Electric Vehicles: Future of Last-Mile Deliveries in India

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Electric Vehicles: Future of Last-Mile Deliveries in India

Electric vehicles (EVs) are fast emerging as the vehicle of choice across multiple applications. In particular, the organized last-mile delivery space is playing a pivotal role in driving EV adoption in India, as evident from the multiple 'Proof of Concepts' (POCs) being carried out and ambitious fleet electrification commitments by key players in food, grocery and e-commerce delivery. For instance, Zomato has announced 100% electrification of its fleet by 2030, while Big Basket has announced 70% fleet electrification by 2024. Our analysis shows that last-mile deliveries in these industries will drive over 25% of EV sales by FY25; presenting a significant opportunity for EV manufacturers and other industry players. This report discusses the reasons for EV popularity in the organized last-mile delivery market, the emerging shifts in market dynamics and the actions that the key players of the EV ecosystem must undertake to capitalize on this opportunity.

Size of opportunity: Why should the EV ecosystem increase focus on the organized last-mile delivery sector?

Last-mile deliveries are set to experience significant growth over the next five years, with a CAGR of 15-20% across a wide range of applications from food delivery, groceries, e-commerce etc. Food delivery, which currently processes around 5 million orders daily, is projected to see a CAGR of 30% during this period. This robust growth will drive the need and demand for expanded delivery fleets (See Exhibit 1).

The composition and share of different form factors (2/3/4W SCVs[1]) in fleet operations will vary based on the growth of different demand segments. For example, food delivery primarily utilizes 2Ws, with a limited presence of 3W or 4W fleets. In contrast, approximately 20% of grocery and e-commerce fleets consist of L5 3W and 4W SCVs, with 4W SCVs having a slightly higher share.

Regardless of the form factor and application, a significant proportion of the expanded fleets of the future is likely to be composed of EVs. By 2025, EV adoption will likely increase significantly in organized last-mile delivery fleets, with 20-30% adoption across 2/3/4Ws, as shown in Exhibit 1. With the organized last-mile delivery making up 25% of the entire market, it presents significant opportunities for growth and expansion to the EV ecosystem as compared to ICE vehicles. Consequently, EV players must enhance their understanding of customer needs and how to meet them.

Why is the organized last-mile delivery segment adopting EVs?

To succeed in this segment, it is crucial to understand the reasons behind EV adoption. While the environmental benefits of EV deployment are well established, it is not the only rationale. EVs can also generate significant financial benefits from reduced Total Cost of Ownership (TCO)[2]. While higher upfront costs can often deter EV adoption, over time, the TCO for EVs becomes superior to that of ICE vehicles.

We examined expected TCO in typical duty cycles for a range of vehicles and compared EVs in each product segment with the closest fuels. For instance, we evaluated 2W EVs against petrol, and 3W and 4W against diesel and CNG.

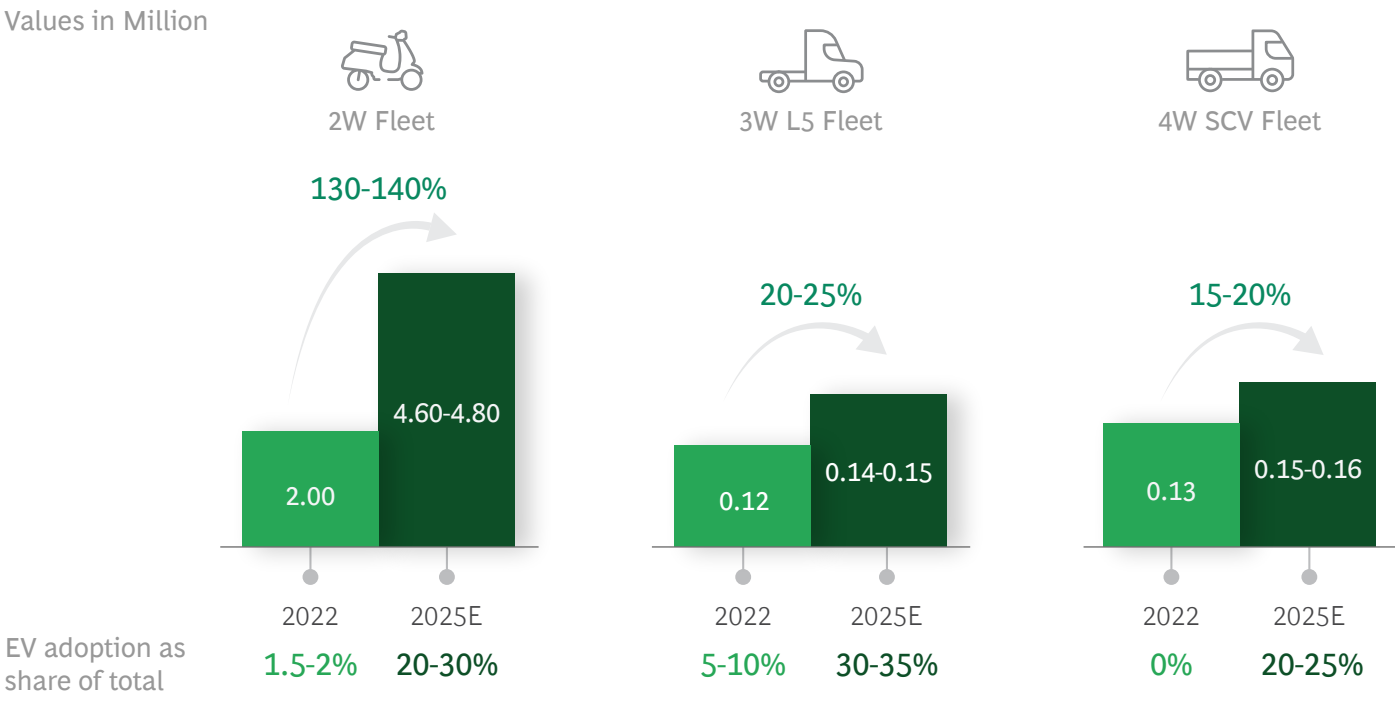
Exhibits 2, 3, and 4 shown below illustrate the 10-40% TCO benefit of EVs as compared to ICE vehicles across the three categories of vehicles typically deployed in last-mile deliveries:

- 2Ws High Speed (HS) vehicles with a top speed of up to 80 kmph and Mid Speed (MS) vehicles with a top speed of up to 50 kmph

1. Small Commercial Vehicles (SCV) are the entry-level 4W trucks utilized for quick delivery of cargo

2. TCO represents the lifetime cost of owning a vehicle, comprising the purchase cost, energy cost, maintenance cost, battery replacement cost and financing cost, net of residual value

Exhibit 1 - Total Fleet Deployment and EV Adoption in Organized Last Mile Deliveries



Source: Analysis as on December 2022

- 3Ws (L5 commercial cargo category)
- 4Ws (SCV category with payload up to 2 tonnes)

Based on the TCO comparison between Electric and ICE vehicles in the exhibits, we conclude that:

- For 2W, lower variable cost (energy, maintenance, etc.) of EVs within the vehicle lifespan more than compensates for the high upfront vehicle costs and makes the residual value redundant
- A fall in battery prices is likely to aid E3Ws and E4Ws in maintaining TCO superiority over CNG variants even without subsidy by 2025

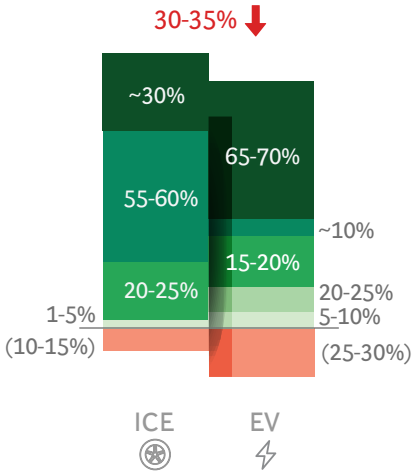
EV adoption is likely to be further driven by regulatory measures. Central and state governments have already underscored their support for EVs via EV adoption mandates and subsidies, including the FAME-II subsidies (Faster Adoption and Manufacturing of Electric Vehicles). For instance, the Delhi government's aggregator policy mandates all delivery services to ensure that by 2023, at least 50% of the new 2Ws and 25% of the new 4Ws in their fleet are EVs. Similarly, the Maharashtra government has issued a 25% target for EV adoption for fleet aggregators by 2025. Niti Aayog's Shoonya initiative targets the promotion of 100% electrification of commercial vehicles in the urban freight sector through focused campaigns.

To drive the electrification of last-mile deliveries, we believe the organized sector is better positioned. Not only can it overcome issues pertaining to high upfront cost of EVs and the lack of competitive financing and insurance options, but can also fully realize the TCO benefits and regulatory incentives for EV adoption. Additionally, organized segment can as well establish the necessary infrastructure for charging/swapping and enabling access to maintenance services, all of which can be challenging for individual driver owners/small-scale aggregators operating on market load, i.e., the unorganized segment and discourage them from purchasing EVs.

Exhibit 2 - TCO for both High Speed (HS) and Mid Speed (MS) E2Ws Superior to ICE variants

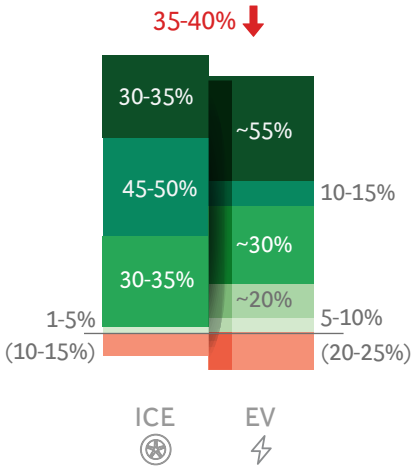
ICE Scooter vs. High Speed E2W

TCO components



ICE Motorcycle vs. Mid Speed E2W

TCO components



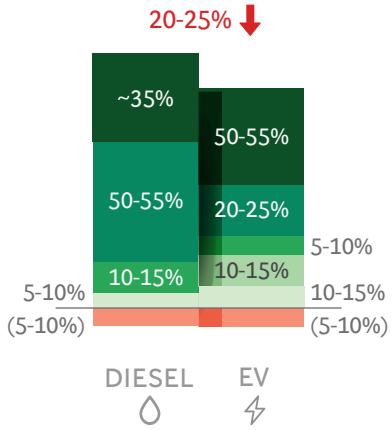
Purchase cost net of subsidy | Energy | Maintainance & Repair | Battery Replacement | Financing | Less: Residual valu

Source: Expert interviews, Press search, BCG analysis as on December 2022
Note: TCO = Purchase cost net of subsidy + Energy cost + Maintenance Cost + Battery Replacement Cost + Financing Cost – Residual Value
Assumptions: TCO starts in 2022; 24k km annual run, Fuel: Rs 101/L, Electricity: Rs 8.44/KWh; Avg. of Delhi & Maharashtra taken for Fuel, Electricity, Road Tax & Subsidy; Comparable EVs and ICE vehicles used for TCO analysis

Exhibit 3 - TCO for E3Ws Superior to both Diesel and CNG Variants Post Subsidy

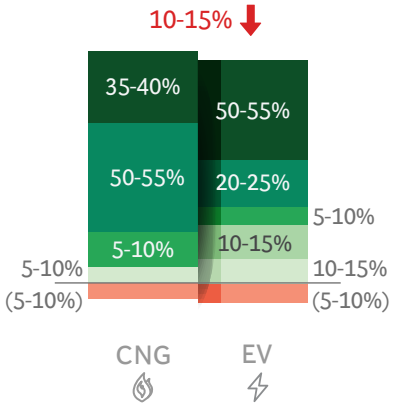
Diesel vs. EV

TCO components



CNG vs. EV

TCO components



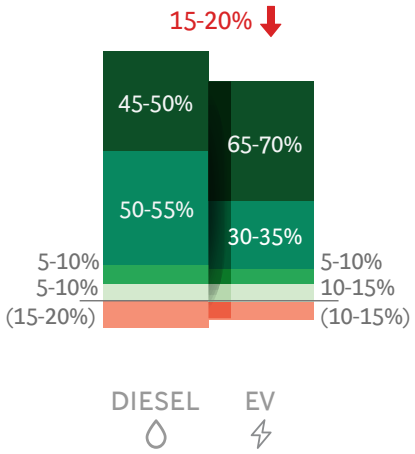
Purchase cost net of subsidy | Energy | Maintainance & Repair | Battery Replacement | Financing | Less: Residual valu

Source: Expert interviews, Press search, BCG analysis as on December 2022
Note: TCO = Purchase cost net of subsidy + Energy cost + Maintenance Cost + Battery Replacement Cost + Financing Cost – Residual Value
Assumptions: TCO starts in 2022; 30k km annual run, Diesel: Rs 92.5/L, CNG: Rs 77.5/l, Electricity: Rs 9.4/KWh; Avg. of Delhi & Maharashtra

Exhibit 4 - TCO for E4W SCV Expected to be Superior to both Diesel and CNG Variants Post Subsidy

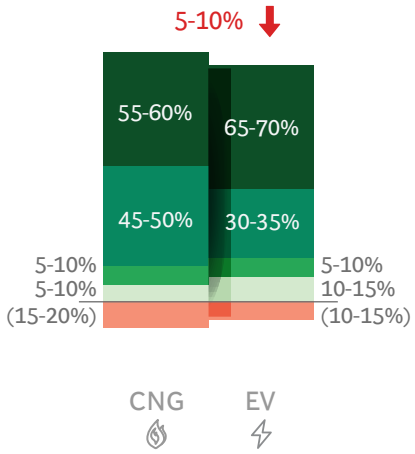
EV vs. Diesel

TCO components



EV vs. CNG

TCO components



Purchase cost net of subsidy | Energy | Maintainance & Repair | Battery Replacement | Financing | Less: Residual value

Source: Expert interviews, Press search, BCG analysis as on December 2022
Note: TCO = Purchase cost net of subsidy + Energy Cost + Maintenance Cost + Battery Replacement Cost + Financing Cost – Residual Value
Assumptions: TCO starts in 2022; 30k km annual run, Diesel: Rs 92.5/L, CNG: Rs 77.5/l, Electricity: Rs 10/KWh; Avg. of Delhi & Maharashtra taken for Fuel, Electricity, Road Tax & Subsidy; 5-year period considered for analysis; Comparable EVs and ICE vehicles used for TCO analysis; potential price points & specs assumed for eSCV

What are the key shifts in market dynamics due to EV adoption?

As the organized last-mile delivery sector continues to transition to EVs, it is crucial to comprehend the changes that this adoption is driving in the current operating model across various dimensions, including ownership patterns, usage patterns, vehicle sourcing/purchasing journey, and opportunities to improve utilization.

I) Ownership model for EVs different from ICE-EV Asset operators playing a critical role in driving adoption

To run last-mile delivery operations, delivery platforms in the organized sector utilize three key models for sourcing their fleets, i.e., DCO fleet (Driver-cum owner), Captive fleet, and Contracted fleet, as illustrated in Exhibit 5.

In the case of ICE, majority of vehicle ownership is driven by driver owners or small-scale fleet operators (10-15 vehicles). EVs adoption by this segment of customers is likely to be low & delayed. This can be mainly attributed to the several unaddressed issues, i.e., higher upfront costs, perceived uncertainty about technology, range anxiety, lack of affordable financing and resale value benchmarks. Further, this segment has limited awareness of the concept of TCO and the advantages of EVs over ICE.

EV adoption is led by large EV fleet operators or EV asset operators who purchase vehicles and offer fleets on rental contracts. They also enter into partnerships with players across the ecosystem and provide or arrange for additional services, such as maintenance, access to charging infrastructure, vehicle insurance, etc. This mitigates some of the immediate concerns surrounding EV deployment. A significant share of this segment is comprised of startups.

Both in case of EV and ICE, delivery platforms prefer to remain asset-light and abstain from captive ownership due to the high CAPEX required to purchase vehicles and the additional costs incurred for parking, maintenance, security, legal compliance, etc.

Thus, asset operators are better suited to adopting EVs first. While the value added by such asset operators is well-suited for the short term, as the market matures and

Exhibit 5 - Vehicle Ownership Models

DCO Fleet (Driver cum Owner) / Small-cale Fleet Aggregators	Contracted Fleet	Captive Fleet
Delivery platforms onboard drivers/small-scale aggregators who own the vehicles	Delivery platforms take vehicles on rental contracts from third party transport vendors or asset operators	Vehicle purchased/leased by delivery platform for in-house dedicated use; drivers are onboarded separately to utilize fleet

Source: BCG analysis

the several unaddressed problems get sorted, E2Ws may return in part to a DCO model.

Exhibit 6 highlights the vehicle sourcing model for EVs basis form factor (2/3/4W) across various applications compared to ICE variants.

II) Increasing role of delivery platforms as influencers:

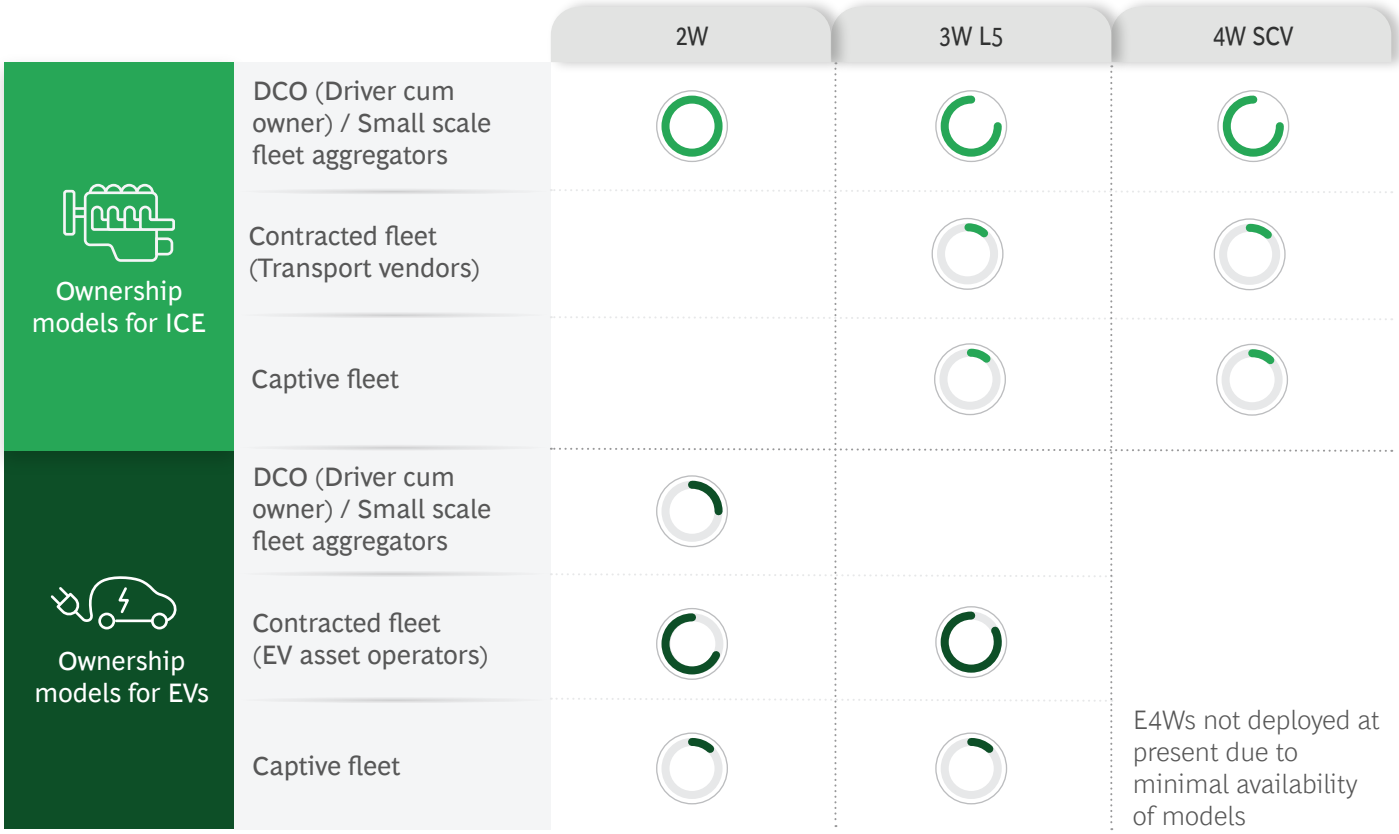
Vehicle models are no longer chosen solely based on dealer recommendations—end customers, such as e-commerce/food delivery platforms, act as influencers and drive vehicle selection for their fleets. They conduct pilot programs with OEMs to identify the best-suited models for their usage and unit economics, based on which they make purchase recommendations. These recommendations are made after considering factors such as expected payload, distance coverage, etc., and the overall fleet compositions. Therefore, it becomes critical for OEMs to factor in this trend when developing their overall product and go-to-market and curate engagement plans to continuously keep in touch with delivery platforms. For instance, given the higher tonnage handled by organized firms operating at a large scale and managing demand in-house, they would potentially utilize E4W SCVs over E3W for maximizing vehicle utilization and improved economic benefits. This shift is likely to capture a portion of the E3W demand and drive sales of E4W SCVs.

III) Growing need for 'fit-for-purpose' 2W vehicles:

There is a lack of 2W models catering to the different needs pertaining to delivery. Our primary research indicates that delivery personnel have unique requirements, such as ample storage space, good pickup even after heavy loading, and customizations such as backrests for usage over extended periods. Furthermore, these drivers also use the 2Ws for personal travel post work hours and hence, have some minimum expectations in terms of the vehicle design and look as well. With these factors at play, it is crucial to design fit-to-purpose 2W vehicles catering to the need of the customer segment.

In case of 3W and 4W vehicles there is a clear demarcation between vehicles used for delivery and personal applications. While vehicle needs vary here too, the primary driver of variant design could solely be based on type of goods delivered.

Exhibit 6 - Ownership model for EVs vs. ICE



Source: Expert calls, desktop research, BCG analysis as on December 2022
Note: ICE vehicles are deployed both in organized & unorganized sector whereas EVs are predominantly deployed in organized sector

IV) SCOPE TO IMPROVE VEHICLE UTILIZATION AND DEEPEN TCO BENEFITS

This is due to two key reasons. Firstly, duty cycles vary widely by application (see two examples in Exhibit 7). Secondly, vehicles are currently largely dedicated to a single application, wherein demand varied by time of day. Our analysis indicates that there is scope of upto 50% increase in utilization (km covered/day) by simply cross-utilizing vehicles across applications to minimize downtime. For instance, a E3W can be used for milk delivery in the morning, grocery and e-commerce delivery later in the day. EV telematics can also be used to minimize unplanned downtime further improving gainful utilization. Thus by serving multiple customers across applications, EV asset operators can optimize vehicle utilization and offer vehicles at lower rates to delivery platforms, establishing themselves as a superior option compared to individual driver-owners or small-scale fleet aggregators.

However, increasing the distance covered in a day is constrained by the charging time. Options like battery swapping, once established, can help overcome this barrier. Our primary research indicates that while drivers are open to the concept of swapping, concerns exist on the battery quality and the pricing. To address them, players need to work on increasing interoperability across stations, improving customer awareness, offering technical support, and offering attractive economics compared to charging. As the market and experience for EVs matures, we are likely to see these emerge.

What do these shifts imply for key players?

We expect the impetus by companies and the government (subsidies, e.g., Production Linked Incentives (PLI), electrification targets, etc.) to expand EV adoption.

Exhibit 7 - Usage Patterns for Organized Last Mile Deliveries

Applications[1]	Average Utliization	Payload	Orders
Food delivery Grocery delivery (On-demand/instant) *E2W usage predominant*	60-70 km/day	5-10 kg/trip	20-30 per day
Grocery delivery (Scheduled) E-commerce delivery *E3W usage predominant*	80-100 km/day	200-300 kg/trip	50-60 per day

Source: BCG analysis
[1] List of applications non-exhaustive

Concurrently, as experience with EVs grow, such newer approaches will emerge first as experiments and then at same scale. Considering the expected evolution, the three key players of the ecosystem, namely OEMs, EV asset operators, and last-mile delivery platforms must prepare themselves.

Key Implications for OEMs

Create fit-to-purpose E2W vehicles via modular platform design

As discussed earlier, there is a growing need for 'fit-to-purpose' E2Ws, which cater to the unique needs of the delivery segment. Currently, potential EV customers have to contend with numerous trade-offs when compared with an equivalent ICE vehicle:

1. Opt for a vehicle of higher cost for equivalent performance as ICE counterpart as is the case with HS E2Ws[3] (e.g., Ather 450 Plus, a typical EV is priced 1.6X compared to a standard ICE variant, say Activa 125).
2. Opt for a vehicle of equivalent cost but lower performance than ICE counterpart as is the case with MS E2Ws[4] (e.g., Hero Electric Optima HX, a sample EV is priced ~1.1-1.2X compared to a standard ICE variant, say Bajaj Platina).
3. Experience poorer pickup with increasing payload
4. Commercial vehicle aesthetics not appealing for personal travel

It becomes essential for OEMs to upgrade their overall product strategy for E2Ws and design fit-to-purpose products, catering to different technical, functional and emotive needs. This may be achieved by ensuring the EV platform is modular that allows for both multiple variants that are viable at smaller volumes and potentially faster refreshes and upgrades.

3. High Speed EV with top speed of 80kmph
4. Mid speed EV reaching top speed of 50kmph

Focus on E4W opportunity

Given the push for electrification, several firms had originally replaced 4W SCV delivery fleets with E3Ws despite lesser payload capacity. However, with the introduction of commercially viable E4W SCV, this trend is likely to reverse. OEMs may focus on product design and compelling economics. Similar to ICE SCVs, even their EV counterparts will need to serve a large array of applications with consequent implications for modularity and variety in variants to provide a commercially attractive alternative to E3Ws and thereby recapture a large share of market.

Develop a B2B selling approach incorporating the entire ecosystem

The purchase journey for EVs is significantly different compared to ICE vehicles. Firstly, although delivery platforms prefer to remain asset-light and do not purchase EVs themselves, they play a major influencer role in selection of vehicles. They routinely undertake pilots to test different EV models for their requirement and recommend best-suited models to the final purchasers. Thus, it is highly beneficial for OEMs to continuously engage with them via structured pilots at appropriate stages to secure an early buy-in.

Secondly, given the significant role played by EV asset operators in the medium term, OEMs need to focus on these businesses as potential customers. In other words, a B2B selling approach incorporating a broader set of stakeholders needs to be designed. However, as driver-owners and small-scale fleet aggregators would start purchasing EVs in the long term, B2C GTM cannot be discarded.

To address barriers for this segment, thirdly, it is important for OEMs to develop an 'ecosystem view' rather than a narrow 'product view' to improve sales. They need to play a bigger role by enabling allied services like charging, insurance, maintenance etc. This would not just help drive customer acceptance for EVs as a viable proposition over ICE vehicles but can also open additional revenue streams for the OEMs.

Finally, communication needs to be tailored to the delivery segment. Our research indicates three key imperatives for communication:

- EVs need to be positioned as serving key technical, functional, and emotive user needs while being fit-to-purpose for deliveries
- Favorable TCO as a concept needs to be reinforced by quoting simple, easy-to-understand metrics like per km fuel cost
- Significantly lower maintenance requirement for EVs vs ICE vehicles needs to be emphasized

Key implications for Delivery Platforms

Adopt a holistic approach to drive EV adoption

While delivery platforms have ambitious fleet electrification targets, achieving them requires focused effort. They should work towards ensuring sufficient supply of EV fleets by entering into tie-ups with asset operators and OEMs. They can continue to work with OEMs and other players to experiment on the overall fleet composition and choose the right vehicle models via pilots. Further, to drive on-ground acceptance of EVs amongst the delivery personnel, delivery firms need to work on providing a smooth end-to-end driver experience by mitigating key concerns. This may be achieved by enabling better access to charging infrastructure, maintenance services, affordable financing options, insurance etc. via partnerships. Special training on technical aspects of EV usage can also be offered to help drivers overcome any inhibitions on the technology.

Currently, several of the above initiatives are being undertaken by firms, but in a piecemeal manner. A more holistic and proactive approach is needed to drive adoption as this would ultimately translate into greater cost savings.

Key Implications for EV Asset Operators

Differentiate value proposition to play a significant role in the maturing market:

Many EV asset operators currently offer value by leasing out EVs on a contract basis. This approach might work in the short term wherein driver ownership is minimal. However, the likely re-emergence of driver ownership, esp. in E2W, necessitates a shift in their value proposition. One such way may be to offer additional services beyond short-term/long term vehicle rentals, like manpower services i.e., sourcing drivers out to firms to operate fleets, 3PL services like E2E order management etc.

Another lever for differentiation would be offering superior unit economics to delivery platforms by maximizing vehicle utilization. In other words, a single vehicle may be used for multiple applications and by multiple drivers across shifts to increase daily utilization. For instance, an E3W may be used across multiple shifts

during the day to deliver not just groceries but also e-commerce packages and courier parcels. EV asset operators serving multiple customers are best suited to implement this.

Finally, asset operators can increase revenue potential by expanding and strengthening offerings to drive widespread EV adoption. They may address vehicle-related services such as maintenance, battery charging and swapping infrastructure, vehicle insurance, etc. Collaborations with banks/NBFCs to enable EV financing at preferential rates would help drivers overcome prevalent issues of minimal credit history and/or inadequate financial literacy and over time promote DCOs to re-emerge and attach their vehicles to the asset operator platforms as we see in ICE.

Conclusion

In conclusion, we believe EVs are well-positioned to become the vehicles of choice in organized last-mile delivery fleets, given the clear economic and environmental benefits and the government impetus. However, players in the EV ecosystem cannot approach this segment using the tried and tested approach for ICE and need to refresh their strategy. As EVs become mainstream and the allied ecosystem on charging, financing, etc., evolves, key operational elements such as fleet composition (2/3/4W), fleet sourcing models, and usage patterns must adapt. Such shifts require a recalibration of strategies of OEMs, EV asset operators and other players. OEMs cannot continue to rely solely on conventional dealer-driven channels and will need to reimagine GTM with revamped communication and product strategy. EV asset operators have avenues to pivot their value proposition to continue to play a significant role as EV technology starts to become more mainstream. Delivery platforms need to develop a holistic strategy to achieve fleet electrification targets. Thus, players in the EV ecosystem that are agile and most flexible in reshaping strategies are bound to capture value pools in the attractive market of organized last-mile deliveries.

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