



Electric Vehicles are Poised to Create a \$100B+ Opportunity in India by 2030

Multiple new revenue and profit pools will emerge as electric vehicle growth continues

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The authors would like to thank Anjani Varshney for contributing to the development of this report.

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At a Glance

- ▶ The Indian electric vehicle (EV) market is expected to see 40%–45% EV adoption for two-wheel (2W) vehicles and 15%–20% for four-wheel (4W) passenger vehicles (PVs) by 2030, with 12 million to 13 million new 2W EVs and 1 million new 4W PVs being sold in India annually by 2030.
- ▶ EV growth will create material new revenue and profit pools, generating \$76 billion–\$100 billion of cumulative revenue opportunity and \$8 billion–\$11 billion of profit across the EV value chain.
- ▶ The new EV value chain will be materially different from today's internal combustion engine (ICE) value chain: At least six new segments are emerging as promising EV-specific opportunities.

India EV market at an inflection point

In more mature global automotive markets, widespread EV penetration has depended on a confluence of factors. In the shift from ICE to EV, government support, original equipment manufacturer (OEM) investments, ecosystem build-out, relative vehicle cost competitiveness and performance, and consumer acceptance must marry to create a meaningful inflection point. The Indian automotive market is seeing many of these factors converge and is poised for rapid EV growth thanks to sustained stakeholder investments and efforts over the past few years.

Government incentives

Central and state governments are offering meaningful incentives to consumers to adopt EVs and suppliers to propel local manufacturing and ecosystem build-out.

- **Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME)** offers consumer incentives across vehicle types along with a Phased Manufacturing Plan (PMP) to promote indigenous EV production and assembly. In its most recent iteration, FAME II has provisioned \$1.1 billion in demand-led incentives, significantly reducing the capex gap vs. ICE for consumers while driving adoption. There is an additional \$200 million provisioned for charging infrastructure setup and operation.
- **Production-linked incentive (PLI) schemes** launched by the central government for advanced chemistry cell battery storage to drive local cell manufacturing.
- **Goods and Services Tax (GST) rate cuts and road tax waivers**, supplemented by state-level subsidies and direct investments in electrifying fleets and setting up charging infrastructure.

Improved cost competitiveness

EVs offer significant operating (fuel and maintenance) cost savings over ICE vehicles, but the high up-front purchase cost has been a significant barrier to adoption.

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The gap in capital costs for EVs in India has materially reduced due to a sustained global decline in battery prices until 2021 (battery prices marginally increased in 2022 due to recent inflationary pressures) and continued government subsidies. For example, a high-speed 2W EV vehicle costs only 15%–20% more than its ICE equivalent in Delhi when you factor in FAME and state subsidies. Standalone capital costs are likely to decrease further, assuming an ongoing drop in battery prices (albeit at a slower rate) and increased localisation and scale of manufacturing for vehicles and components, which will eventually make EV capital costs competitive, even in the absence of material subsidies.

From a total cost of ownership (TCO) perspective, EVs are already competitive, even at today's pricing levels. Today's leading 2W EVs have TCO that is up to 40% lower than comparable ICE models when used more than 40 kilometres a day. While TCO competitiveness is currently lower for electric 4W vehicles, high daily usage cases like ride-hailing and fleets are already seeing TCO advantages, and this is only improving.

OEM investments in EV

Cross-segment OEMs have started to take significant steps towards building an EV product slate for the Indian market and setting up the enabling ecosystem (charging and dealership networks, financing) to serve the market, often via partnerships with other players across the ecosystem.

We have seen the most action on the 2W and three-wheel (3W) product front where, in addition to ambitious EV plans from domestic automotive incumbents like TVS and Bajaj, we have seen the emergence of a whole host of new EV OEMs, such as Ather, Ola, Ampere, Okinawa, and Hero Electric.

Most major PV and commercial vehicle (CV) OEMs operating in India have also made preliminary market product introductions and have announced full EV product launch slates across the next few years. Domestic champions like Tata Motors and Mahindra are building an extensive EV portfolio for the Indian market, and global players like Hyundai and Mercedes are bringing their global EV platforms into India.

Emerging EV supply chains and ecosystems

There have been a slew of recent investments into building out an enabling ecosystem in India to drive mass adoption. This includes localised manufacturing and battery assembly, battery management systems (BMS), software and telematics, and components. There is also an emergence of charging infrastructure, mobility services, and platforms to meet end consumer needs.

Increased customer readiness/EV awareness

An increasing number of Indian customers are willing to buy EVs, according to a survey conducted by CarDekho and Omnicom Media Group last year. The survey found that 66% of customers are willing to buy EVs, and 68% showed environmental concern—they believe switching to EVs will help reduce air pollution. Corporate customers, especially in the e-commerce and logistics sectors,

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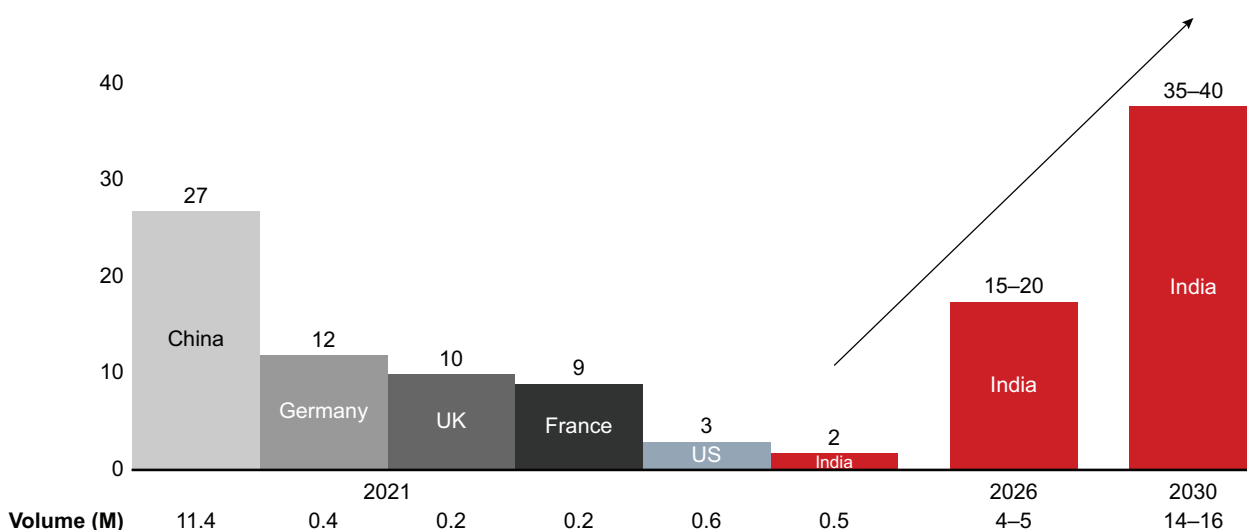
are also setting ambitious targets for electrifying their delivery fleets and reducing their overall carbon footprint. For example, both Flipkart and Zomato have pledged a 100% transition to EVs by 2030.

These factors are leading to an inflection point for EV adoption in India—EV sales have accelerated significantly in the past year (albeit of a small base) and are likely to continue unabated. Our analysis indicates that 35%–40% of all vehicles sold in India by 2030 will be EVs (see Figure 1), up from 2% in 2022. This will equate to approximately 14 million to 16 million new EVs sold each year.

- The 2W and 3W segments will be the vanguards for EV adoption, achieving 40%–45% penetration by 2030. This is driven by several factors, including highly competitive TCOs, limited need for public charging infrastructure given the adequacy of home charging for daily use, investments in building compelling product offerings with comparable performance to ICE vehicles, and early adoption by delivery and logistics fleets (see Figures 2a, 2b).
- It’s likely that 4W PVs will remain behind on the adoption curve. Higher requirements for product performance and build-out of public charging infrastructure, plus higher capital cost and TCO gaps, serve as barriers to adoption. Even with these challenges, this segment is still expected to achieve 15%–20% market penetration within that same time frame.
- Buses will see a penetration curve similar to that of PVs by 2030, driven in large part by State Transport Undertakings (STUs) focused on fleet electrification for intracity transport—already being pushed by multiple state governments.

Figure 1: By 2030, 35%–40% of all vehicles sold in India are expected to be battery electric vehicles (BEVs)

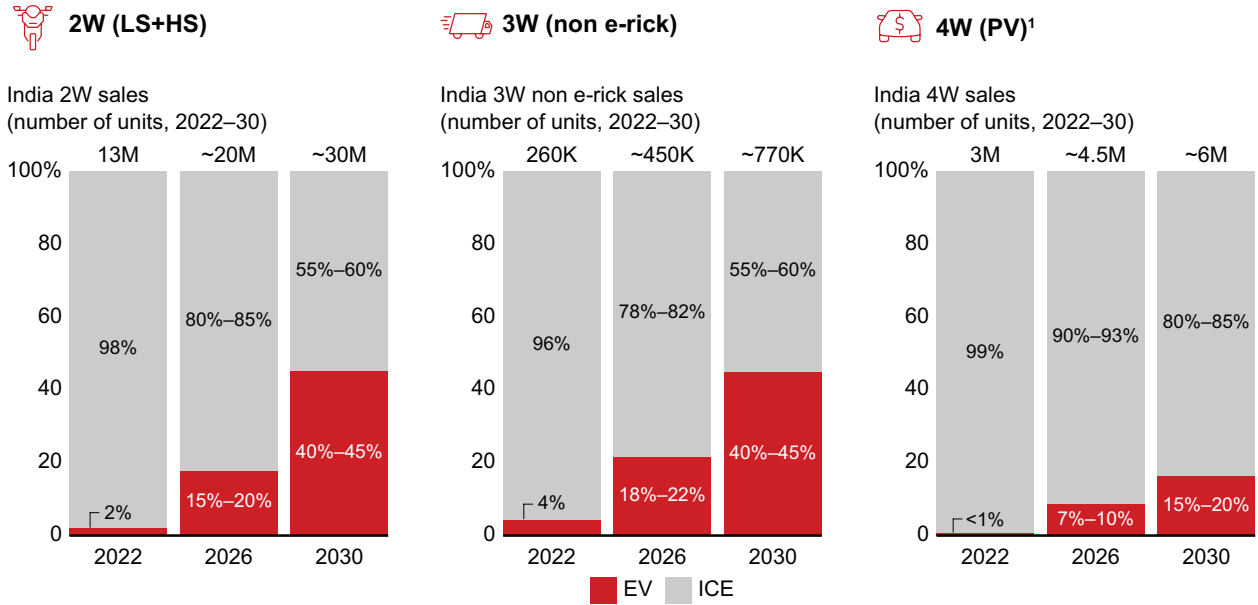
Share of EV in vehicle sales (%)



Notes: 2030 BEV penetration—Bain estimate; US figures account for light vehicles only; calendar year considered for China, Europe, and US, and financial year considered for India
Sources: International Energy Agency (IEA), Fitch Ratings; Frost & Sullivan; Europe Association of Motorcycle Manufacturers; Bain analysis

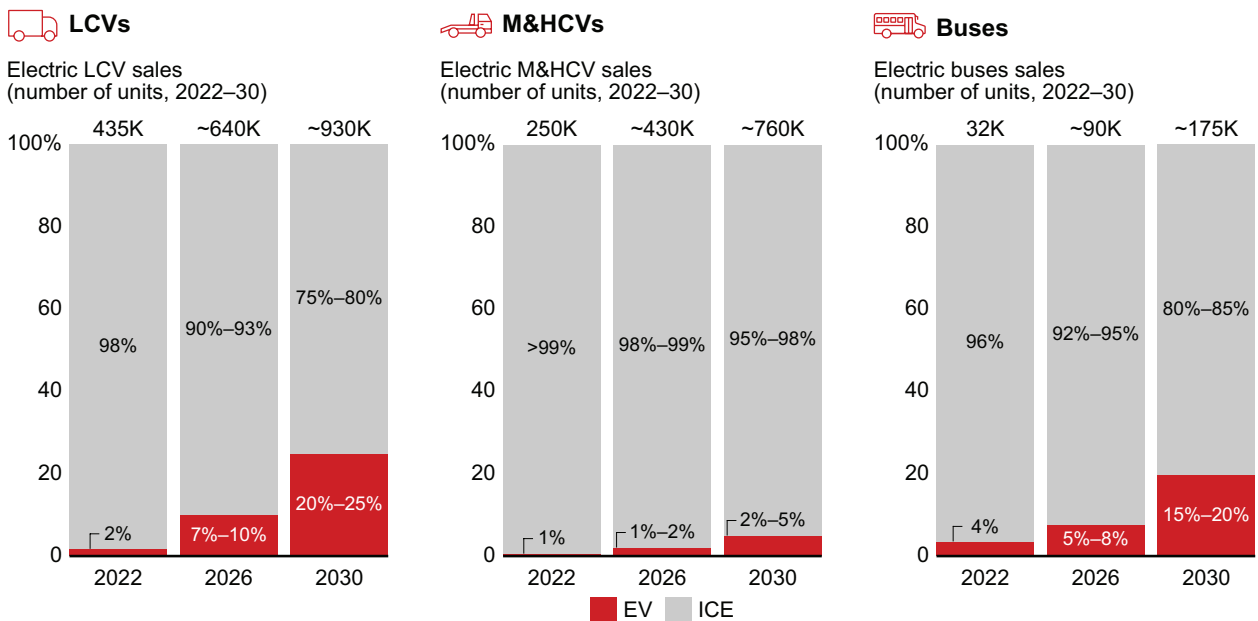
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Figure 2a: BEV penetration in India for passenger vehicles is expected to reach up to 45% for 2W and 3W and 20% for 4W by fiscal year 2030 (FY30)



Notes: ¹Includes PVs, utility vehicles, and multipurpose vans; fiscal year considered for India; 2W: two-wheel; 3W: three-wheel; ICE: internal combustion engine; PV: passenger vehicle; LS: low speed; HS: high speed
Sources: SIAM data; CRISIL; IBEF; Bain analysis

Figure 2b: For commercial vehicles in India, BEV market penetration will be more modest, with LCVs up to 25% and buses up to 20% by FY30



Notes: E-bus penetration to be driven primarily by electrification of intracity STU fleet; financial year considered for India
Sources: SIAM data; literature search; analyst reports—CRISIL; S&P; Bain analysis

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While we believe that deep EV penetration in India by 2030 is a realistic scenario, five key areas need to align to make it a reality:

1. Global battery prices have seen (and will continue to see) some short-term volatility given disruptions in the supply chain, even leading to recent increases in pricing. The enactment of the Inflation Reduction Act (IRA) in the US will likely further change global supply dynamics. Long term, the price of batteries would need to fall an additional 20%–30% to drive price competitiveness with ICE vehicles in the absence of subsidies.
2. OEMs will need to build new and sustainable EV-specific business models for the Indian market. This will include building or sourcing new capabilities like software and system integration, developing competitive EV platforms for the mass market, designing new channel structures with sustainable economics, and managing an ecosystem of EV partnerships.
3. There has been a slew of well-publicised safety incidents (e.g., battery fires) with early EV product introductions. As the industry matures, there will need to be a sustained focus on safety (through greater localisation, quality control and audits, and standardisation) to quell consumer concerns.
4. The government must continue to support EV adoption via consumer and producer incentives and regulatory support. The FAME II incentives have been extended until 2024, by which time they will surpass their intended targets for EV sales. Some government support may be needed after FAME II expires to help consumers mitigate the cost differential between EVs and ICEs, and spur further local manufacturing and ecosystem development.
5. India's charging infrastructure will need to significantly expand to support the projected volume of EVs on the road. Several players have made early investments here and are committed to significant future expansion, yet there is no clarity on the economic model viability for charging point operations or mechanisms to drive OEM interoperability. India also must develop viable models for battery recycling and disposal as a critical mass of EV parc builds.

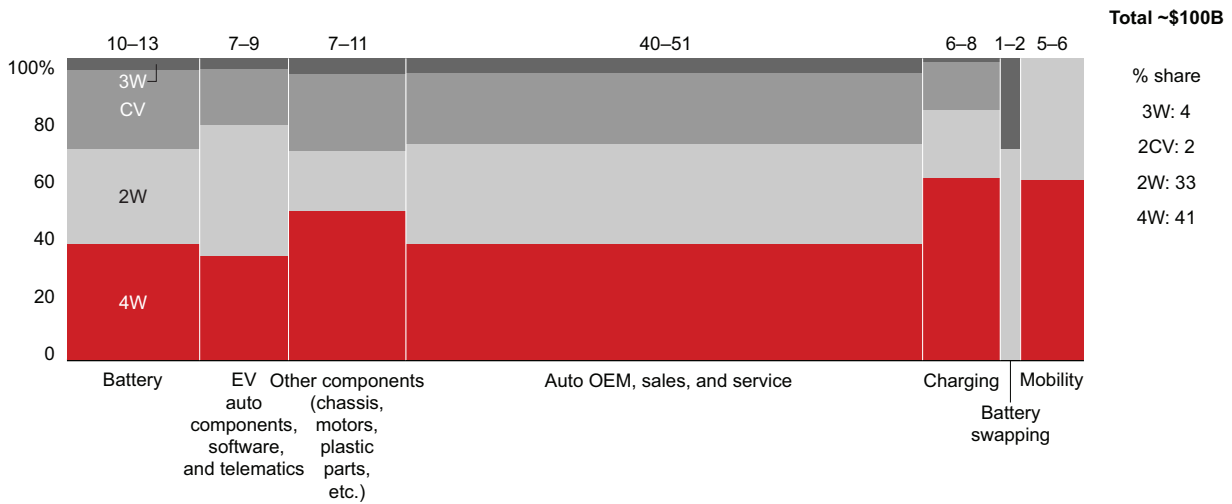
Revenue pool of up to \$100 billion and profit pool of up to \$11 billion by 2030

Achieving the projected levels of penetration would lead to a new EV-specific revenue pool of \$76 billion–\$100 billion by 2030 (including some double counting in the value chain from the cost of batteries, and other components) (see *Figure 3*), potentially translating to an \$8 billion–\$11 billion participant profit pool (see *Figure 4*). 4W passenger vehicles will constitute the largest segment of this profit pool by value (despite seeing relatively lower penetration and volumes), followed closely by 2W vehicles.

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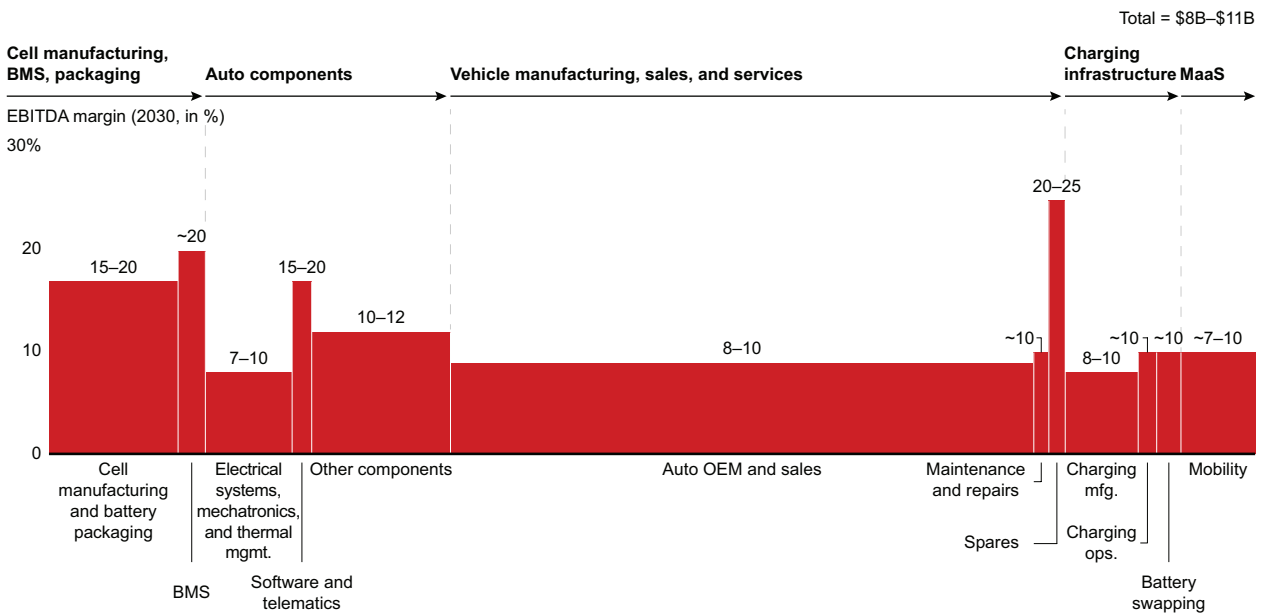
Figure 3: The e-mobility value chain revenue pool is estimated to reach up to \$100 billion in FY30

EV revenue pools along e-mobility value chain (2030, \$B)



Notes: Auto OEM, sales, and service includes cost of battery and auto components, software, and telematics; hence, there is some double counting in the value chain; CVs include LCVs, M&HCVs, and e-buses
Sources: Analyst reports—CRISIL, S&P Global, International Council on Clean Transportation (ICCT), International Energy Agency (IEA); company annual reports; government websites; Bain analysis

Figure 4: The e-mobility value chain profit pool could reach \$11 billion in FY30



Notes: Profitability estimated based on analogs of ICE players and global EV players; BMS: battery management systems; ICE: internal combustion engine; MaaS: mobility as a service; OEM: original equipment manufacturer
Sources: Literature search; Capital IQ; VCC Edge; Ministry of Corporate Affairs filings; Bain analysis

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These new EV revenue and profit pools will be significantly different from those in today's automotive industry. Several new EV-specific segments (cell manufacturing and battery packaging, BMS, mechatronics, thermal management, telematics, charging and swapping, e-mobility) will emerge and scale. Existing automotive segments like auto OEM (new players, decrease in service revenues) and components (new EV-specific products, decline of ICE-specific components in powertrain and transmission) will also be significantly altered in the nature and composition of revenue and profit pools.

Six emerging business models

This electrification-led disruption of the automotive value chain in India will create several opportunities for investors and new participants. Existing players will still subsist in these pools, but many new and relatively uncontested spaces will open over the next few years:

#1: Battery cell manufacturing, packaging, and BMS

India's EV industry today largely relies on imported battery packs for their vehicles. However, there is a push to localise large parts of the battery value chain and increase domestic value add. This is partly driven by government localisation targets and incentives, opening opportunities for new players to participate:

- Cell manufacturing is capital intensive, complex, and requires deep global linkages to raw material supply. As a result, most global cell supply historically has been concentrated across China, Korea, and Japan. However, we are likely to see significant cell supply localisation in India by 2030. This is spurred by the \$2.3 billion PLI schemes for advanced chemistry cell battery storage, which targets cumulative annual domestic capacity of 50 GWh over the next five years. Players such as Reliance New Energy, Ola Electric, and Rajesh Exports are already taking advantage of this scheme.
- Local investment in battery assembly and BMS development for Indian conditions will meet localisation targets and take advantage of government incentives. While some of this investment will happen within existing battery manufacturers and OEMs, standalone players will have the opportunity to participate.

#2: EV components

Substantial demand for localised EV-specific components has created opportunities for component suppliers. For example, subsegments such as mechatronics have already seen 50%–60% localisation of manufacturing. Similarly, OEMs' outsourcing of motors and motor control units and the desire to increase local supply chains will lead to sustained demand in the long run. Players choosing to make an EV component play will not only be able to access the \$6 billion–\$7 billion market but also have opportunities to extend global markets and nonautomotive consumer segments, making this an attractive long-term opportunity.

#3: Software and telematics

Asia-Pacific already has the fastest-growing automotive telematics market in the world, with a CAGR of approximately 31%. India is the third-largest provider, after China and Japan. India's telematics market was approximately \$4.5 billion in 2021 and is poised to grow at a CAGR of 30% over the next five years. In addition, the start-up market is still nascent, with the top 10 start-ups accounting for less than 1% of the overall market size. There is significant room to grow, with multiple emerging applications across predictive and preventive maintenance, driver behaviour monitoring, and other vehicle-tracking use cases.

#4: New-age OEMs

As the EV landscape has evolved in more mature markets, several examples of new, EV-first OEMs have emerged. They challenge, and sometimes beat, large automotive incumbents because they are unencumbered by legacy platforms, processes, and channels, meaning they can create a “fit-for-purpose” solution from the ground up. They have also attracted and developed talent and capabilities in EV-critical areas that traditional OEMs are relatively weaker in, such as software and telematics. An increased propensity of consumers in these segments to try new/challenger brands has also helped.

This dynamic is playing out within the 2W and 3W space in India—multiple new players, such as Ampere, Ather, Okinawa, and Ola, have been early movers and are looking to challenge ICE incumbents, such as Hero, Bajaj, and TVS, for share in this space. Both the product mix and market landscape for 2W and 3W EVs will shift as the market evolves, and one or more of the new-age OEMs could emerge as credible challengers.

#5: EV charging infrastructure

India's charging infrastructure is in its very early stages of build-out, offering participation opportunities as the market evolves. No one player dominates the market today; rather, government agencies (e.g., Indian Oil Corporation Limited [IOCL]), OEMs (e.g., Ather Energy and Ola Electric), utilities (e.g., Fortum and Tata Power), and pure-play charging station operators and manufacturers (e.g., Exicom and PlugNgo) are jockeying for position. This fragmentation, combined with incentives for stakeholder participation, has created an attractive opening for both disruptors and conglomerates looking for adjacent growth opportunities.

Several elements that will influence long-term returns are still playing out. Given the relatively low EV volumes in the market, a viable economic model for charging point operation or battery swapping is yet to emerge. There are still several technical challenges around interoperability and standardisation to be solved, too. However, given the switch to electric power accrues significant operating cost savings for consumers, it is likely that a sustainable model will emerge, allowing a portion of this value to go to charging infrastructure players over time to build a sustainable and scalable business.

6: Mobility-as-a-Service

The TCO benefits of EVs, combined with customers' emerging preference for green and sustainable solutions, will lead to the rise of electric mobility offerings in the Indian market. This will encompass business-to-consumer (B2C) electric ride-hailing offerings, rental mobility offerings, and business-to-business (B2B) mobility-as-a-service (MaaS) platforms seeking to provide an integrated solution for fleet operators to electrify their fleets.

The competitive landscape for B2B MaaS is relatively nascent—smaller start-ups (e.g., Rapido, Bounce, Zypp) are looking to pilot the model in key e-commerce and delivery markets like Bangalore, weaving together an integrated platform solution for fleet operators via partnerships with OEMs, financiers, and charging-point/battery-swapping operators. Cracking a sustainable and replicable city-level operating model here could allow rapid growth and scale given the rise in underlying demand across these segments and the professed push for electrification.

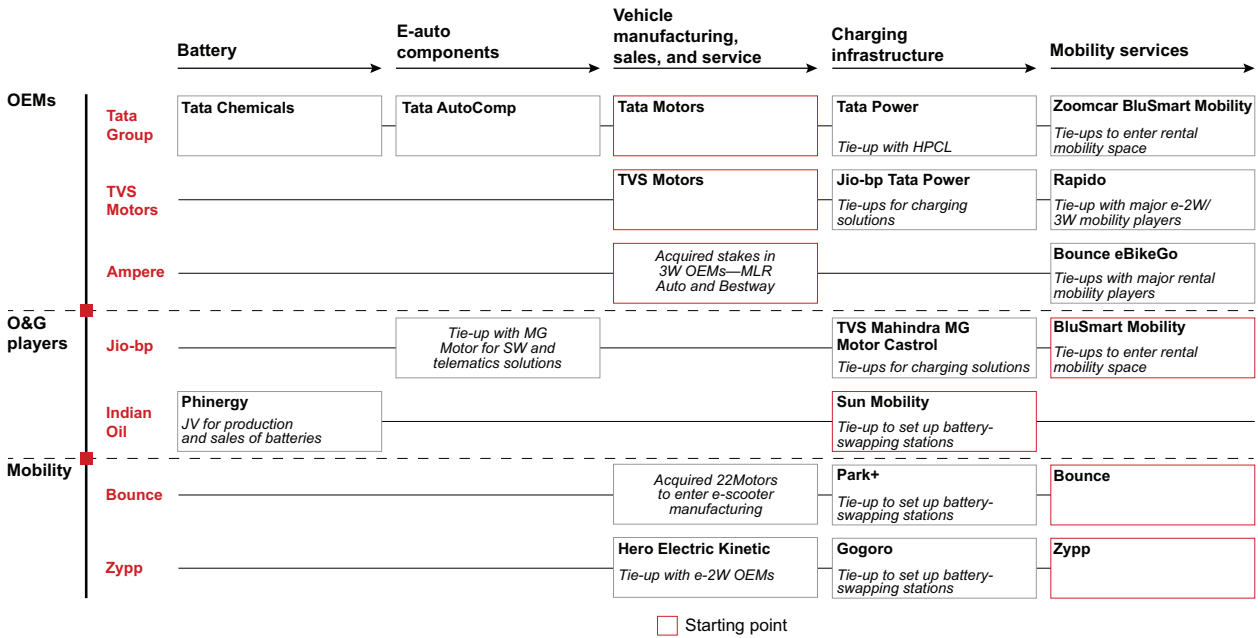
Navigating a new landscape

Many EV ecosystem players are looking for forwards or backwards integration by leveraging multiple participation models (build, acquire, or partner) to create a broader e-mobility ecosystem (see *Figure 5*). While market evolution uncertainties abound, there is scope for participants and investors who make the right early bets to accrue significant value. We have already seen \$3.7 billion private equity and venture capital (PE/VC) investments in this space in India over the past three years, and this number looks set to increase significantly as the industry transforms (see *Figure 6*).

India's automotive market is on the cusp of full-scale transformation. Stakeholders with the vision and agility to navigate and differentiate in a rapidly evolving landscape have multiple opportunities, but there is no single roadmap for stakeholders to follow. Each will have to calibrate which parts of this profit pool they want to participate in, control, or influence based on their starting points and end objectives.

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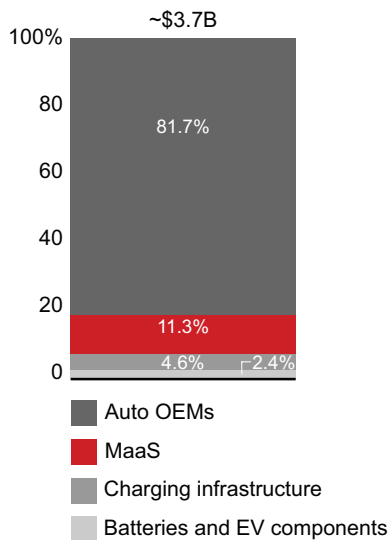
Figure 5: In India, most EV ecosystem players are using multiple models to create a broader e-mobility ecosystem



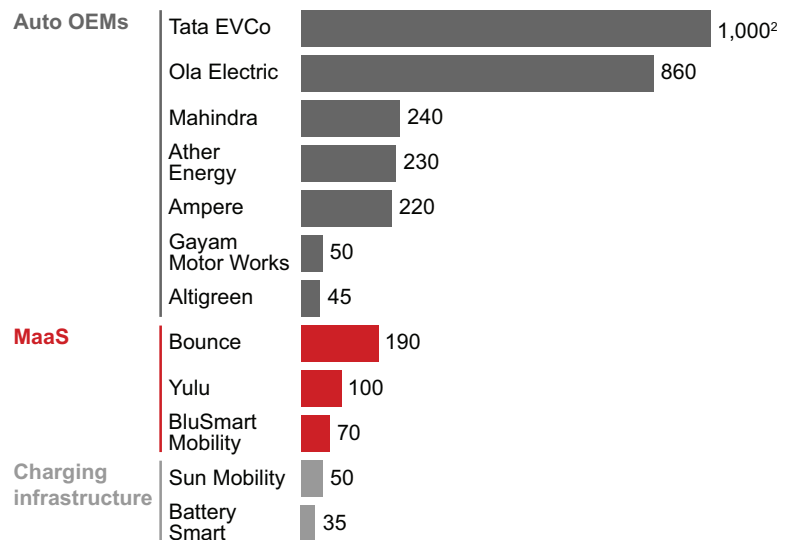
Notes: Examples listed are not exhaustive
Source: Literature search

Figure 6: PE/VC investment deals in Indian EV sector companies totaled \$3.7 billion over the past three years

PE/VC investments in Indian EV companies (2019–2022)



Investment amount (\$M)¹



Notes: PE/VC investments from 2019 to October 2022 have been considered; ¹For deal size > \$40M; ²Entire funds will be infused by end of 2022
Sources: Tracxn deals and funding database; PitchBook database; literature search

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