

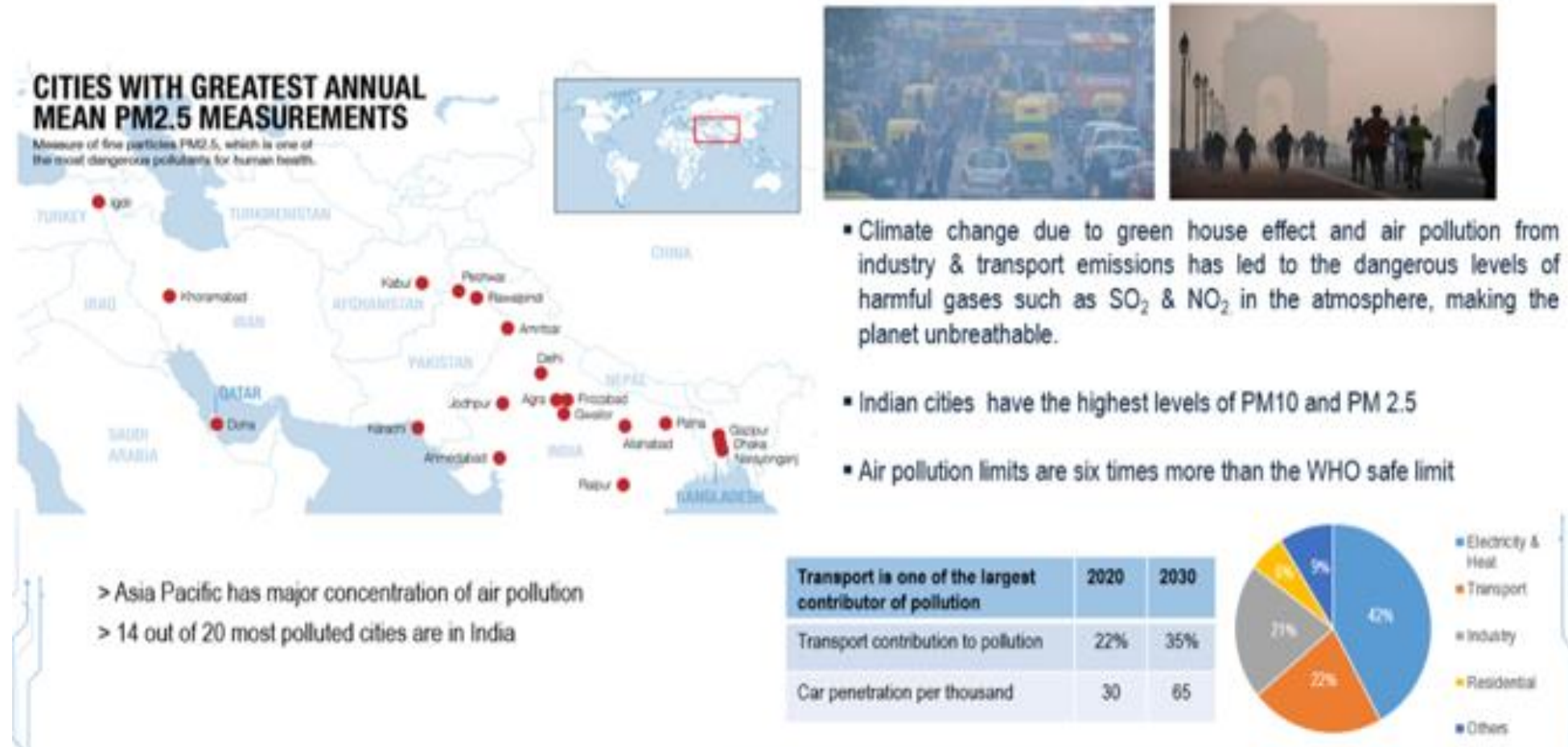
E-mobility

Perspective | India and Asia

Mr. Yogesh Mittal

India

Climate change | Major concern all over World

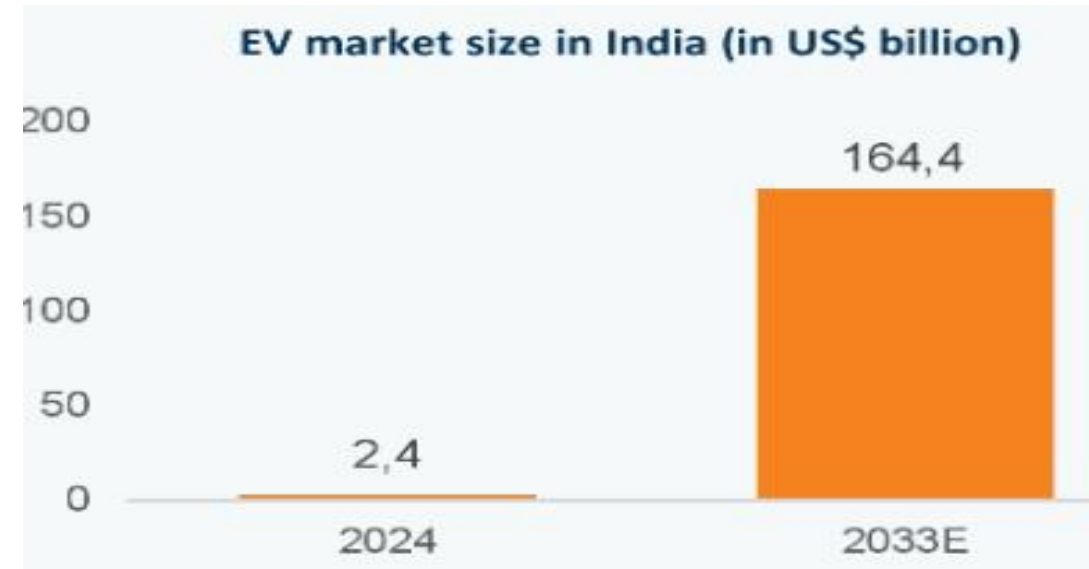
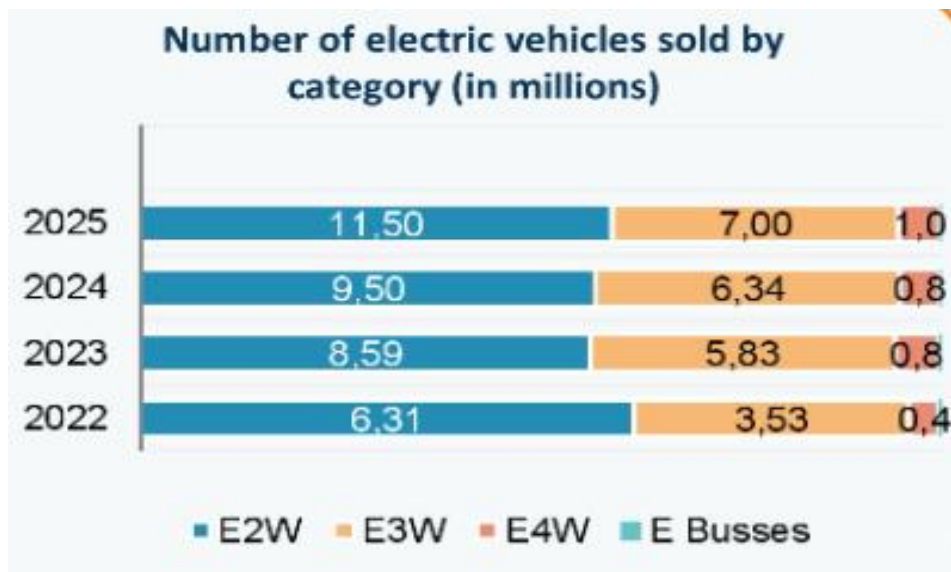


India's transport transition is tied closely to its climate goals - aims to cut carbon intensity by 45 per cent by 2030 and achieve net zero emissions by 2070.

Advantage India

India, a South Asian nation, is the seventh-largest country by area, the most populous country with over 1.46 billion people. Most populous democracy in the World.

Indian economy size : US\$ 3.88 trillion in FY25, expanding at 6.5% YoY.



The total FDI inflow into India from April-June 2025 stood at US\$ 25.2 billion and FDI equity inflow for the same period stood at US\$ 18.6 billion.

Indian EV Market | A different Perspective

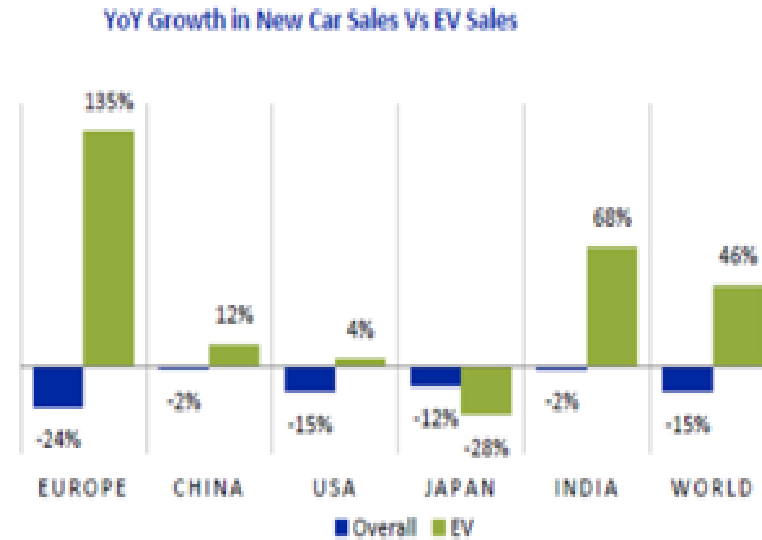
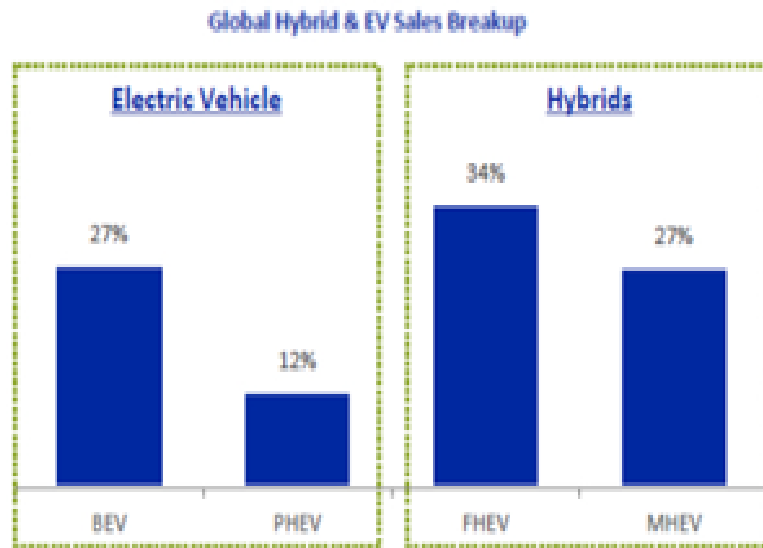


| |  |  |
|----------------------------|---|---|
| Road space Sq ft/person | 50 | 5 |
| Pollution in PPM/KM | 40 | 1 |
| Parking | All Over | Fixed |
| Finance Interest | Low | Low |
| Road Entry | Free | Limited |

Global EV landscape

EVs account for 39% of Global New Energy Vehicle Sales

More & more OEMs are launching BEVs and PHEVs, to capitalise on lower emission and incentives for BEVs



- Over 8.3 million new energy vehicle (NEVs) were sold, out of which 39% (~3.2 mn) were electric vehicle (including plug-in hybrids)

GLOBAL 02-WHEELER MARKET OVERVIEW

Asia dominates the global E2W market with 33% market share, demonstrating robust demand and adoption rates. The region continues to lead market growth with strong infrastructure development and favourable regulatory environment.

GLOBAL TWO-WHEELER MARKET SIZE

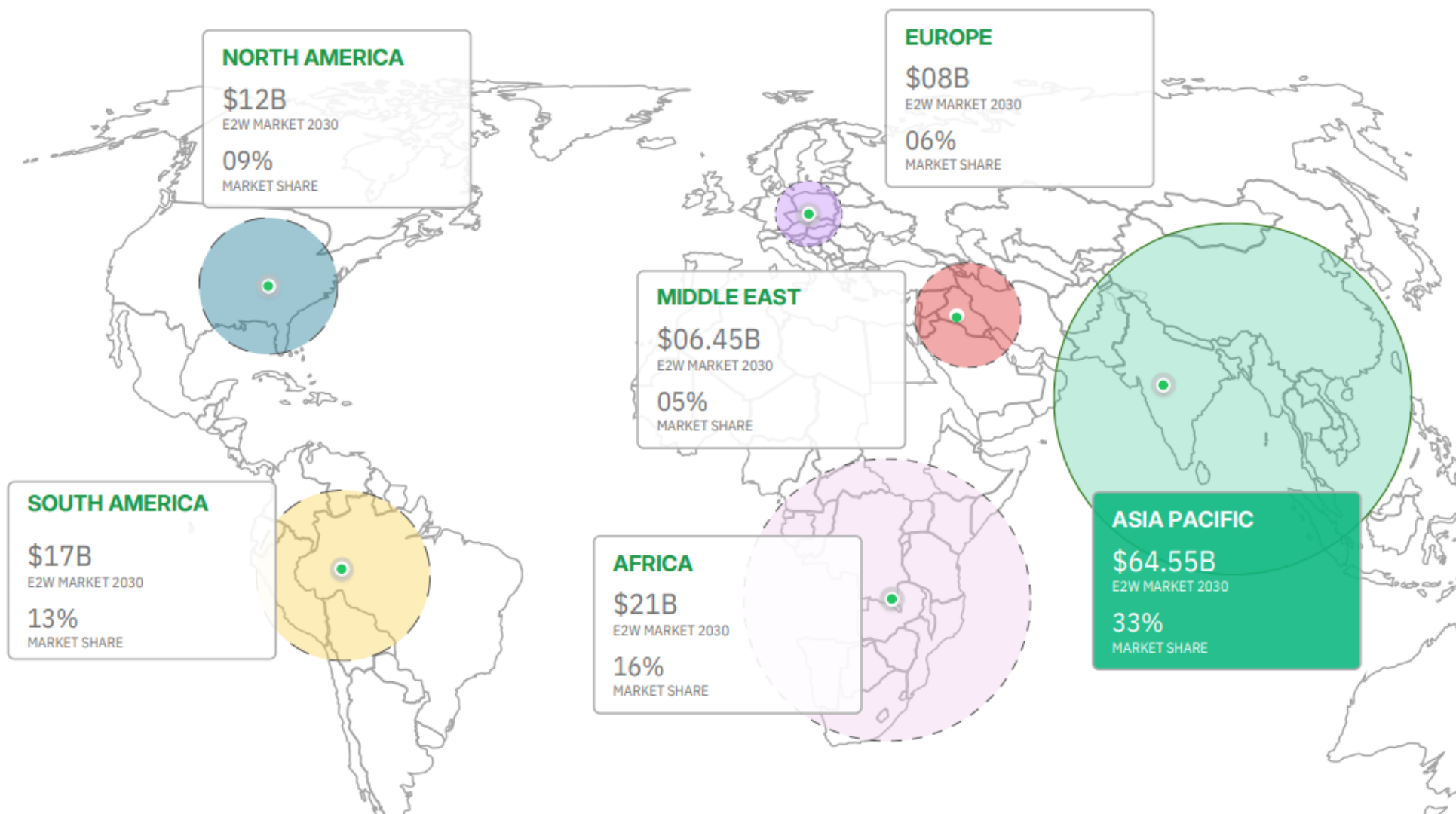
2024
\$673B
2030
\$759B

GLOBAL ELECTRIC TWO-WHEELER MARKET SIZE





2024
\$70B
2030
\$203B

FASTEST GROWING INDUSTRY

19% CAGR



EV Penetration across segments

| | Current Penetration % | FY2025 Base scenario % | FY2025 Optimistic scenario % |
|--|-----------------------|---------------------------|---------------------------------|
|  Electric Two-Wheelers | < 1% | 8-10% | 13-15% |
|  Electric Three-Wheelers | < 1% | > 30% | 30-35% |
|  Electric Buses | ~ 1% | ~ 20% | ~ 25% |
|  Electric Cars | <1% | 3-5% | 6-8% |

02-WHEELER INDUSTRY SNAPSHOT

While existing players concentrate on the saturated scooter segment, Kabira Mobility strategically targets the underserved motorbike market. This focused approach addresses a significant supply-demand gap in India's rapidly growing E2W sector.

\$129B

Global E2W Market (2030)

\$42B

Indian E2W Market (2030)

36.1%

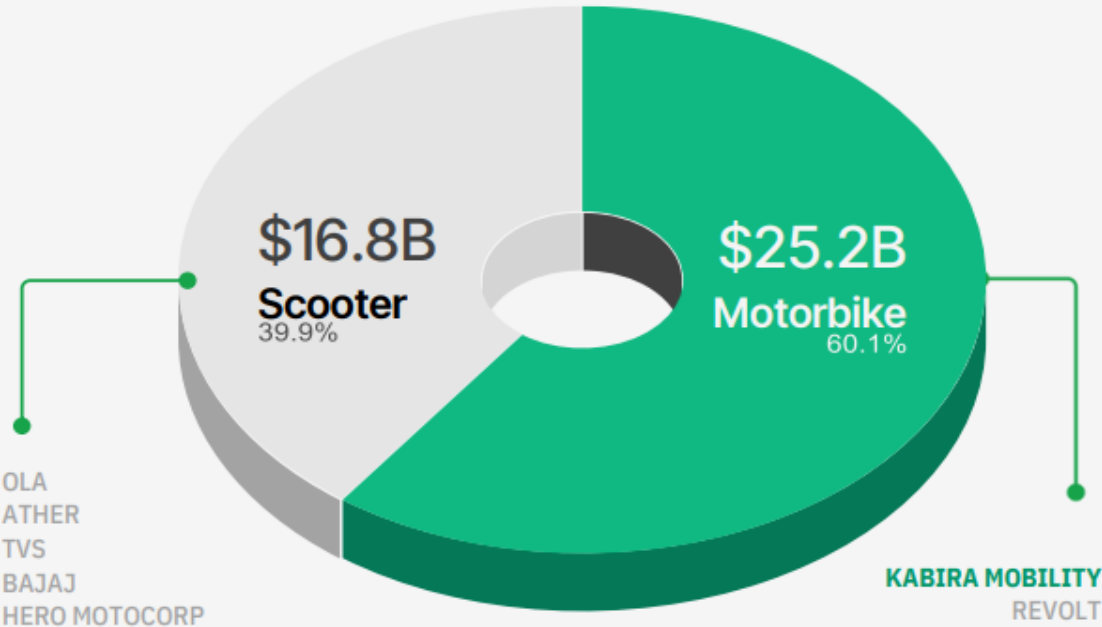
CAGR - 2024 - 2030

\$2.2B

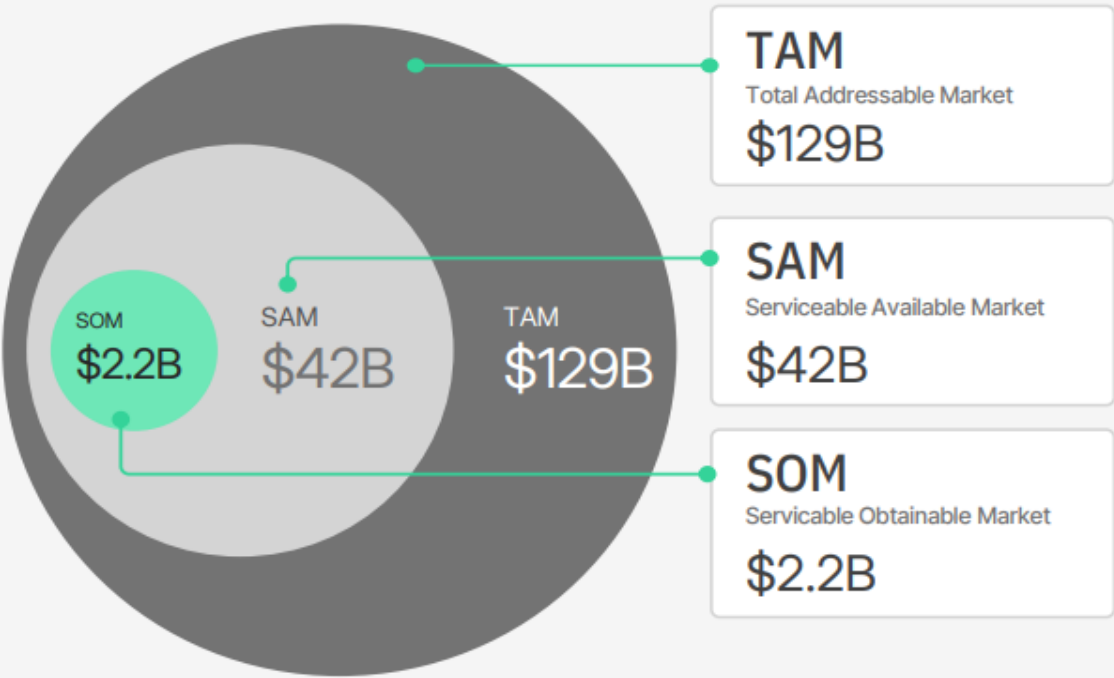
Kabira Mobility Market CAP (2030)

MARKET SEGMENTS IN E2W INDUSTRY

- Motorcycles
- Scooters



MARKET INSIGHTS



India Story | enablers for EV penetration

Policy Support

Demand incentives, tax concessions, interest subsidy will act as enabler for EV penetration



Vendor Ecosystem

Strong growth opportunity for vendors in the segments like battery cells, battery pack, motor, controller and associated electronic components



Charging Infrastructure

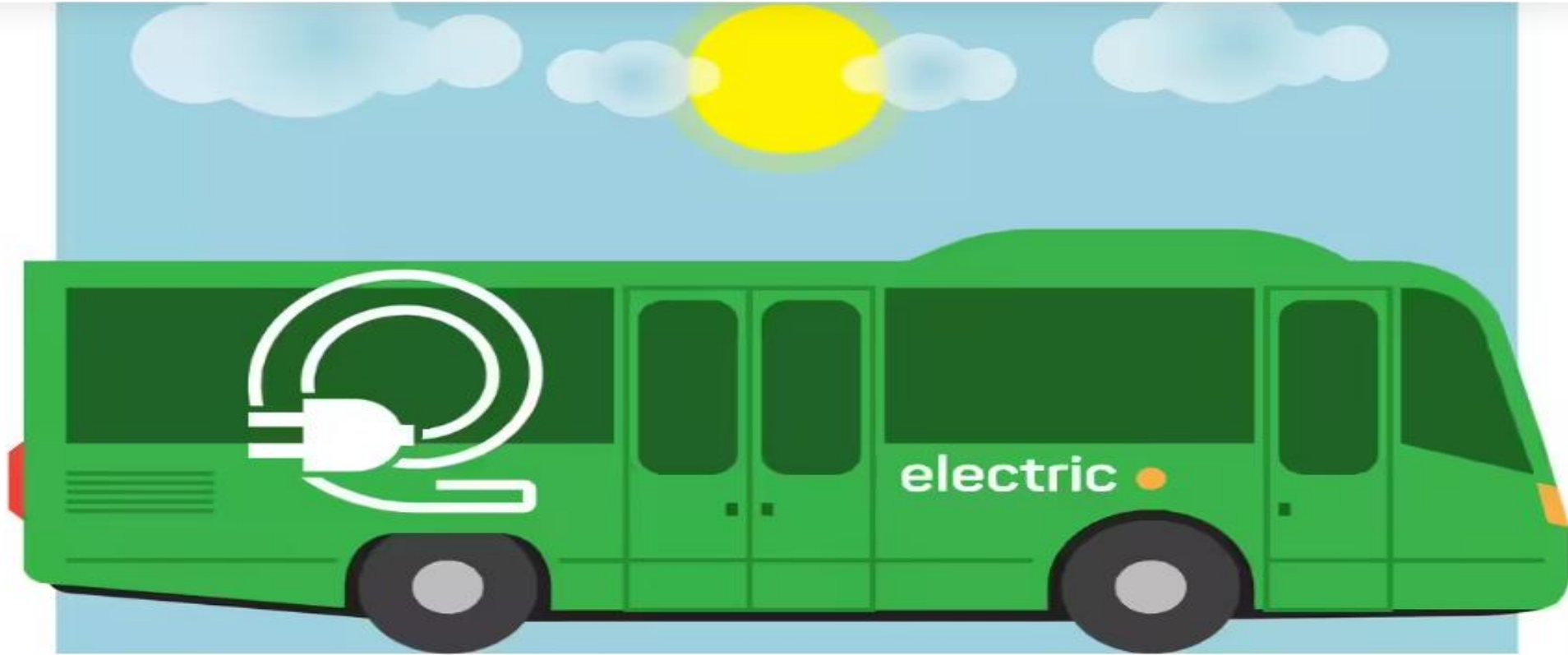
Significant scale up required in the public as well as private charging station. Most Indian consumers don't have parking space, which is another key bottleneck



Affordability

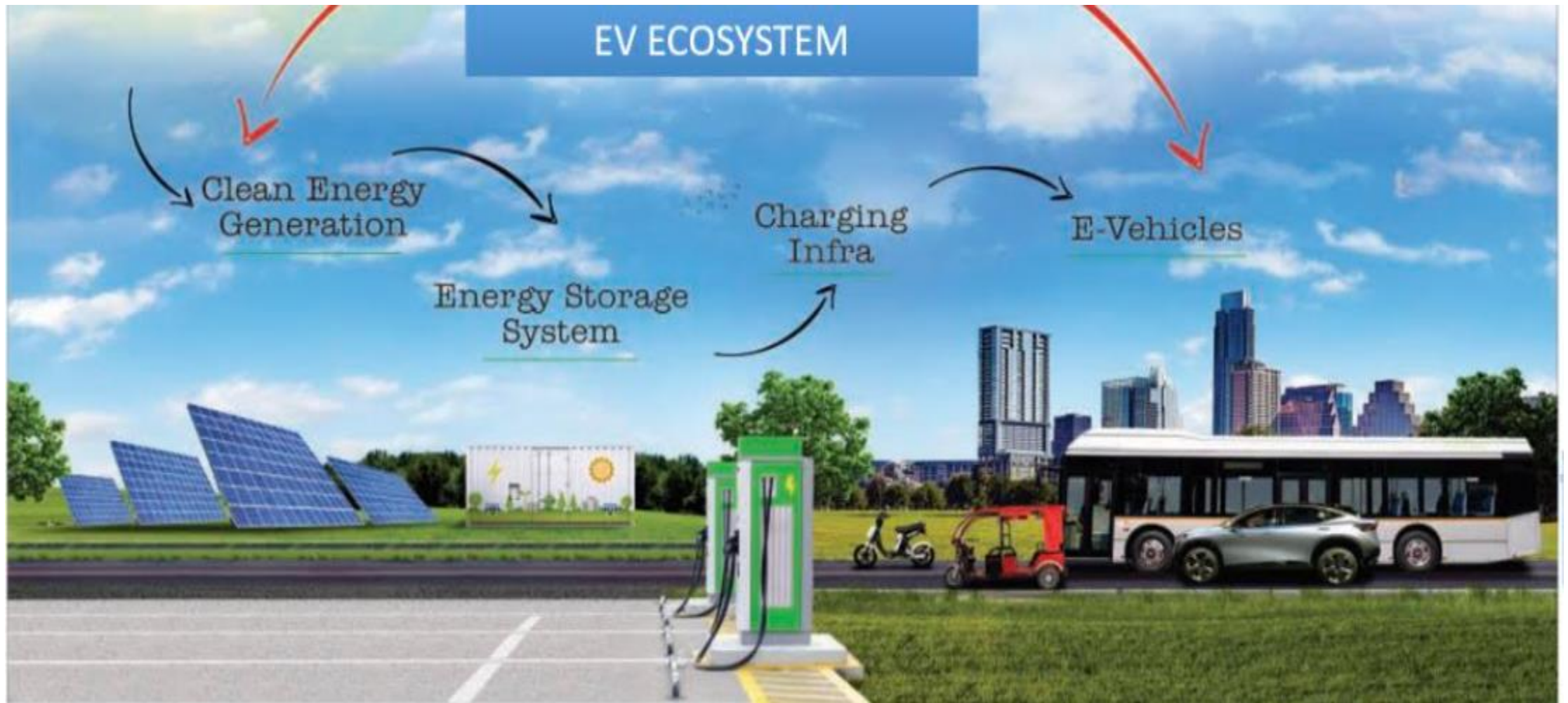
Awareness about lower total cost of ownership and availability of easy financing remain crucial for mass adoption





India's electric bus adoption is accelerating, driven by government policies and lower running costs, though challenges like charging infrastructure and private operator inclusion persist.

Electric buses currently make up only 5 per cent of new bus sales in India. But by FY27, that number could double to 10–12 per cent, according to India Ratings and Research (Ind-Ra).



The top five original equipment manufacturers (OEMs) together hold an order book of more than 25,000 e-buses to be delivered over the next one to two years. But the industry has faced delays due to dependence on imported components like batteries, chassis, and powertrains.

Electric Vehicle Power Architecture

Most of the Indian E2W OEMs are operating on 48V architecture which is considered as a base architecture & New Technology is adopting advanced power architecture of 96 / 120V architecture.



Power Architecture

$$\text{POWER(P)} = \text{VOLTAGE(V)} \times \text{CURRENT(I)}$$

- To obtain Speed Power (P) is required
- Power is directly Proportion to VI
- If Low Voltage Arch., High current Required which is Risky
- Most Cars run on 120-480V+ to reduce the current

48V

ATHER / OLA / TVS

60V

ULTRAVIOLETTE / OBEN

72V

KABIRA MOBILITY

96V

ULTRAVIOLETTE

120V

KABIRA MOBILITY

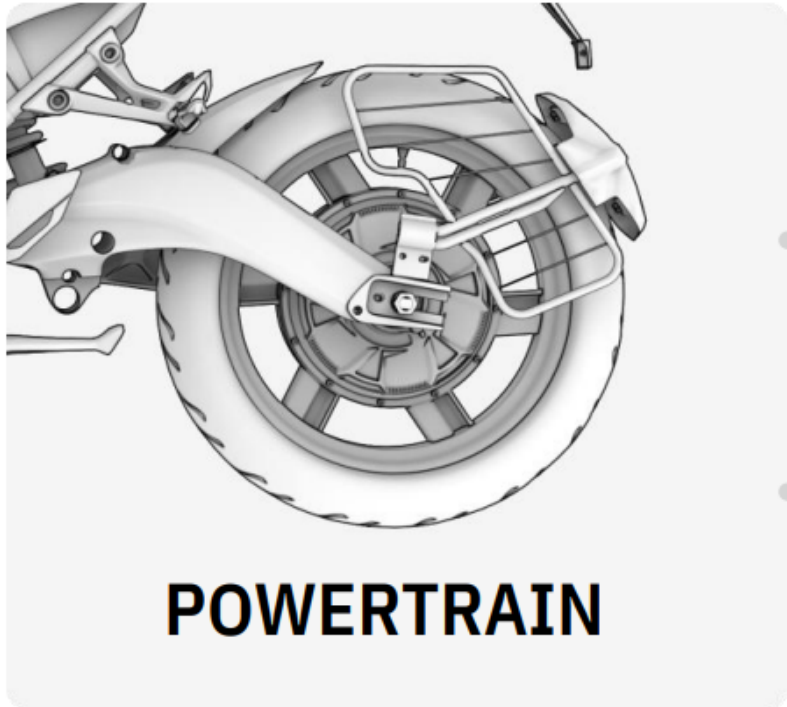
Higher Voltage = Safer Architecture with increased Durability.

Higher Current is Risky & Expensive Architecture.

At 120V we can connect to National Charging Grid. Fast DC Charging.

Powertrain Evolution

In-Hub Powertrain is a new Technology and is widely adopted due to its Higher Efficiency and simplified engineering. In-Hub BLDC is widely adopted and used throughout Electrical Industry. (Fan, Appliances, etc.)



IN-HUB POWERTRAIN

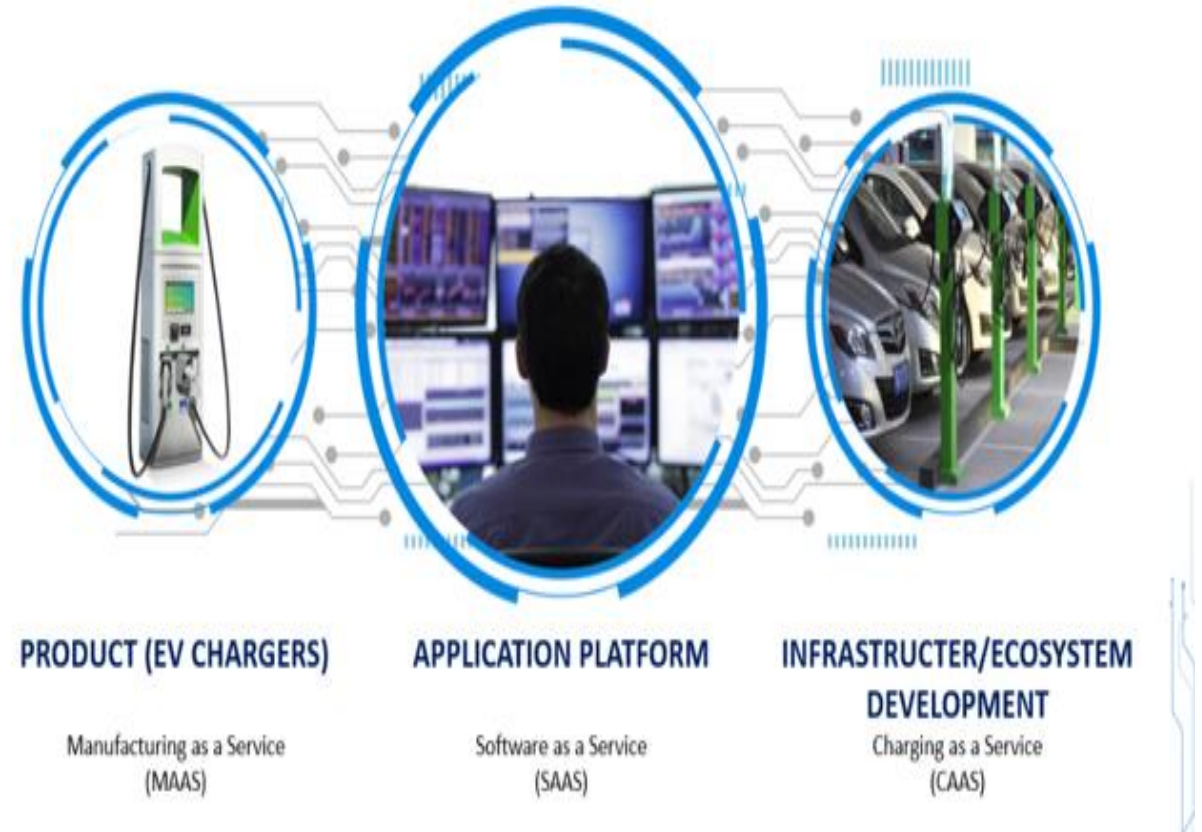
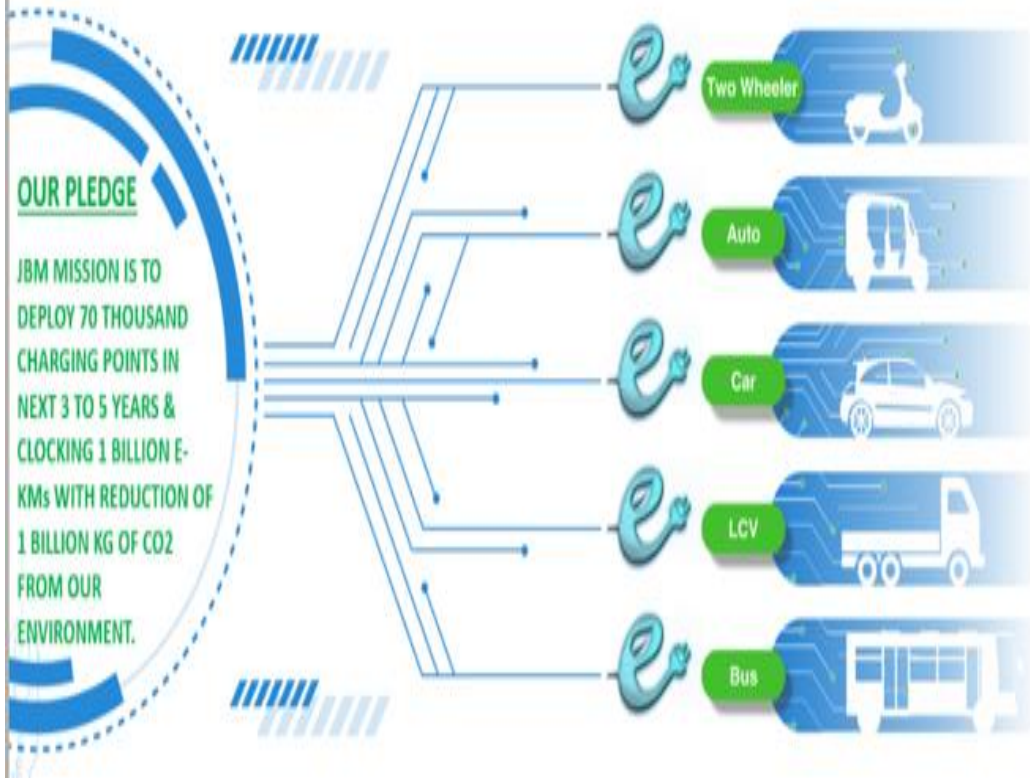
- Lowest Center of Gravity in Industry (CG)
- No Transmission Loss / Wheel Drive
- >92% Efficiency
- Upto 220nM Torque at Wheel
- Simplified Assembly Process



MID-DRIVE POWERTRAIN

- Higher Center of Gravity (CG)
- Higher Transmission Losses
- 15 - 18% Power Loss
- Belt / Chain Drive requires Maintenance
- 80 - 120nM Torque

EV Charging



EV Charging

| Company Name | Charging Infrastructure |
|--------------|---|
| Tata Power | - Installed over 4,000 Public and Semi Public EZ CHARGE points across 450+ cities in India |
| Charge Zone | - Over 1,750 charging stations and 3,500 charging points across India |
| Ather Energy | - Established over 550 fast-charging grids across 56 cities, creating one of the largest fast-charging networks for two-wheelers in India |
| Charzer | - Participated in the Indian government's pilot program to install charging stations in major cities |
| ABB Ltd. | - Has installed charging stations in various locations across India |
| BrightBlu | - Operates a network of charging stations in Mumbai and other cities |

| Company Name | Charging Infrastructure |
|--------------------------------|--|
| Delta Electronics Inc. | - Has supplied charging solutions to various EV charging networks in India |
| Ensto India Pvt. Ltd. | - Has installed charging stations for various clients across India |
| Exicom Tele-Systems Ltd. | - Has supplied charging solutions to various EV charging networks in India |
| Fortum India Pvt. Ltd. (GLIDA) | - Operates a network of charging stations in India |
| Mass-Tech Controls Pvt Ltd. | - Has supplied charging solutions to various EV charging networks in India |

- Market valued at **USD 348.50 million in 2024** and is projected to grow to **USD 1652.20 million by 2030**, with a compound annual growth rate (CAGR) of 27.67% between 2025 and 2030,
- AC and DC charging popular in India,
- Wireless charging : emerging concept

Batteries

Technology Roadmap for Batteries, 2019-2030



Bus Battery Pack (130-450 kWh)



ESS (Up to 2500 kWh at system level)



3W Battery Pack (5-10 kWh)



2W Battery Pack (1.2-2.3 kWh)

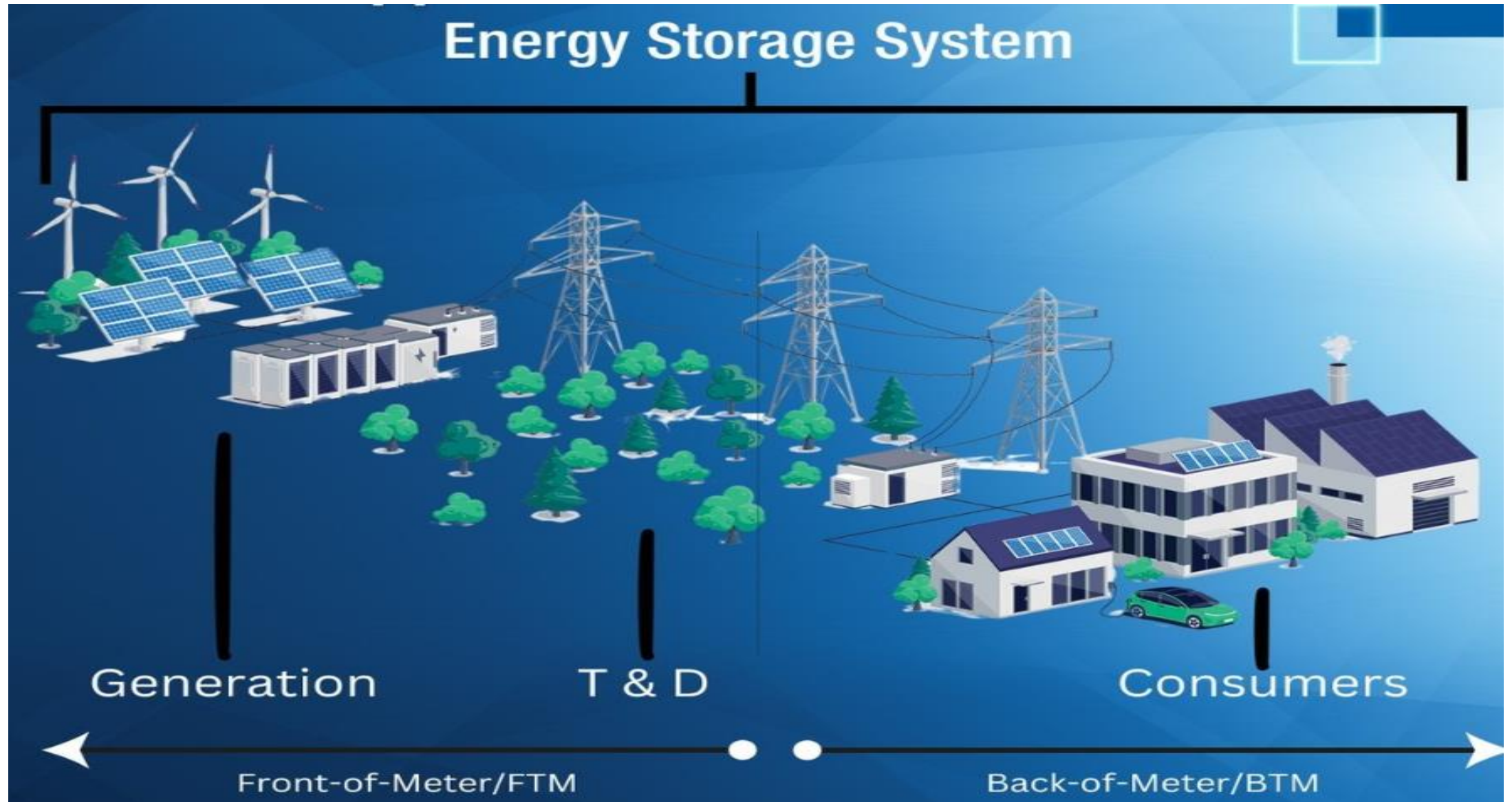
Applications

| Sr No | Particulars | Details | Remarks |
|-------|----------------------|---|-------------------------------------|
| 1 | Stationery | Mobile towers, Hospitals & Commercial / Industrial establishments | Prismatic cells, May be Pouch cells |
| 2a | Mobile 2W | For 2 wheelers EVs | Cylindrical cells of NMC Chemistry |
| 2b | Mobile 4 W / E-buses | For 4 wheelers and e-buses | Prismatic cells, |
| 3 | Others | Défense requirements (drones, others) | Likely to be Prismatic cells |

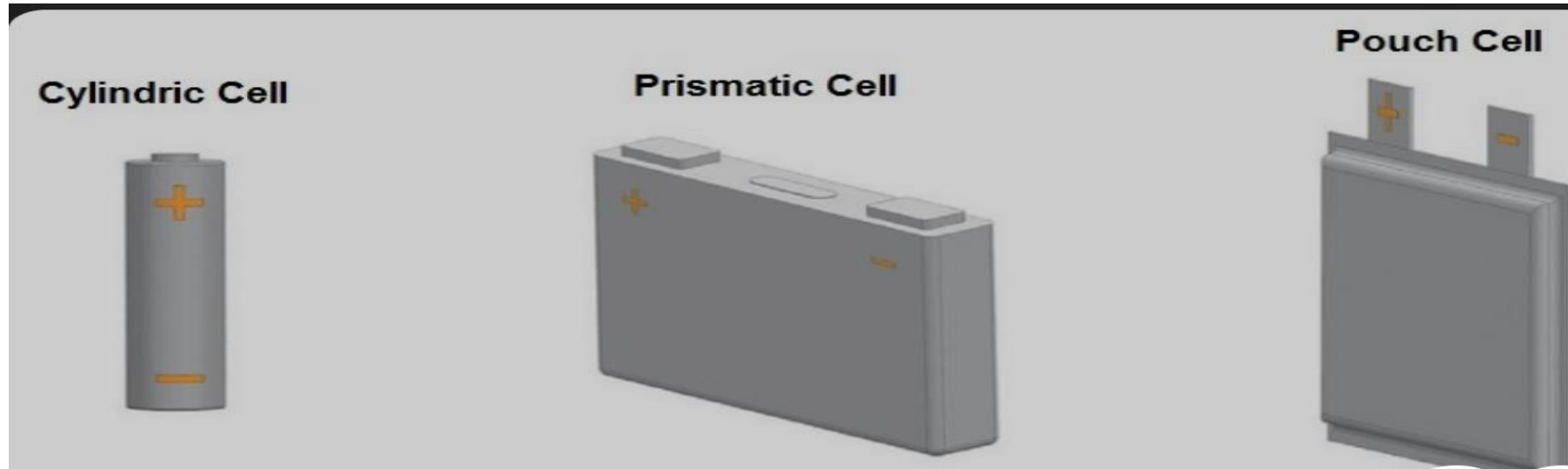
Market size and projections



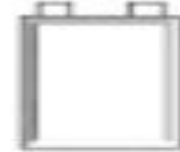
- **2024:** USD 5,265.9 million
- **2030 projection:** USD 19,473.2 million
- **CAGR (2025-2030):** 24.4% 

BESS

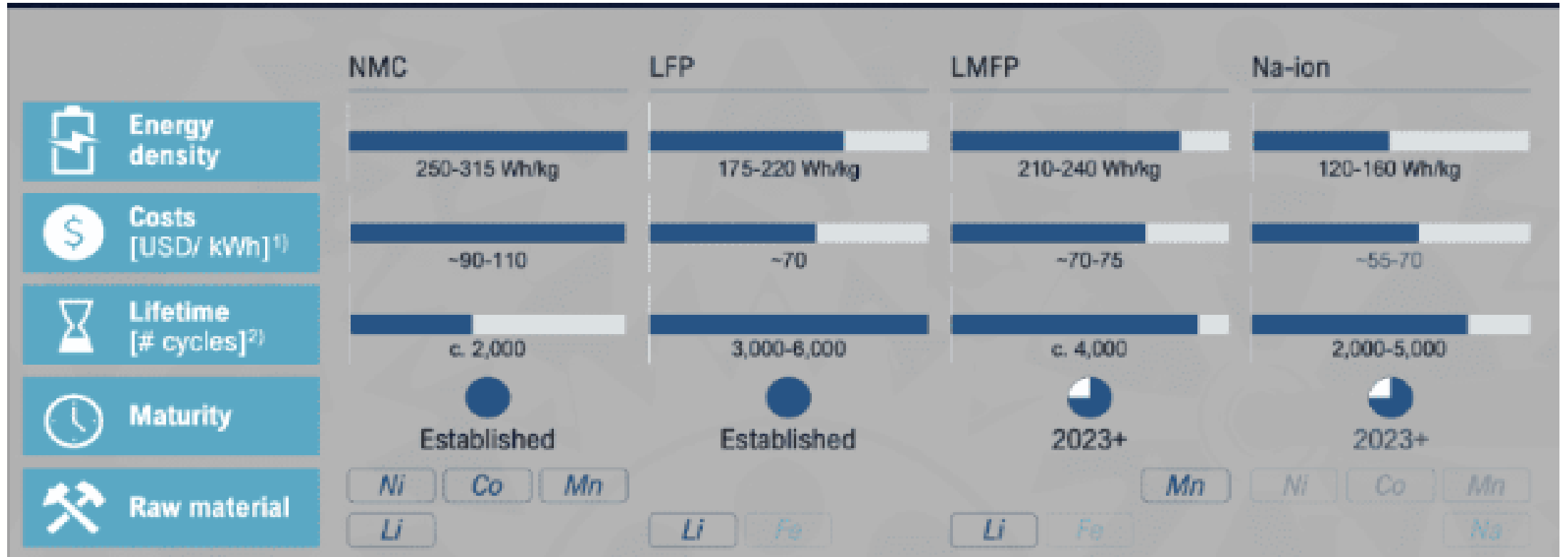


Cells



| Cylindrical cell | Prismatic cell | Pouch cell |
|--|--|--|
|  |  |  |
| <ul style="list-style-type: none">• Small size [e.g. 18650 type (ϕ 18 mm, height 650 mm)]• Hard casing• Low individual cell capacity• Build in safety features• Comparably cheap | <ul style="list-style-type: none">• Hard casing• Large size• High individual cell capacity | <ul style="list-style-type: none">• Soft casing• Large size• High individual cell capacity• Geometrical deformation during (dis-)charging |

Chemistry



Highly evolving space / tech and costs changing frequently...

Indian Ecosystem | an overview

Figure 2: Existing Capacities of LiB Battery Pack Manufacturers

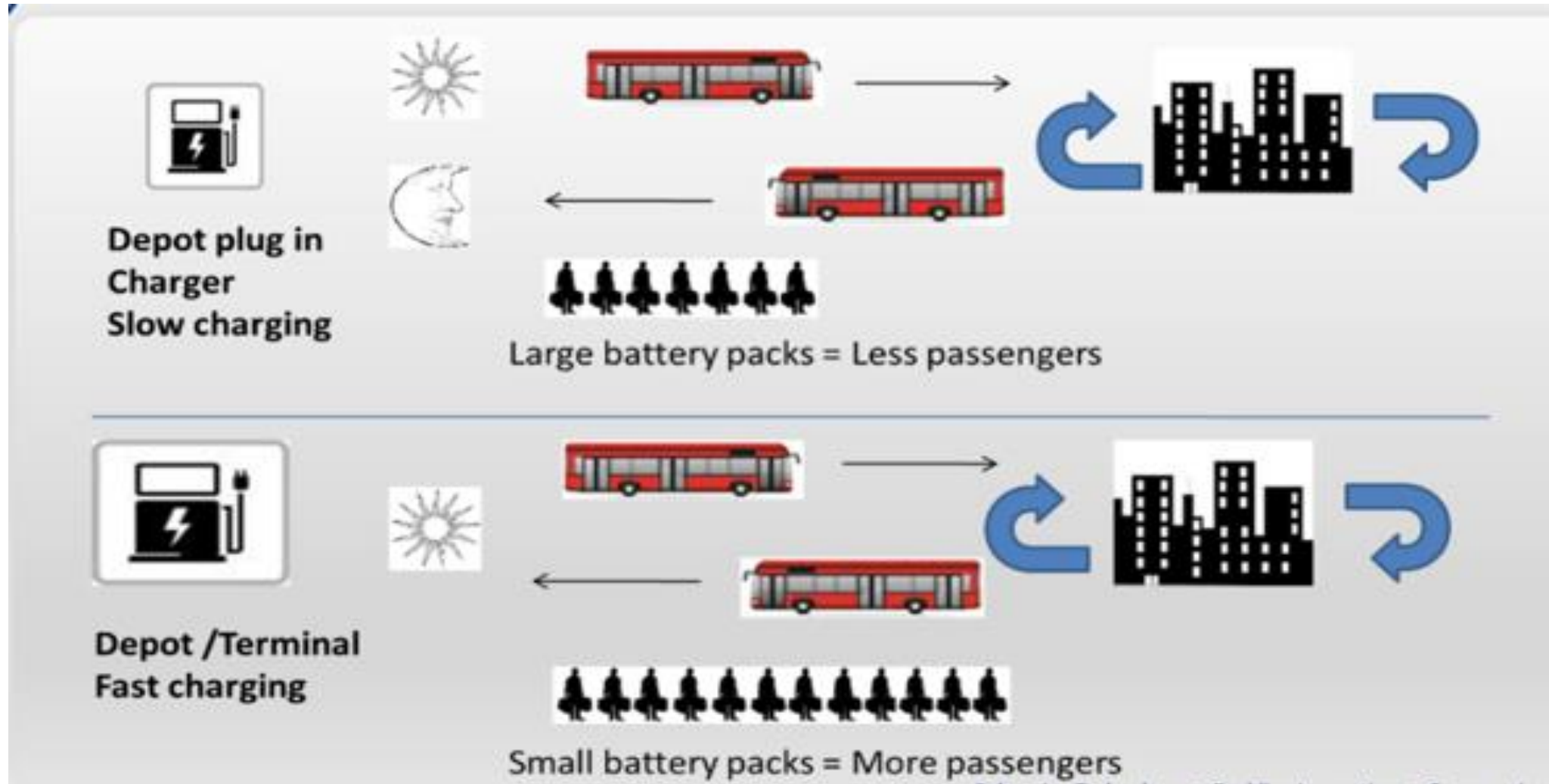


Upcoming Li-ion Gigafactories in India

| Manufacturer | Chemistry | Capacity (GWh) |
|----------------|---------------|----------------|
| Ola | NMC | 20 |
| Reliance | LiB | 5 |
| Rajesh Exports | LiB | 5 |
| Exide | NMC, LFP, LTO | 12 |
| Amara Raja | LiB | 16 |
| Tata Group | LFP | 20 |
| TDSG | LiB | 3 |
| JBM | NMC | 3 |

*Additional 20 GWh PLI to be awarded soon

Electric bus operating model



TCO Model

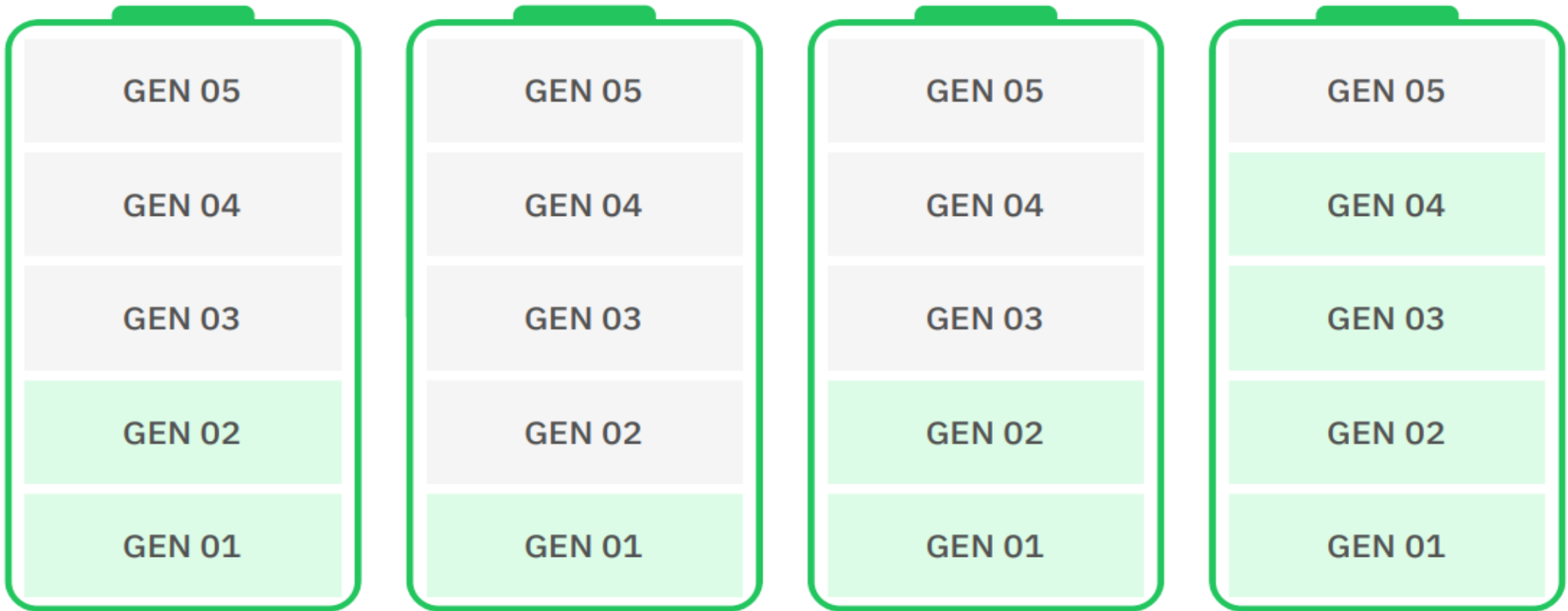


Improvement of Energy Efficiency:

- Light weighting
- Optimum powertrain configuration
- System efficiency improvement
- Reduction of parasitic losses
- Optimization through RLDA/ route mapping

Battery Pack Evolution

Indian E2W Industry is still relying on traditional battery pack chemistry and architecture, Kabira Mobility is leading the Battery Front with Gen-4 Modular battery pack, similar to High Performance Electric Cars. KM has adopted an Agile approach to stay up to date with the evolving battery technology.



OEM

ATHER ENERGY

OLA ELECTRIC

TVS

KABIRA MOBILITY

DENSITY

~ 160 Wh / Kg

~ 170 Wh / Kg

~ 170 Wh / Kg

175 WH/KG

MFG COST

~₹ 14,100.00

~₹ 13,800.00

~₹ 13,850.00

~₹ 13,100.00

Synergies with Solar tech

- Enable the BESS integrated with solar power for charging activities – *for up to 30 to 50%,*
- In areas where difficulty with grid – instal solar power plant and deploy BESS,
- Synergies for resources for manpower, technology & others – from existing / operational capacities,
- Similar quality control philosophy,
- Same channels for marketing, distribution, quality control and project management,



Government support to the Sector

- FAME-II scheme (erstwhile),
- **PM E-DRIVE Scheme** in FY25 with an outlay of ₹10,900 crore to boost e-bus adoption and charging infrastructure. The scheme offers subsidies up to ₹10,000 per kWh, capped at ₹35 lakh per bus, for state transport undertakings (STUs). It also supports charging depots and power infrastructure under a public-private partnership (PPP) model.
- The new EV policy offers reduced import duties for companies investing in India. Tesla, however, is reportedly only interested in setting up showrooms without manufacturing in India. The government has stated that the portal for applying for investments will open shortly, with a 120-day window.
- Increased the PLI allocation for automobiles and auto components to Rs. 3,500 crores (US\$ 409 million) in FY25, up from Rs. 604 crores (US\$ 70 million) in FY24.
- The Indian Government has outlined a scheme to transition 800,000 diesel buses to environmentally friendly alternatives, possibly supplanting FAME III. The strategy involves substituting 800,000 diesel buses, comprising over a third of all vehicles on roads, with electric ones within seven years. This endeavour seeks to diminish vehicular emissions and stimulate investments in the national electric vehicle (EV) infrastructure.
- 100% FDI allowed under automatic route for the auto components sector.

Global Players in Indian EV ecosystem

Automotive manufacturers

- **Luxury segment:** Companies like Mercedes-Benz, BMW, and Audi are prominent in the premium EV market, though their sales volumes are lower compared to mass-market EVs.

- **Mass market:** Volkswagen and other European brands are actively exploring and planning to increase investments to launch new electric vehicle products in India.

Vietnam's VinFast is set to enter India with two premium electric SUVs. Chinese players BYD and MG Motor are looking to expand their presence in the country with their EV models. Similarly, South Korea's Hyundai Motor has also started bringing its EVs to the Indian market.

Signed an MoU with EV maker Ather Energy to boost India's EV and manufacturing startup ecosystem. The partnership will support deep-tech startups with mentorship and infrastructure in areas like battery tech, vehicle manufacturing, and clean energy.

Charging infrastructure

- **Joint ventures:** European companies are partnering with Indian companies to develop charging infrastructure. For example, Enel X entered a 50-50 joint venture with Sterling and Wilson to create charging solutions.

Components

- In April 2024, Uno Minda, an auto components manufacturer, announced that it has partnered with Suzhou Inovance Automotive Co. from China to produce electric vehicle components.

World Bank's IFC invested US\$ 137 million in India's e-bus sector,

Ultraviolette has entered the European market with electric motorcycles, launching across 10 countries

Industry Challenges

| Sr No | Challenge | Opportunities |
|-------|----------------------------|--|
| 1 | Product Failures | Quality testing, field trials, rectification post launch |
| 2 | Battery Challenges | Gen 4 / Gen 5 solutions |
| 3 | Charger Failures | Ample scope for growth of charging infrastructure and efficiencies |
| 4 | Data-deficient Development | Data driven engineering and usage of AI / ML tools |
| 5 | Alternative Fuels | Market moving towards Hydrogen Fuel Cells at interesting speed |

Global Peers

| MARKET | CHINA | EUROPE | USA | INDIA |
|---------------------------|-------|---------|---------|---------|
| Financial Support | | | | |
| Upfront Subsidy | Yes | Yes | Yes | Yes |
| Tax Incentives | Yes | Yes | Yes | Yes |
| Regulatory Support | | | | |
| CO2 Emission | Yes | Yes | Yes | Yes |
| License Plate Restriction | Yes | Limited | Limited | Limited |
| Infrastructure Support | | | | |
| Charging Infrastructure | Yes | Yes | Yes | Limited |
| Supplier base | Yes | Limited | Limited | Limited |
| Access to financing | Yes | Yes | Yes | Limited |

Thanks

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