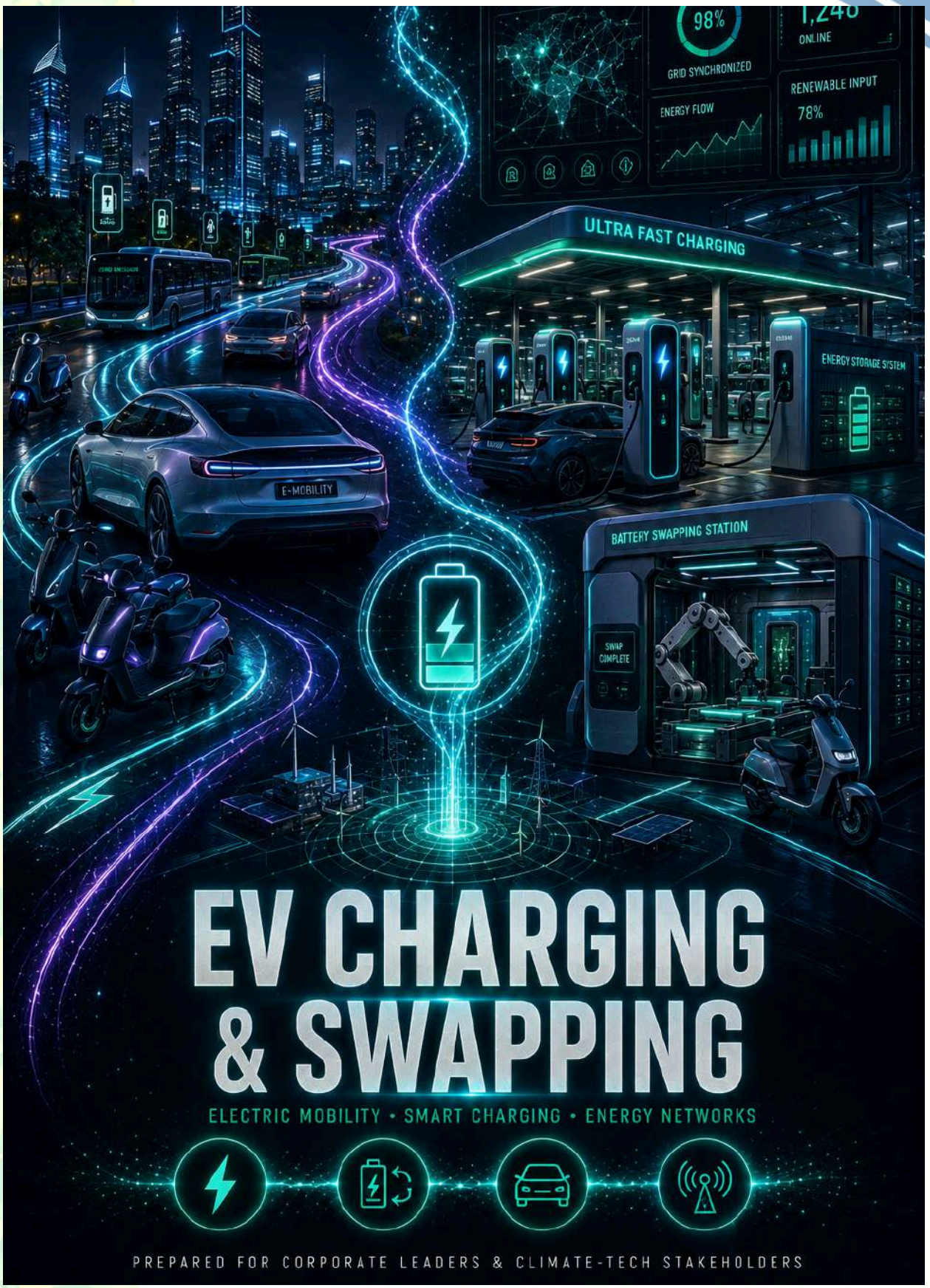
98%
GRID SYNCHRONIZED
ONLINE
ENERGY FLOW
RENEWABLE INPUT
78%
ULTRA FAST CHARGING
ENERGY STORAGE SYSTEM
E-MOBILITY
BATTERY SWAPPING STATION
SWAP COMPLETE
EV CHARGING & SWAPPING
ELECTRIC MOBILITY • SMART CHARGING • ENERGY NETWORKS
PREPARED FOR CORPORATE LEADERS & CLIMATE-TECH STAKEHOLDERS

Mobility
EV Charging / Swapping

This section provides key inputs on EV Charging / Swapping Opportunities for corporate leaders.

Opportunity Snapshot: EV Charging & Swapping

Provide energy to EVs via charging stations or battery swapping networks

Market Signal

- High growth in **2W/3W swapping and 4W fast charging networks**
- **EV adoption accelerating;** hence strong demand for public and fleet charging infra
- **Annual Market size by 2030:** 10,000 - 12,000 ₹ Cr

What Makes or Breaks It?

- **High utilization** (>20–30% load factor) via fleet tie-ups
- **Strategic site selection** (high-traffic corridors, urban hubs)
- **Reliable uptime + fast charging/swapping cycles**

Why It Matters NOW?

- **Charging infra** is a key bottleneck for EV adoption
- **Fleet electrification** (e-commerce, ride-hailing) driving high utilization demand
- **Opportunity for recurring revenue** (charging as a service)

Well Aligned Opportunity for

- **Energy companies and utilities**
- **Fleet operators and mobility platforms**
- **Infra developers and charging startups**

Key Challenges

- **Low utilization** in early stages
- **High capex**: ₹5–15 lakh per charger (AC/DC mix)
- **Grid connectivity** and land access constraints

Business Model

- Deploy chargers in urban hubs, highways, and fleet depots
- Build battery swapping networks for 2W/3W fleets
- Partner with OEMs and fleet operators for assured demand

Introduction and Business Case

As EV adoption accelerates, charging and swapping infrastructure becomes the backbone of India's e-mobility transition. Reliable, accessible and affordable charging reduces range anxiety, improves fleet economics and ensures grid integration of millions of EVs. Charging caters to private and long-haul users, while swapping offers fast turnaround for 2W/3W fleets.

Together, these create a scalable energy distribution network, reduce oil imports and enable India to meet its EV30@2030 targets. And in the process present a large and attractive opportunity for Indian businesses and corporates.

Market Potential for EV Charging / Swapping in India

Year	Market Size (₹ Cr)	Chargers / Swap Stations	Drivers
2025	2,000-3,000	~100,000 chargers; ~2,500 swap stations	Early FAME-II incentives; fleet electrification.
2030	10,000-12,000	~500,000 chargers; ~10,000 swap stations	30% EV penetration; urban infra scale-up.
2040	30,000-35,000	>1.5M chargers; >25,000 swap stations	Mass adoption across passenger & commercial fleets.

Market Segments and Applications

Segment	Applications	Business Model	Key Drivers
Highway DC fast charging	Long-distance travel	Asset-heavy network ownership	Range anxiety reduction
Urban public fast charging	City commuting, ride-hailing	Utilization-driven station economics	Urban EV density growth
Destination & workplace charging	Offices, malls, hotels	Host-funded / revenue-share model	Dwell-time charging demand
Fleet & depot charging	Delivery, buses, logistics	Long-term fleet contracts	Fleet electrification mandates
OEM-led charging ecosystems	Brand-specific EV charging	Vehicle-integrated charging networks	Customer experience differentiation
Energy-major charging networks	Retail fuel sites, highways	Integrated energy retail model	Fuel-to-electrons transition

Platform-based charging networks	Mixed public & private charging	Hardware + SaaS platform	Asset-light scaling
Battery swapping (passenger vehicles)	High-utilization urban EVs	Battery-as-a-Service (BaaS)	Downtime reduction
Battery swapping (2W / 3W)	Urban mobility, delivery	Standardized battery infrastructure	Standardized battery infrastructure
Charging hardware & technology	Fast chargers, software	Equipment sales + service contracts	Infrastructure build-out

Typical Project Capacities & Investments Required in India

Type	Typical Capacity	Indicative CapEx (₹)	Notes
AC Public Charging (Level 1/2)	7-22 kW per gun	0.6-2.5 lakh / gun	Apartments, offices, malls; low grid impact.
DC Fast (Light Vehicles)	30-60 kW	8-20 lakh / gun	2W/3W/4W mixed use; metro corridors.
DC Fast (HPC)	120-180 kW	25-45 lakh / gun	Highway hubs; split cabinets + liquid-cooled cables.
Ultra-Fast (HPC+)	250-360 kW	60-120 lakh / gun	Premium highway / fleet depots; high demand charges.
Bus Depot Charging	1-5 MW aggregate	₹5-15 Cr / depot	60-200 e-buses; pantograph/CCS mix; load management.
Battery Swapping - 2W/3W	50-300 swaps/day/site	₹10-25 lakh / swap kiosk + ₹1-3 Cr battery pool	Economics driven by utilisation + battery financing.
Battery Swapping - LCV	30-100 swaps/day/site	₹40-90 lakh / site + ₹3-8 Cr battery pool	Standardisation critical; depot-first model.
Hub with PV+BESS	200-800 kW PV + 0.5-2 MWh BESS	₹3-12 Cr	Shaves peaks; arbitrage; improves uptime where the grid is weak.

Underlying Technologies & Processes

Feature	EV Charging	Battery Swapping
Infrastructure	Chargers + grid	Battery lockers + charging backend
Time to Charge	30 mins to 6 hours	<2 minutes
Vehicle Compatibility	Needs standard plug	Needs standard battery interface
Battery Ownership	Owned by user	Owned by operator
Tech Focus	Grid & power electronics	Battery pack + IoT + logistics
Smart Charging	Maximize battery life	Off-peak hour charging to minimize cost

Key Challenges

Challenge Area	Key Issues	Business Impact	India Specific	Strategic Implications
Utilization Risk & Demand Uncertainty	Charging infrastructure utilization dependent on EV adoption rates	Delayed revenue realization and lower ROI	EV penetration varies by state, vehicle segment, and urban density	Focus on fleet segments (2W/3W/logistics buses) with predictable demand
Capital Intensity & Profitability Challenges	High upfront investment in chargers, grid upgrades, batteries (swapping), and land	Long payback periods and margin pressure	Low tariffs and price-sensitive users limit revenue potential	Develop asset-light models and strategic partnerships (OEMs, fleets, real estate)
Grid Connectivity & Infrastructure Constraints	Power availability, grid capacity, and approval timelines impact deployment	Slower rollout and operational complexity	DISCOM approvals vary regionally; grid reliability challenges	Select locations aligned with grid capacity and renewable integration
Technology	Different	Operational	Fragmented	Support open

Standardization & Interoperability Issues	charging standards, battery formats, and OEM specifications	inefficiencies and scaling challenges	ecosystem, especially in swapping for 2W/3W segments	standards and collaborate with OEM ecosystems
Policy, Regulatory & Location-Specific Risks	Evolving incentives, tariff structures, and state policies	Business model uncertainty and regional variability	State-specific EV policies; land regulations; electricity pricing structures	Maintain regulatory flexibility and diversify geographic footprint

Prominent Players in the Indian Market

Company / Entity	Project Details
Tata Power EZ Charge	India's largest public EV charging network with 80,000+ home, public and fleet charging points.
Fortum India	Operates fast-charging corridors on highways and in metros; partnerships with OEMs and DISCOMs.
ChargeZone	Building fast-charging highways and urban hubs; 13,000+ charging points installed.
Magenta ChargeGrid	Provides grid-integrated charging stations, solar-powered chargers and fleet charging hubs.
Jio-BP Pulse	JV of Reliance & BP; setting up multi-energy stations with EV charging across India.
Battery Smart	Delhi-based startup; India's largest 3W battery swapping network with 30,000+ daily swaps.
Bounce Infinity	Provides scooter battery swapping and operates swap stations in metro cities.
Ola Electric	Developing Hypercharger network for its 2W EVs; 100+ stations under rollout.
Ather Energy	Runs Ather Grid — a network of fast chargers across 100+ cities.

Innovation Perspectives

Innovation	Business Opportunity	For Senior Management
Charging as a location-based platform	Real-estate–anchored charging platforms	High utilization + long-term moat
Fleet-first charging economics	Depot charging + fleet energy contracts	Faster breakeven, predictable cash flows
Battery-as-a-Service (BaaS)	Subscription-based battery platforms	Lowers EV upfront cost
Ultra-fast charging hubs	Highway energy hubs	Enables EV parity with ICE refueling
Swapping for high-utilization segments	Urban swapping networks	Superior for taxis, delivery, 2W/3W
Software-defined charging networks	Charging SaaS & energy management platforms	Higher margins via optimization
Energy retail integration	Energy retail integration	Increases customer stickiness
Grid-interactive charging (V2G-ready)	Grid-services-from-charging models	Monetizes flexibility
Standardization & interoperability	Neutral charging marketplaces	Accelerates adoption
Carbon-aware & renewable-linked charging	Green charging certificates & contracts	Corporate ESG demand

Concentric & Satellite Opportunities

- Charger manufacturing & component supply: Domestic production of DC fast chargers, cables, connectors and switchgear to meet Bharat/DC-001 and CCS standards.
- CPO & EMP network operators: Concentric players building interoperable charging and payment ecosystems across highways, cities and fleets.
- Battery swapping infra & logistics firms: Operators managing battery pools, kiosks and data-driven routing for 2W/3W and LCV fleets.
- Renewable-powered charging hubs: Integration of rooftop solar and BESS at charging depots to stabilise grids and lower operating costs.
- Digital payment & roaming platforms: Unified UPI-based solutions enabling frictionless billing and real-time energy settlement between operators.
- Fleet energy management & analytics platforms: Satellite systems optimising charging schedules, SoC and total cost of ownership for logistics operators.

- Battery health & recycling alliances: Cross-sector ecosystem reclaiming used batteries for stationary storage, ensuring circular value retention.

Key Takeaway for Senior Management

Takeaway	Details
Charging & swapping is an energy-platform business, not a hardware rollout	• Value accrues to networks that control software, utilization, pricing, and grid interaction—not just charger counts • ***Examples****:* network operating systems, dynamic pricing, roaming/interoperability layers • **Competitive advantage:** higher utilization, faster payback, and ecosystem lock-in
Utilization beats footprint as the primary economic driver	• ROI depends more on charger/swapping throughput than on site count, and thus emphasis should be on generating predictable revenues and superior unit economics • ***Sub-components****:* fleet contracts, depot charging, 2W/3W corridors, logistics hubs • **Recommended innovation focus:** demand aggregation and fleet-first deployment models
Swapping wins where uptime and speed matter; charging wins where dwell time exists	• The two models serve different use cases and should be deployed selectively • ***Examples****:* swapping for 2W/3W fleets and last-mile delivery; fast charging for highways and commercial hubs • **Recommended innovation focus:** hybrid networks combining charging + swapping • **Competitive advantage:** broader addressable market with optimized capex
Grid integration and energy management are emerging value pools	• Smart charging reduces peak demand and unlocks grid services revenue • ***Examples****:* demand response, peak shaving, solar + BESS integration • **Recommended innovation focus:** AI-driven load management and energy optimization • **Competitive advantage:** lower energy costs and additional revenue streams
Data and customer experience determine long-term defensibility	• Seamless payments, reliability, and analytics drive repeat usage • ***Examples:*** app-based discovery, uptime SLAs, predictive maintenance • **Competitive advantage:** sticky customers and network effects

Next Steps for Corporate Leaders

EV charging and battery swapping are entering a scaling phase as electrification accelerates across logistics, last-mile, shared mobility, and municipal fleets. Multiple infrastructure models — including depot charging, public fast charging, and swapping — are progressing in parallel as policy, OEM alignment, and fleet economics improve.

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 or talk to Muthukrishnan - 9952910083