

Electric Vehicle Conference 2.0

Refer to important disclosures at the end of this report

EVs at a point of no return

We organized our second 'Electric Vehicle' conference, featuring eminent speakers representing the entire EV value chain – Global & Indian OEMs, government associations, battery manufacturers, component suppliers, charging infrastructure firms and software companies. All participants believe that India has reached a point of no return in automotive electrification. Companies such as BYD, Omega Seiki, Panasonic and Minda Corporation provided estimates of FY30 EV share of 65-100% for 3Ws, 40-50% for 2Ws, 20-30% for Buses and 15-20% for PVs vs. FY22 share of 31% for 3Ws (including lead-acid based products), 3% of 2Ws, 12% for Buses and 1% of PVs. The pace of EV penetration is expected to be much faster than earlier for 2Ws/3Ws. The key takeaways:

OEMs: New products expected to drive adoption: Global OEMs already have a wide range of products, which are being introduced either directly (e.g., BYD) or through collaborations (e.g., GreenPower collaborating with Jupiter Wagon Group). In addition, almost all domestic OEMs and start-ups are also indigenously developing and launching products. These launches should drive mass adoption of EVs – for both personal and commercial use – in the medium term. Competitive intensity should increase for incumbents, but they should still hold dominant positions, considering their strong brand, aggressive R&D efforts, better reliability, and extensive sales/service networks.

Government policies are benign; subsidies may taper gradually: EV penetration is expected to be driven by stringent emission norms, incentive schemes, PLI benefits and expansion of charging infrastructure. FAME-2, battery swapping policy, PLI and state government policies are expected to promote EV demand and support the development of a complete ecosystem. **A battery swapping policy is likely to be introduced soon, and is expected to be successful for 2Ws and 3Ws, as customers would get the benefits of demand incentives, similar to the fixed battery models.** Niti Aayog has indicated that demand incentives/tax rebates will be phased out over a period of time, and auto companies will have to reduce costs leveraging localization efforts and economies of scale. The government has been lenient toward the EV space, and is likely to become more stringent on safety norms, considering the recent thermal runaway incidents.

Battery manufacturing capacities are expected to reach 100 GWH by 2030 for automotive and storage applications, as per Panasonic. Li-ion battery cost stands at 40-50% of raw material costs, and localization is necessary to achieve cost competitiveness. The PLI scheme for Advanced Chemistry Cells with incentives of Rs181bn should drive a 50GWH addition over the next three years. Capacities should be commissioned even without PLI benefits, through investments from OEMs, international/domestic ancillaries and start-ups, either on their own or through consortiums. Indian listed players Exide Industries and Amara Raja are expected to enter lithium cell manufacturing this year, in collaboration with international players. Battery costs may not decrease, mainly due to commodity inflation and robust demand.

Component suppliers are adapting to EV transition through indigenous product development, inorganic efforts or global tie-ups (e.g., Minda Corp). The PLI scheme, with an incentive outlay of Rs259bn, is encouraging further investments. Based on global experience, only a few existing ancillaries and start-ups that focus on EV parts are likely to benefit, while others should lose out.

Charging infrastructure is being expanded, mainly by existing power companies and start-ups (e.g., Volttic and eChargebays) in highways, tourist locations, hotels, offices, malls, parking areas, dealerships, residential societies, etc. The number of publicly accessible fast/slow chargers is expected to increase significantly. The requirement for chargers is estimated at 5-10% of the vehicle population.

Driven by expectations of a strong sales upcycle, we retain our positive view on the automobile sector. Our top picks among OEMs are TTMT (TP: Rs535), MSIL (TP: Rs9,400) and ESC (TP: Rs2,140). Among ancillaries, we prefer MNDA (TP: Rs1,135) and MSUMI (TP: Rs85).

Please see our sector model portfolio (Emkay Alpha Portfolio): [Automobiles & Auto Ancillaries \(Page 15\)](#)

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BYD India

Background: BYD is a major Chinese automaker based in Shenzhen, Guangdong Province and listed on the Hong Kong Stock Exchange (market capitalization at \$115bn). BYD operates in four core fields: Electronics, Automobile, New Energy and Rail Transit.

We hosted Mr. Sanjay Gopalakrishnan, SVP – E-PV business, India. Key takeaways:

- BYD globally plans to reach EV sales of 3mn units by 2025 from current level of 1.2mn units. It has a backlog of 0.45mn orders.
- It has discontinued ICE products, and it currently derives 60% of sales from BEVs and remaining 40% from PHEVs. This should change in the next two years, with 80% contribution from BEVs.
- It follows a 7+4 strategy for full-market EV strategy, depicting 7 conventional applications (consumer, buses, coaches, taxis, logistics, construction and sanitation) and 4 specialized applications (port, warehouse, airport and mining).
- The company has dedicated EV platforms, while other OEMs are modifying existing ICE platforms for EVs. The dedicated platform provides better mileage, and deviation from real-time test range is small.
- In PVs, it uses blade battery technology. Blade batteries are based on LFP chemistry. They derive their name from the fact that each cell is prismatic and incredibly long, measuring 96cm in length, 9cm in height and just 1.35cm in thickness. BYD claims that its Blade batteries are superior to conventional LFP cells.
- Blade batteries have a Cell-to-pack structure, which refers to the direct integration of cells into a battery pack, without the modules used in most current pack designs.
- This technology has passed nail penetration test and heavy truck pressure test. It has a thermal runaway temperature of over 500 degree celsius and does not release oxygen, which means it has less risk to fires.
- It has tied up with Toyota for providing blade batteries. **Joint EV product of Maruti Suzuki and Toyota which will be launched in 2025 in India could use blade batteries.**

Exhibit 1: BYD's blade battery



CORE TECHNOLOGIES

THE BLADE BATTERY — SET TO REDEFINE EV SAFETY STANDARDS



REDEFINING THE STANDARDS OF EV SAFETY

- 6 "S" of Blade Battery
- Super Safety
- Super Strength
- Super Endurance
- Super Low Temperature
- Super Life Time
- Super Power

The Blade Battery has passed the "Mt. Everest" Nail Penetration Test to achieve high levels of energy density and safety at the same time.

Source: BYD

- **In India, EV penetration by 2030 is expected to be 15-18% in PVs, 40-45% in 2Ws and 85-90% in 3Ws.**
- Battery prices may continue to trend lower in the next 4-5 years. The residual value in EVs is uncertain, in nascent markets like India, which is restricting finance availability.

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- It can produce 3,000-5,000 cars in the Chennai plant. It is exploring opportunities to improve presence in India. The long-term plan would be to have local manufacturing in India. It may also explore a partnership model.
- BYD India supplies E-Bus chassis to Olectra Greentech. It also has an E-MPV for the commercial segment, which is seeing good interest. It plans to introduce more products on the commercial side.

Exhibit 2: BYD's E6 MPV



Source: BYD

Hero Electric

Background: Hero Electric comes under the Hero Eco Group, an enterprise with diversified interests in EVs, exports, bicycles, healthcare, and real estate. It offers a wide range of E-2Ws manufactured in its facility at Ludhiana and has a widespread network of exclusive sales and service outlets across the country.

We hosted Mr. Naveen Munjal, MD of Hero Electric. Key takeaways:

- E-2W industry volumes stood at 350,000 units in FY22, implying a 3% share in overall 2Ws. This share has the potential to increase to 40-50% over a period of five years. Factors such as better cost of ownership, better financing availability and increased acceptance for B2B purposes can support penetration.
- Hero Electric has a capacity of 100,000 units, which is being expanded toward 1mn units. It has sales of ~100,000 units in FY22, which is expected to surge to 250,000-300,000 units in FY23.
- It has 700+ touch-points, which is being expanded to 1,000+ by next year. The physical network is important for most customers, especially the middle-class income category. Having only online presence may not succeed in India. Most OEMs are adopting a hybrid approach.
- **Customer mix:** Over 30% of purchases are by first-time buyers. The remaining volumes are contributed by replacement and additional vehicle buyers. Additional vehicle buyers are mainly purchasing low-speed vehicles, which are used for short distances.
- **Speed mix:** Low-speed vehicles form 20-25% of volumes. The remaining volumes are contributed by City speed/high-speed vehicles. The share of low-speed vehicles is expected to reduce. In the low-speed category, there are several unorganized players.
- **Geography mix:** Large cities contribute 35-40% of volumes. The remaining volumes are contributed by other cities, towns and rural areas.
- **B2B mix:** The share of B2B users stands at 8-10%, with increasing acceptance by e-commerce, food-delivery and parcel delivery businesses. The share is expected to further increase ahead as corporates are looking at EVs as a CSR/SDG play. Swappable battery

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products are expected to succeed in the B2B segment. The B2B share is expected to increase to 25-30% over the medium term.

- **Lithium battery mix:** A significant portion of volumes (95%+) are for lithium-ion battery vehicles. Lithium ion batteries have warranties of 3 years and service life stands at 4-5 years.
- There are three battery options: fixed, portable and swappable. Portable batteries can be charged anywhere, but the weight of battery could be an issue. Swappable batteries need a wide network of swapping stations and interoperability. Hero Electric will work on all battery options.

Panel discussion on E-2Ws

Background: 1) About Mr. Shaji Titus: He has 35 years of experience in the manufacturing domain, specialized in automobile and auto component manufacturing. He has worked with Ola Electric, Sundaram Clayton and TVS Motors. **2) Wardwizard Innovations & Mobility** (Market capitalization: Rs14bn) is engaged in manufacturing of EVs, consumer durables and electrical items, with manufacturing facility at Vadodara, Gujarat. Its flagship product Joy e-bike was introduced in 2016.

We hosted Mr. Shaji Titus, Ex-Director, Ola Electric and Mr. Ravindran Nambiar, President - International Business, Wardwizard Innovations & Mobility

- E-2W penetration is expected to increase to ~30% by 2025 from 3% in 2021.
- E-2Ws have lower moving parts at ~200 vs. ~500 in ICE. E-2W industry supply chain is becoming more robust, due to investments in batteries and other EV parts under the PLI scheme. This should result in cost reduction for OEMs.
- Over a period of time, EV subsidies would be phased out. Auto companies will have to reduce costs as a result of localization efforts and economies of scale.
- **The number of E-2W OEMs will reduce, as smaller companies may not survive, or may get acquired in the medium- to long term. Start-ups are also facing quality issues due to inadequate testing of products. Smaller companies have not qualified for PLI benefits.**
- The competitive intensity should increase for incumbents, but they should still hold dominant positions in the 2W industry, considering their strong brand image, aggressive R&D efforts, better reliability, and extensive sales & service networks.
- Safety issues such as thermal runaway could be due to low quality of cells, high temperature levels, inadequate testing of products, excessive use, etc.
- **Financing ratio:** Around 15% of vehicles are financed. The share is expected to increase ahead, as financiers become more forthcoming and there is better discovery of resale values.
- Low-speed vehicles are seeing acceptance in towns and rural areas.
- Wardwizard targets to increase volumes from ~30,000 units in FY22 to 200,000 units in FY23. It is targeting to increase touch-points from 650 in FY22 to 1,500.
- Wardwizard is planning an ancillary cluster on a 100 acre area at Vadodara, to improve sourcing.

Panel discussion on E-3Ws

Background: 1) **Piaggio Group** was established in 1884 and is a Europe's scooter and motorcycle manufacturer. Piaggio India has been the pioneer of 3W goods transportation in India. It started India operations in 1999 with the launch of Apé in 1999. 2) **Omega Seiki Mobility** is an Indian EV manufacturer that is developing its own line of commercial EVs, primarily deployed for last-mile e-commerce delivery. It is a part of the Anglian Omega Network, which is present in six countries: India, the UAE, Switzerland, Thailand, Japan and Hong Kong.

We hosted Anand Bhangaonkar, EVP (Head of R&D, Platform and SQE), Piaggio Vehicles and Uday Narang, Founder, Omega Seiki. Key takeaways:

- Supply issues are restricting production in the near-term. OEMs such as Piaggio and Omega Seiki have healthy order-books. Major customer segments include e-commerce companies, corporates and retail customers.
- E-3W penetration is expected to be 65% by 2030. Financing availability needs to improve to support faster adoption of EVs.
- OEMs need to focus on cost-competitiveness of EVs, and should not depend on government subsidies over the long term.
- OEMs need to differentiate products in terms of warranty and after-sales service. Piaggio believes that incumbents will score over start-ups in this regard.
- Lead-acid based E-3Ws have safety concerns, and OEMs need to focus on better products. The share of this segment is expected to reduce notably over the medium term.
- Charging infra is important. Piaggio is partnering with oil marketing companies to setup charging points at petrol pumps.
- Battery swapping has strong potential in E-3Ws. Piaggio's swappable battery 3W has been launched at Chandigarh/Kerala markets in collaboration with Sun Mobility. With anticipated introduction of government incentives, improved acceptability is expected.
- Omega Seiki is likely to launch E-LCVs. It is targeting a price of Rs1.2mn for 1.5T capacity product. It believes that the cost of ownership will be favorable at this price.

GreenPower Motor

Background: Green Power Motor is a NASDAQ-listed (\$120mn market cap) electric CV manufacturer with headquarters in Vancouver, Canada, and manufacturing operations in California, USA. GreenPower serves local cargo & delivery market, transit, shuttle and school sectors.

We hosted Mr. Fraser Atkinson, Chairman and Mr. Brendan Riley, President & Director. Key takeaways:

- GreenPower has entered into a JV with the Jupiter Wagon Group to bring select medium and heavy duty E-CV models to the Indian market. Jupiter will support in the creation of manufacturing/supply-chain eco-system, service/spares network, etc.
- E-CV models are likely to be modified, so that they are affordable and suit Indian conditions. Models may have smaller battery packs.
- The Star-CC model is likely to be locally manufactured in India to meet cargo and passenger applications. The cargo version would have battery pack of 62.5 KWH, providing a payload of 4,095 kg with a range of 150km, or an optional battery pack of 118 KWH, providing a payload of 3,675 kg with a range of 250km.

Exhibit 3: GreenPower's EV Star Cab and Chassis (right-hand drive version)

Source: GreenPower Motor

- In the near term, batteries and power electronics are expected to be imported. Over the medium term, India is expected to become a manufacturing hub, especially for products like axles and frames.
- The target customers would be e-commerce firms and corporates. GreenPower plans to start small in the South region, and then gradually expand its regional presence.
- Considering government stimulus and lower running cost for EVs, cost of ownership is expected to be favorable in comparison with ICEs.
- Battery costs are increasing due to commodity inflation.
- The company is also working in areas such as wireless charging and autonomous vehicles.

Panel discussion of government associations

Background: 1) **NITI Aayog** is the premier policy think tank of the Government of India, providing directional and policy inputs. Apart from designing strategic and long-term policies and programmes for the Government of India, NITI Aayog also provides relevant technical advice to the Centre, States, and Union Territories. 2) **ARAI** established in 1966, is the automotive R&D organization of the country set up by the Automotive Industry with the Government of India. ARAI is a prime testing and certification agency and is an autonomous body affiliated to the Ministry of Heavy Industries.

We hosted Mr. Randheer Singh, Director of Niti Aayog and Mr. Anand Deshpande, Senior Deputy Director and Head of Automotive Electronics Department of Automotive Research Association of India (ARAI). Key takeaways:

- Customer acceptance of EVs has notably increased in the last one year owing to: 1) increased demand incentives under FAME2 scheme and state EV policies, 2) improved supply chain eco-system and connected vehicle technologies and 3) low operational costs in comparison with ICEs considering surge in petrol/diesel prices.
- Charging infra network is improving. Both government and private players are aggressively setting up network.
- EV subsidies are being provided to support initial transition. Over a period of time, demand incentives/tax rebates would be phased out. Auto companies will have to reduce costs as a result of localization efforts and economies of scale. Localization efforts are receiving a boost with PLI schemes for advanced chemistry cells and automotive components.
- The government will provide incentives for EVs, and will not focus on Hybrids. The government wants to skip hybridization and directly focus on electrification.

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- The government is investigating thermal runaway incidents with technical inputs from ARAI. It will come out with norms/guidelines to prevent such incidents. Customer awareness needs to be improved to eradicate such incidents.
- **The battery swapping policy provides a level-playing field as customers would get the benefit of demand incentives, similar to fixed battery models.** Standards for battery dimensions and connectors will be specified, so that interoperability can be achieved. Every battery would have a unique identification number to support the tracking of battery through its life, remote monitoring and reuse/recycling of battery.
- Other areas of government focus include improving finance availability, development of battery as a service (BAAS) model and development of cell manufacturing supply chain for automotive and storage applications.
- ARAI measures the range of an EV under ideal conditions using a chassis dynamometer that aims to simulate real-world conditions. They simulate both city and highway road conditions on the dynamometer. These tests will not consider the altitude, road elevation, weather, and many other factors that play important factors in deciding the range of an EV in the real-world.

Panasonic India

Background: Panasonic Corporation is a worldwide leader in the development of diverse electronics technologies and solutions for customers in the consumer electronics, housing, automotive, and B2B businesses. It offers a wide product assortment of Rechargeable and Non-Rechargeable Batteries, including Lithium Ion, Nickel Metal Hydride, Lead Acid, Coin, Nickel Cadmium, Lithium and Alkaline technologies for almost any application.

We hosted Mr. Atul Arya, Head – Energy System Division. Key takeaways:

- E-2Ws/ E-3Ws are witnessing strong acceptance. E-PV penetration is also expected to accelerate ahead.
- The charging infra network is important to support EV penetration across segments.
- Battery prices may not see major correction, considering demand-supply dynamics.
- Battery chemistries may co-exist, as different chemistries have different applications. For instance, NMC has better energy density and takes less space, while LFP is more cost effective. A blend of battery chemistries is possible within a single vehicle.
- In a cell manufacturing facility, it is difficult and expensive to shift from one chemistry to another, as it involves change in manufacturing process, layout and supply chain.
- Battery swapping has advantages such as absence of charging anxiety and reduction in initial cost of vehicle purchase. Battery as a service (BAAS) model has potential for success ahead.
- Over a period of time, demand incentives/tax rebates would be phased out. Auto companies will have to reduce costs as a result of localization efforts and economies of scale.
- Voltage architecture of 48V is suitable for 2Ws, whereas higher voltages can be used in PVs. There is a need for balance between fast charging using higher voltage and safety.
- Solid state battery can improve charging speed and can provide long range. Among new-age technologies, solid state battery research is at an advanced stage in terms of design, test and commercialization.
- In India, 30%+ of vehicle sales may shift to EVs by 2030.
- **Battery capacity required for automotive and storage applications could be 100 GWH by 2030.**

Panel Discussion on EV batteries

Background: 1) **Kabra Extrusion Technik** is a part of the renowned Kolsite Group which comprises two listed companies Kabra Extrusion Technik Ltd. & Plastiblends India Ltd. Kabra Extrusion Technik (market cap of Rs10.4bn) is the future technologies division of Kabra Extrusion, dedicated to developing and producing green energy systems. 2) **Epsilon Carbon** is a backward integrated carbon company with a dedicated source of raw materials. They provide a wide range of carbon products such as binder pitch, impregnation pitch, carbon black oil, anthracene oil, naphthalene and phenol, and cater to the aluminium, steel, carbon black, tyres, mechanical rubber goods, graphite electrode and specialty chemicals industries, among others. 3) **Mr. Rahul Bollini** is a battery industry consultant, with experience in Lithium-ion cell engineering, architecture, testing and validation. He also has experience in raw material procurement.

We hosted **Mr. Anand Kabra, Vice Chairman & MD, Kabra Extrusion Technik, Mr. Vikram Handa, Founder, Epsilon Carbon and Mr. Rahul Bollini (Battery sector consultant).** Key takeaways:

Kabra Extrusion Technik (Batrix Division)

- Battery cost accounts for 40-50% of total vehicle cost.

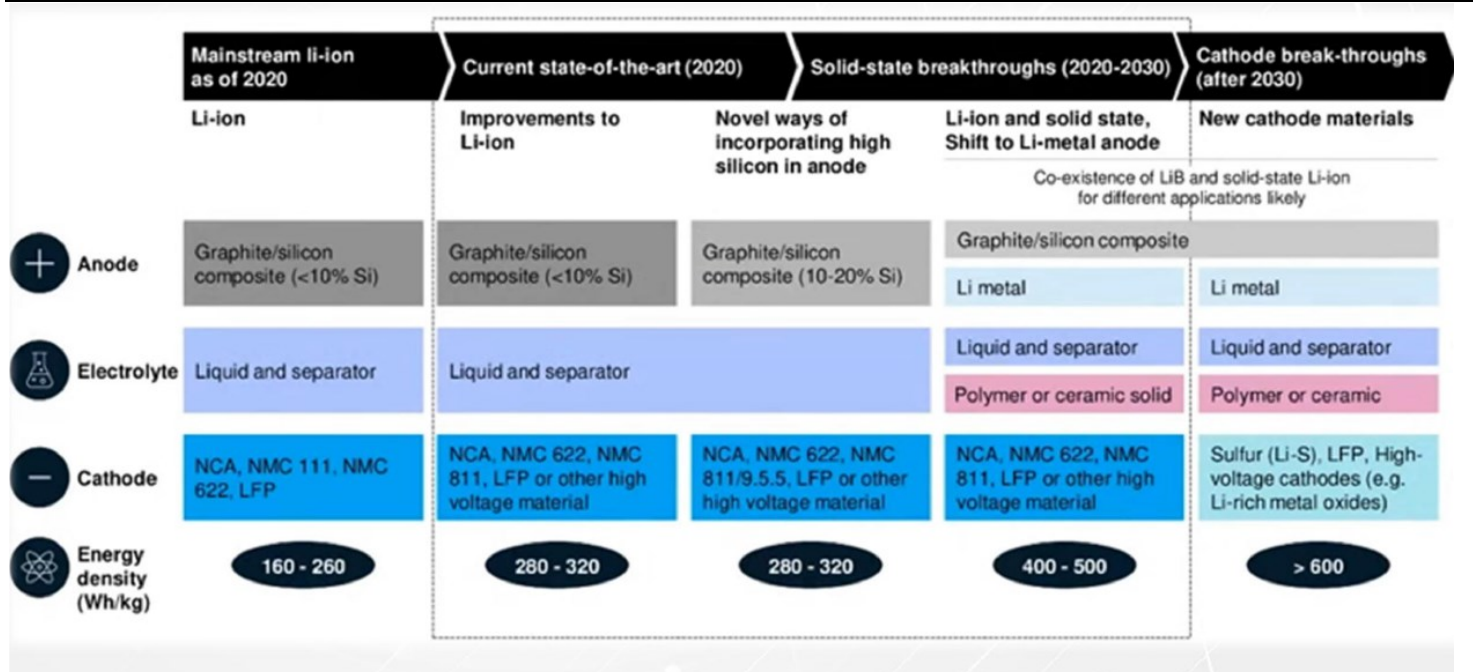
Exhibit 4: Cost structure across segments

Proportion of raw material cost (%)	2W	3W	Cars	Buses
Battery & related components	45-50	40-45	35-40	40-45
Powertrain & power electronics	35-40	30-35	25-30	20-25
Other connectivity and control systems	3-5	5-7	6-8	5-7
Chassis and other body parts	15-20	15-20	25-30	30-35

Source: Kabra Extrusion Technik

- Battery technologies are evolving. In the medium term, the advent of solid-state batteries should result in better energy density/safety and faster charging.

Exhibit 5: Energy density to increase with evolution of battery technologies



Source: Kabra Extrusion Technik

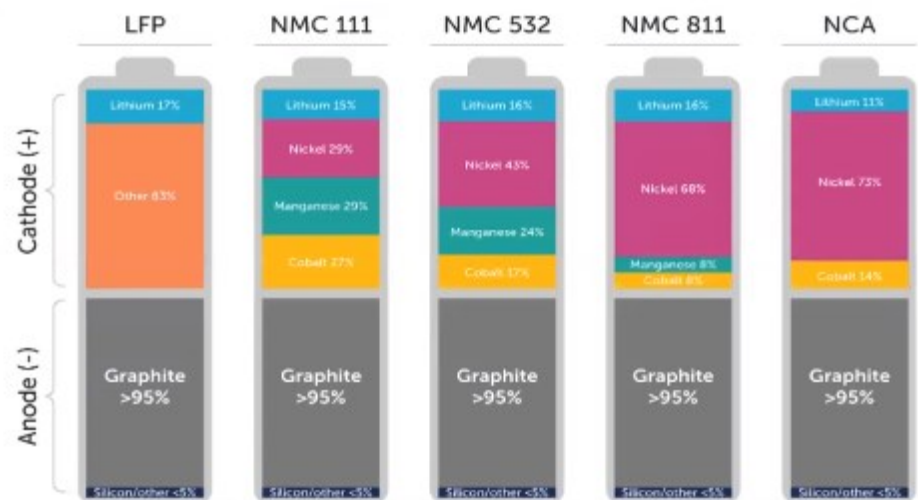
- Due to the changing battery technologies, the company has taken a decision to be cell and battery chemistry agnostic. It is focusing on module production, pack assembly and vehicle integration.

- Annual production capacity is expected to reach 700,000 battery packs by FY24-end from 100,000 battery packs currently. Total investment planned is Rs1bn.
- Battrix plans to have 2 GWH annual capacity by the end of 2022 vs. current capacity of 500 MWH.
- R&D efforts are in the areas of: 1) development of advanced BMS; 2) single-cell level fusion system (for safe disconnection of cells in case of thermal runaway); 3) twin-system packs (for swappable solutions); and 4) liquid cooling systems, etc.
- It had a 10%/19% market share of India cell imports in FY22/Q4FY22 for NMC, LFP and NCA chemistries.
- Expect a definite shift to LFP chemistry due to lower cost and better safety.

Epsilon Carbon

- It produces synthetic and natural Graphite, which is used for anode across cell chemistries.

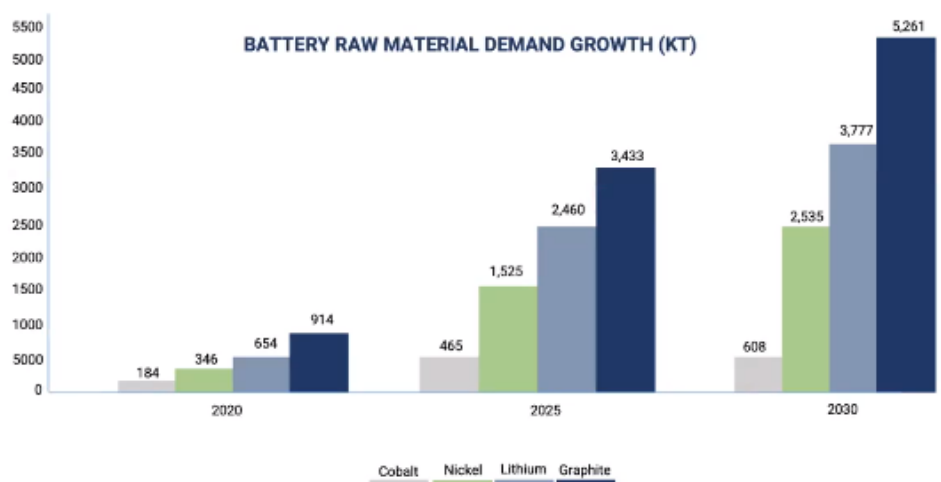
Exhibit 6: Sustained demand for Graphite across cell categories



Source: Epsilon Carbon

- Batteries raw material demand is expected to grow notably by 6x over 2020-30.

Exhibit 7: Battery materials demand growth at 6x

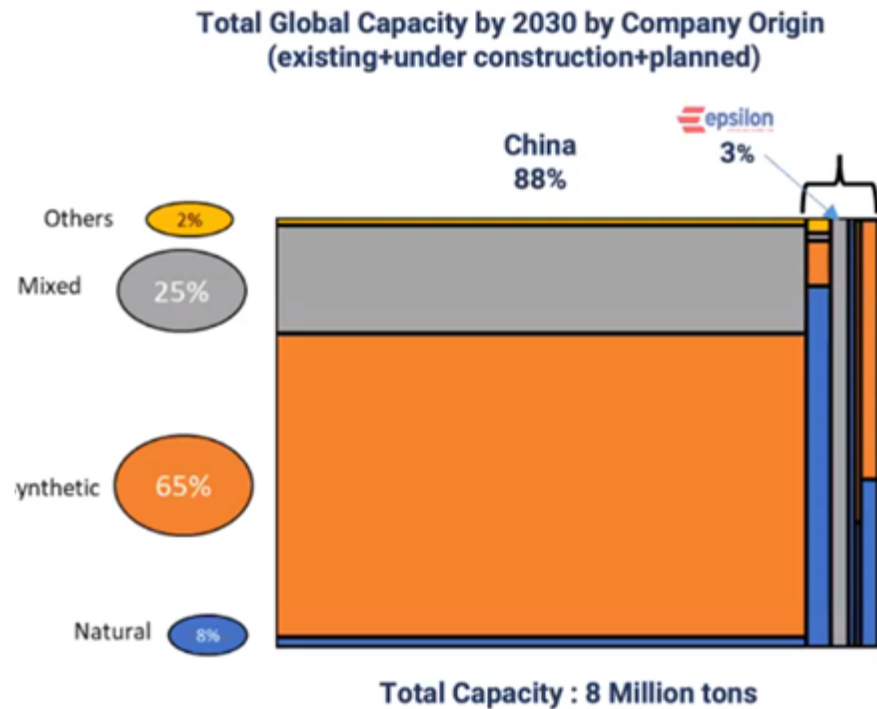


Source: Company

- Epsilon would have a capacity of 150,000/25,000 MT of synthetic/natural graphite capacity in India by 2030. 150,000 MT of synthetic graphite can cater to 150 GWH of batteries.
- It would have a capacity of 50,000 MT of natural graphite capacity in Finland by 2030.

- Global capacity would be dominated by Chinese players with share at 80%+. Even in 2030, China is expected to have an 88% share. Epsilon market share is expected at 3% in 2030.

Exhibit 8: Total Global capacity by 2030 – China to dominate with 88% share



Source: Benchmark Anode Assessment Report – Feb22

- Epsilon would cater to global and domestic markets. Domestic demand is expected to increase notably post 2025. Revenue is expected to increase from \$1mn in FY22 to \$1.5bn in FY30.

Industry Expert: Mr. Rahul Bollini

- Under PLI scheme, Hyundai Global, Ola Electric, Reliance New Energy Solar and Rajesh Exports have been selected.
 - Hyundai Global** would partner with LG for NMC pouch cells for 20 GWH capacity. They have plans 6 model launches in India over medium term with local manufacturing.
 - Ola Electric** is evaluating both LFP and NMC with various partners for 20 GWH capacity.
 - Reliance New Energy Solar** will be working on Sodium-ion and LFP chemistries for 5GWH capacity. It is expected to start with LFP initially and add Sodium-ion at later stages.
 - Rajesh Exports** will be working on LTO chemistry for 5GWH capacity, which is suitable for electric buses and mining trucks. They are into gold mining and have their own requirement for mining trucks.
- Exide Industries and Amara Raja will enter lithium cell manufacturing.** Exide has tied-up with SVOLT of China, and Amara has partnered with InoBat of Slovakia.
- Battery prices are expected to fall eventually. LFP batteries are cheaper but have lower energy density.

Exhibit 9: Breakdown of battery prices

Battery Cells						
NMC Branded A Grade	NMC Chinese A Grade	NMC Chinese B Grade	LFP Cylindrical A Grade	LFP Cylindrical B Grade	LFP Prismatic A Grade	LFP Prismatic B Grade
Prices US\$ per kWh						
170	152	112	151	115	169	131
Logistics Costs (+3%)						
175	157	115	156	118	174	135
Import Duty (+11%)						
194	174	129	172	131	193	149
Battery Packaging Cost (+\$35)						
Final Battery Pack Cost (\$)						
239*	219*	164	207	166	228	184

Source: Industry; Note: *Includes smart BMS cost of \$10

- Thermal runaway in E-2Ws have been caused by low quality cells, improper processing, high temperatures, etc.

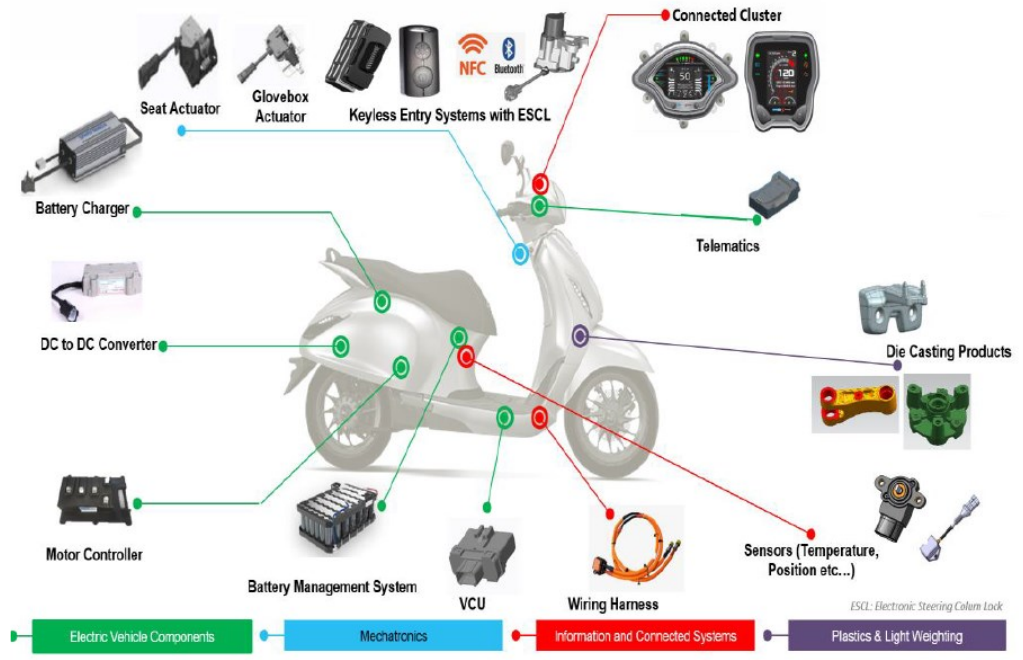
Minda Corporation

Background: Minda Corporation (market cap of Rs48bn) is a component manufacturer with strong presence in segments such as locks, wiring harness, instrument clusters and aluminium die-castings.

We hosted Mr. Anshul Saxena, SVP and Group Head - Strategy and M&A. Key takeaways:

- EV penetration expectations:** Penetration by 2030 is expected to be 100% in 3Ws (commercial), 20-30% in Buses (commercial), 100% in 2Ws (commercial), 30% in 2Ws (personal), 40% in PVs (commercial) and 15-20% in PVs (personal).
- EV content:** Minda is targeting the EV space, with potential content per vehicle of Rs16,000-20,000 for E-2Ws vs. Rs4,000-4,500 for ICEs, through the supply of existing and new products, such as power electronics, chargers, BMS and controllers. It is already supplying legacy products like smart key and wiring harness, while DC-DC converters are under the development stage and motors/controller and BMS are under the evaluation stage. The wiring harness content could increase by 20-40% due to EV transition.

Exhibit 10: Focusing on E-2W segment with several products



Source: Company

Exhibit 11: Addressable content per vehicle in E-2Ws at 4-5x higher than ICEs for Minda Corp

Potential EV kit value	(Rs)
Legacy content in ICE vehicles	4,000-4,500
Premiumization on account of shift toward EVs	4,000-5,500
New EV products	8,000-10,000
Total	16,000-20,000

Source: Company, Emkay Research

- **Minda’s EV revenues** are expected to be Rs200mn in FY22, Rs800mn in FY23 and Rs2bn+ in FY24. The company has won orders from OEMs such as Bajaj Auto, TVS Motors, Ola Electric and Ampere. In FY22, it garnered lifetime orders worth Rs9.5bn and more order inflows are expected in the future. It expects competition from both local players and imports (especially from China). It has acquired a 26% equity stake in charging solutions startup EVQPOINT solutions, which makes battery chargers.
- **R&D** remains a focus area with spends of ~2% of revenue. Of the 218 patent applications filed by company, 40+ relate to EVs. Minda is in reach of collaborations, who can provide support on technology and localization.
- **New product development** has been the focus area, with aggressive efforts at the R&D center, collaborations (tie-ups/JVs) and investments in start-ups. Minda should get PLI scheme incentives. So far, it has applied for incentives for 17 products under the scheme. The government may add more products to the scheme in the future.
- **Minda is focusing on several products**, including 2W/PV keyless solutions, telematics systems, digital clusters, sensors (side stand, rain/light, TPMS, etc.), 2W advanced driver assistance systems, EV parts (power electronics, BMS, chargers, controllers), antennas, kinematics, die-casting parts (motor/battery housings) and other engineering solutions.
- Expects **2W keyless systems** adoption from incumbent players from FY23. It is working on 28 programs for 10+ customers. The keyless solution can increase content by up to 4-5x to ~Rs2,500.
- EV penetration is driving the adoption of **digital clusters (LCD/TFT)** and the company expects penetration levels to increase in the medium term. It expects to sustain market share in the shift toward digital clusters. Digital clusters can increase content by up to 4-5x to ~Rs3,000 for 2Ws.
- **Shark-fin antenna** adoption increases content by up to 2-3x. It has been able to win orders from marquee OEMs such as Hyundai, Kia and Tata Motors.

- **Adoption of 2W advanced driver assistance systems** can increase content by Rs10,000-18,000. They could find applications in over 200cc/cruiser motorcycles.
- **Exports** are expected to see a 25% CAGR, led by strong order book in both North America and Europe. **Die-casting export** revenues could double in the next three years. The company is also setting up a marketing team in Europe to explore sales opportunities for lock-sets, starters, alternator motors, etc.
- **The aftermarket** segment should witness a 20% CAGR for next 3-5 years, led by new products in 2W/3Ws, increase in distribution reach and new customers (overseas markets like Latin America).
- The **PLI** application filed by company has been approved under the Component Champion Incentive Scheme.
- **Outlook:** Management expects to outpace underlying auto industry growth by 10-15% in the next few years, led by increasing content per vehicle, helped by new products, premiumization and regulatory changes, across domestic and overseas markets. Profitability is likely to improve in the next three years, with EBITDA margins of 12%+ and ROCE of 25%+.

Panel discussion on Charging Infrastructure

Background: 1) **eChargeBays** is a start-up with focus on setting up charging infrastructure. It has partnered with MG Motor to setup home charging solutions. 2) **Volttic** is an EV charging service provider providing home and commercial charging solutions. Volttic is registered trade mark product of Tvesas Electric Solutions

We hosted Mr. Rajesh Singh, Founder, eChargeBays and Mr. Varun Chaturvedi, Founder, Volttic EV Charging solutions. Key takeaways:

- There are ~2,200 publicly accessible chargers in India. Of this 60% are slow chargers. **The requirement of chargers is estimated at 5-10% of vehicle population.**
- Charging infra companies are planning expansions, but ramp-up is limited by supply side issues. Subsidy is being provided under FAME2 and state government EV policies.
- eChargeBays is active in passenger car space and has supplied 6,000 home charging stations so far.
- Volttic plans to have more than 10,000 charge points across India in next 5 years.
- Utilization levels for chargers is low at <5% as of now. Financial feasibility can be achieved when utilization levels are at least 25%.
- The cost of setting up a charging station with configuration of CCS standard with 50KW capacity and Bharat DC-001 with 15KW capacity, would be ~Rs1.5mn, excluding cost of real estate. Assuming 8 hours utilization per day, payback period can be three years.
- Charging capacity of 50 KW is ideal, as PVs are expected to move towards higher voltage architectures.
- **Oil marketing companies have over 90,000 fuel pumps across the country, and if charging stations are setup at these fuel pumps, it can make a huge impact on EV transition.**
- The charging infra is important for PVs and CVs. However, swapping network can find acceptance for 2Ws and 3Ws.

Tata Elxsi

Background: Tata Elxsi (market cap of Rs510bn) is a design and technology services provider across industries, including automotive, broadcast, communications, healthcare, and transportation.

We hosted Mr. Nitin Pai, Chief Strategy and Marketing Officer. Key takeaways:

- Tata Elxsi has 10,000 employees and derives 50% of revenue from transportation and automotive segments. Major portion of revenues (~90%) is from software and digital segment, whereas ~5% is from electronics segment and ~5% from mechanical segment.
- The company's focus is on software/services that have high entry barriers.
- Megatrends like CASE (Connected, Autonomous, Shared and Electrified) provide a huge revenue potential, as there will be increased software spends. These mega-trends are likely to increase cost of vehicle for OEMs.
- Cost of automobiles has been increasing, and the share of software/electronics is likely to consistently trend higher in the medium term.
- Considering the large opportunity, there is a shortage of skilled manpower.
- Most OEMs are likely to outsource work to software providers. Although, some OEMs may plan to have software in-house (e.g.: Tata Motors).
- New revenue streams such as data monetization will open-up for OEMs. Data can be used to deliver a better experience to customers, and can also be monetized.
- Mobility as a service (MAAS) model has potential to grow over the long term. It reduces upfront cost for customers.
- SOTA (Software Over The Air) refers to updating software components in general, FOTA (Firmware Over The Air) is more specific. It describes the process of updating firmware over the air. FOTA is the preferred option by automobile OEMs.

Emkay Alpha Portfolio – Automobiles & Auto Ancillaries



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Sector

Automobiles and Ancillaries

Analyst bio

Raghu holds an MBA and comes with total 13 years of research experience. His team currently covers 17 stocks in the Indian Automobiles and Ancillaries space.

EAP sector portfolio

Company Name	BSE200 Weight	EAP Weight	OW/UW (%)	OW/UW (bps)	EAP Weight based on Current NAV	Change vs last published EAP (bps)
Auto & Auto Ancillaries	4.82	4.82	0%	0	100.00	
Amara Raja Batteries	0.00	0.00	NA	0	0.00	0
Apollo Tyres	0.00	0.00	NA	0	0.00	0
Ashok Leyland	0.22	0.22	0%	0	4.48	0
Atul Auto	0.00	0.00	NA	0	0.00	0
Bajaj Auto	0.52	0.42	-20%	-11	8.65	0
Bharat Forge	0.18	0.18	0%	0	3.82	0
Eicher Motors	0.40	0.40	0%	0	8.37	0
Escorts	0.00	0.02	NA	2	0.39	0
Exide Industries	0.00	0.00	NA	0	0.00	0
Hero Motocorp	0.36	0.36	0%	0	7.56	0
Mahindra & Mahindra	0.96	0.98	2%	2	20.45	0
Maruti Suzuki India	1.10	1.12	2%	2	23.34	0
Motherson Sumi	0.00	0.00	NA	0	0.00	0
Motherson Sumi Wiring India	0.00	0.02	NA	2	0.37	0
Tata Motors	0.80	0.81	2%	1	16.78	0
Tata Motors DVR*	0.10	0.11	10%	1	2.33	0
TVS Motor	0.17	0.17	0%	0	3.49	0
Cash	0.00	0.00	NA	0	0.0	0

Source: Emkay Research

■ High Conviction/Strong Over Weight ■ High Conviction/Strong Under Weight

Sector portfolio NAV

	Base					Latest
	1-Apr-19	25-May-21	24-Nov-21	22-Feb-22	21-Apr-22	24-May-22
EAP - Auto & Auto Ancillaries	100.0	123.6	136.2	137.6	133.4	134.6
BSE200 Neutral Weighted Portfolio (ETF)	100.0	123.6	135.1	136.6	132.8	134.3

*Performance measurement base date 1st April 2019

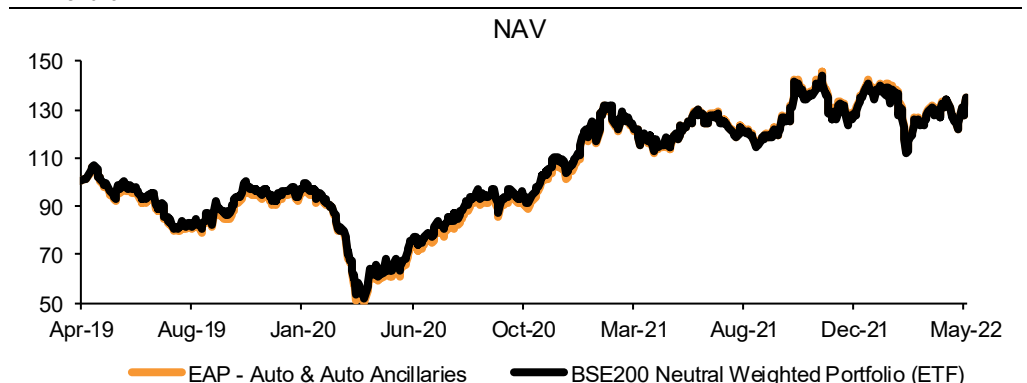
Source: Emkay Research

Price Performance (%)

	1m	3m	6m	12m
EAP - Auto & Auto Ancillaries	0.9%	-2.2%	-1.2%	8.9%
BSE200 Neutral Weighted Portfolio (ETF)	1.1%	-1.7%	-0.6%	8.7%

Source: Emkay Research

NAV chart



Source: Emkay Research

Please see our model portfolio (Emkay Alpha Portfolio): [Nifty](#)

Please see our model portfolio (Emkay Alpha Portfolio): [SMID](#)

“Emkay Alpha Portfolio – SMID and Nifty are a supporting document to the Emkay Alpha Portfolios Report and is updated on regular intervals”

Emkay Rating Distribution

Ratings	Expected Return within the next 12-18 months.
BUY	Over 15%
HOLD	Between -5% to 15%
SELL	Below -5%

Completed Date: 26 May 2022 01:08:37 (SGT)
Dissemination Date: 26 May 2022 01:09:37 (SGT)

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