

# EV 2 & 3 wheelers

## Investment opportunities

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**While transition from Internal Combustion Engine (ICE) vehicles to electric vehicles (EVs) is largely seen across four-wheelers, the two and three-wheeler EV market is also witnessing large scale shifts.**

This is driven by customer preferences shifting towards easier and cost-effective mobility globally, as well as carbon regulation and pollution control in emerging markets leading to a shift to two and three-wheeler EVs from ICE scooters and motorcycles. Electric two-wheelers (E2Ws) make up more than half of all electric vehicle energy demand worldwide though in terms of demand for rare earth metals, it is much smaller than four-wheelers.

The markets which are the focus of this shift are where two and three-wheelers have historically been a large segment (driven by cost considerations) or where customer preferences are shifting rapidly.

These are broadly divided into:

- China and Japan: China dominates the E2W segment by sales (9.5 out of 10 million registrations were from China in 2021 ) along with Japan which has also adopted EVs in a big way led by Japanese OEMs. China has by far the largest E2W adoption rate (70%) of any country, apart from dominance in the EV battery supply chain.
- India: India has the largest two and three-wheeler market segment requiring transition to E2Ws and the presence of dominant multinational OEMs as well as a nascent ecosystem of start-ups. Globally, most E3Ws are sold in India and this segment is expected to increase market share substantially in the next few years.
- USA/Canada: one of the largest markets and leading the technology development across the EV value chain including E2Ws.
- Rest of Asia (incl. Australia): in particular Indonesia is pushing for a new gigafactory presenting strong growth opportunity. Apart from this, Vietnam, Malaysia and Thailand are smaller but also have potential for high growth of this segment. They require a mix of investment in distribution and charging to reach adoption levels seen in more mature markets like China.
- Europe: potential for growth remains strong because of regulatory push for sustainability and interoperability of E2Ws particularly in Europe.
- South America: smaller markets but growth potential remains strong and this region has the presence of OEMs from Asia.

## MARKET SEGMENTATION

The EV value chain for two and three-wheelers is broadly segmented into the following:

### **E scooter and E rickshaw OEMs:**

These are larger public companies as well as start-ups; they are integrating the E2W and E3W value chain and looking to leverage and consolidate their position in the respective market across other segments mentioned here. These companies would lead the transition to E2Ws from ICE and drive global sales.

### **Technology for Engine, Battery and other components:**

These are small to mid-sized companies in various stages of funding or market entry stages looking to enhance the engineering and efficiency of E2Ws. For instance, this could include digitisation of E2Ws, enhancing the transmission of power, or reducing the overall weight of the vehicle or battery. This segment has potential for leading market disruption and has a natural affinity for strategic investments from larger OEMs or subscription based E2W providers where upgrades to a more efficient vehicle are easier and cost effective for consumers.

### **Technology for Charging:**

This segment has companies which provide charging technology infrastructure based on a network of either battery swapping or fast charging as the two dominant themes, and will also be a limiting factor for the transition to EVs in general and E2Ws in particular because of their limited range. Some of the OEMs are either partnering with such companies or developing their own charging infrastructure. If developments in European and South East Asian markets are anything to go by, there would expectedly be a drive towards standardisation of charging points to promote interoperability among providers globally.

### **E mobility platforms and solutions / ride sharing solutions:**

These are companies which provide a platform for mobility, allowing flexibility for businesses to use different vehicles according to their needs. This segment also includes subscription-based EV providers (including E2Ws) that provide scooter and motorcycle convenience for users and businesses with no upfront cost. These companies are targeting various segments of consumers including gig workers, delivery (e.g. hyperlocal delivery) workers as well as specific businesses (e.g. taxi services) or individual users.

### **E commerce for buying/selling E2Ws and components:**

This segment includes aggregators of EVs, platforms for sale and purchase of refurbished bikes, and retailers specialising in EVs including E2Ws.

## TRENDS

### **Policy shifts :**

Policy shifts by governments vary country by country but have broadly been towards tax cuts and subsidies for manufacturers, incentives for customers, restriction on production and sale of ICE vehicles, targets for EVs, carving out low emission zones in cities, and support for charging infrastructure including interoperability. Developments in carbon taxation and accounting will also have a direct impact on growth of the E2W and E3W market and its growth relative to the wider EV market especially where consumers are price sensitive.

### **Reduction in cost of ownership:**

Battery costs are approximately 40 percent of the overall material cost for EVs and are expected to reduce to \$90-130 from \$220-280 per kWh in the next few years. This will have the effect of reducing the cost of ownership and stimulate demand especially among B2B consumers followed by the B2C segment.

### **Transition of battery technology:**

Most E2Ws and E3Ws currently use lead-acid batteries, but regulatory changes, and falling costs would lead to adoption of lithium ion battery packs which are superior in terms of charging density and weight. This will create a surge in demand for lithium (as discussed in our EV paper) on the one hand, while there would also be greater focus on safety standards and testing of new battery technology.

### **Digitisation and connected models:**

Greater digitisation is possible for E2Ws in the coming years with features such as remote tracking and control via phone based apps, and integrated displays with more features. Companies, especially OEMs will also promote connected E2Ws especially in cities to appeal to consumers, backed by physical infrastructure and e-mobility platforms.

### **Investment in charging infrastructure:**

Private investment in charging infrastructure as well as allocation of road infrastructure (e.g. dedicated lanes) is required to provide a credible E2W alternative and overcome “range anxiety” in consumers. Europe, US, and China are leaders in terms of investment in infrastructure and the number of charging points per 1000 vehicles is expected to increase substantially up to 2030 while rest of Asia including India, Indonesia, Vietnam and Malaysia, and South America require sizeable investment for uptake of E2Ws.

## **FOR FURTHER INFORMATION**

Stirling Infrastructure advises both companies and stakeholders in the EV value chain on debt and equity capital raising and the sale and acquisition of companies and technologies within associated sectors. The firm also provides management consulting services in relation to making strategic investments into mining, battery manufacturing, software development and EV infrastructure..

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