Electric Two-Wheelers:
Leading the Charge in India's Mobility Revolution

From the rise of EVs to the dominance of electric two-wheelers, this report explores India's journey towards a cleaner, smarter, and electrified future.

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Executive Summary

Current State of Play: The EV Boom

Riding the Growth Curve

India's EV market is accelerating at a CAGR of 76% (FY20-FY24)

Market Momentum

EV penetration surged from 1% in FY20 to an impressive 8% in FY24, signaling a shift toward electric mobility.

Two-Wheelers Take the Lead

Electric two-wheelers dominate the market with 55% share, revolutionizing urban commutes and last-mile delivery solutions.

Investor Confidence Soars

Private equity and venture capital investments skyrocketed 12x in value in three years (2020-2023), with landmark deals such as Ola Electric ($389 mn) and Ather Energy ($127 mn).

Innovations Unleashed: Technology Meets Opportunity

Battery Breakthrough

Battery costs plummeted by 85% over the past decade, and next-gen technologies like solid-state batteries and battery swapping are redefining range, efficiency, and affordability.

Efficiency Reimagined

Innovations such as regenerative braking deliver up to 15% range improvement, reducing operating costs further.

Homegrown R&D

Localized research and development efforts are scaling innovation and reducing import dependencies.

Charging Up the Ecosystem

India boasts 25,000+ public charging stations, ensuring greater accessibility across urban centers.

Future Roadmap: Investments & Sustainability

Accelerating Capital Flows

Investments are shifting focus to scaling ventures and strategic M&A consolidations.

Government as a Catalyst

Policies like FAME-II and state-level subsidies are accelerating EV adoption.

Target 2030

India aims for 30% EV penetration by 2030, aligning with its climate goals.

India's Net Zero Vision

EVs are playing an important role in India's climate goals of reducing 1 billion tonnes of CO_2 and achieving Net Zero by 2070.

The Evolution of India's Mobility Landscape

Paving the Roads of Progress: India's Mobility Journey

From bicycles to high-speed trains and e-mobility, India's transportation has evolved with rapid urbanization and tech advancements. It's a story of speed, scale, and sustainability.

Two-Wheelers Dominate Early Years

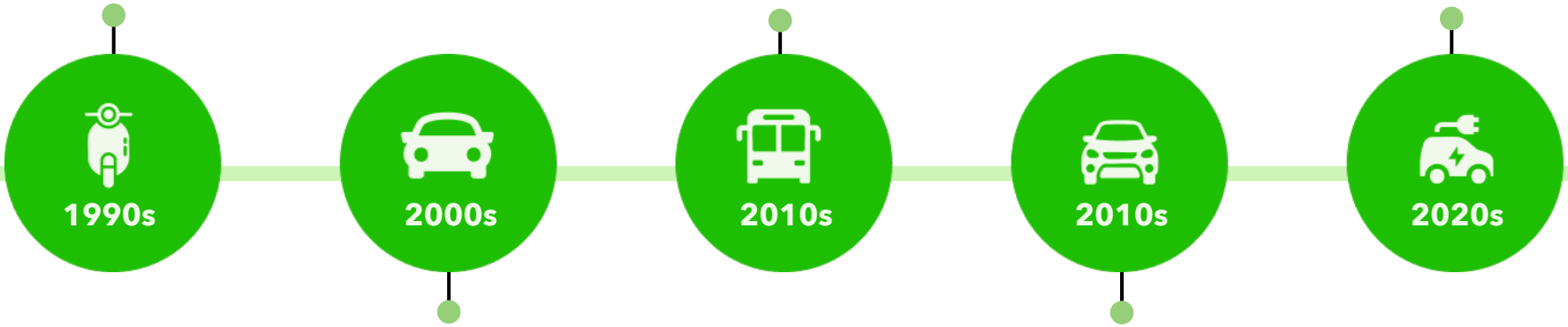
Affordable Mobility: Two-wheelers provided an economical means of transport for the masses, leading to their widespread adoption.
Sales: In 1994, approximately 3 million two-wheelers were sold annually.

Public Transport Innovations

Metro Expansions: Cities like Delhi, Bengaluru, and Pune expanded their metro networks, enhancing urban mobility.
High-Speed Rail: The Mumbai-Ahmedabad bullet train project marked a significant step towards high-speed rail connectivity.

Electric Vehicle Adoption

Policy Support: Government initiatives like the FAME scheme accelerated EV adoption.
Market Penetration: By 2024, EVs constitute a growing segment of the automotive market, increasing its penetration in total vehicles from 1% in FY20 to 8% in FY24.



Passenger Cars Emerge

Market Expansion: The introduction of affordable passenger vehicles, made car ownership accessible to a broader population.
Sales: By 2010, annual car sales surpassed 2 million units.

Rise of SUVs

Consumer Preference Shift: Improved road infrastructure and changing consumer preferences led to surge in SUV popularity.
Market Share: SUVs accounted for a significant portion of the passenger vehicle market by the late 2010s, increasing its % in total vehicles from 5% in 2011 to 27% in 2020.

Source: Society of Indian Automobile Manufacturers (SIAM), Statista

Roadblocks of Traditional Mobility: A Catalyst for Change

From skyrocketing fuel costs to alarming health impacts, traditional mobility faces mounting challenges. Tackling these barriers is the first step toward a cleaner, smarter, and more sustainable transportation landscape.

Traditional vehicles require frequent servicing due to their complex mechanical systems.

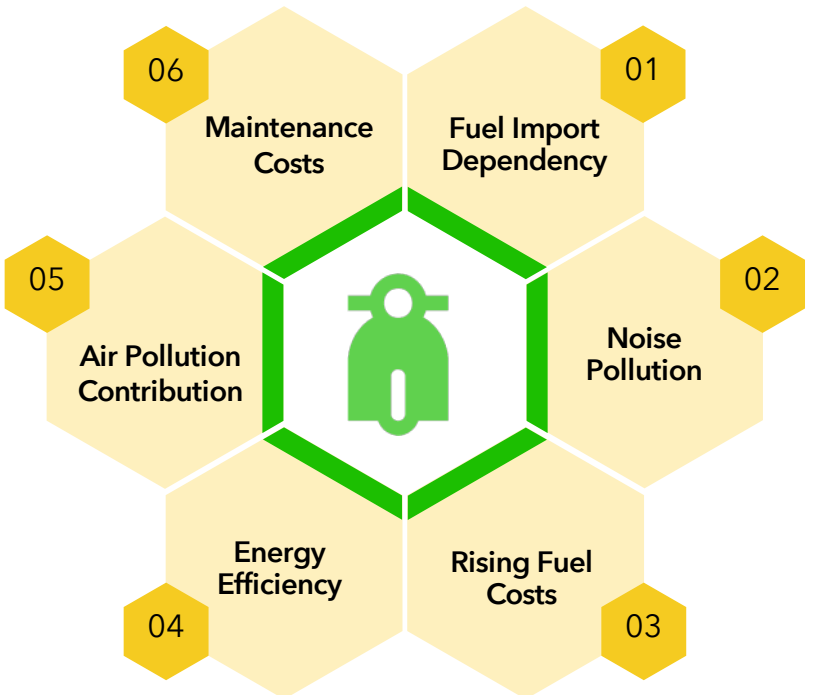
On average, EV maintenance costs are **50-70%** lower compared to ICE vehicles.

40% **Transport sector** accounts for about 40% of air pollution

90% 90% of that comes from **road transport**

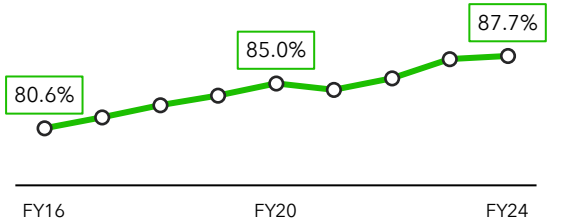
While petrol or diesel cars convert only 17% to 21% of stored energy, EVs can convert up to **60%** of electrical energy from the grid into vehicle movement.

This efficiency leads to lower operational costs and reduced energy consumption.



The Need for Cleaner, Smarter Mobility

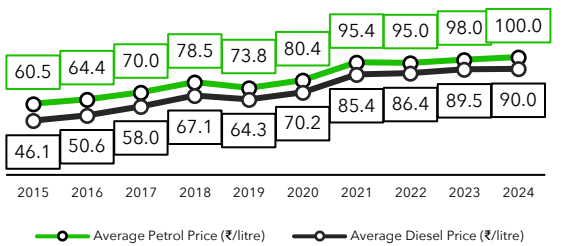
Over **85%** of India's crude oil is imported, exposing it to price fluctuations



Traditional ICE vehicles contribute significantly to **urban noise pollution.**

EVs, being virtually silent, can help reduce noise levels, creating quieter cities.

Retail prices for petrol and diesel have **almost doubled** in the last 10 years



Source: Petroleum Planning & Analysis Cell (PPAC) Ready Reckoners, (International Energy Agency) IEA, Press Information Bureau (PIB), e-Amrit Portal, Bolt Earth

The Alternate Fuel Shift: From Fossil Fuels to Future Fuels

India's transition to sustainable mobility is driven by clean energy solutions like CNG, LNG, and EVs, shaping a green future.

The Alternate Fuel Shift

- **CNG** vehicles have seen a significant rise from almost 38,000 vehicles sold in FY20 to over 4 lakh vehicles in FY24.
- India achieved 10% **ethanol blending** in petrol in 2022, ahead of its 2025 target, and aims for 20% blending by 2025.
- **LNG** is emerging as a viable alternative for heavy-duty trucks and long-haul transportation, offering lower emissions compared to diesel.
- India is exploring **hydrogen** as a clean fuel alternative, with initiatives to develop hydrogen fuel cell technology and infrastructure.
- Efforts are being made to produce **biodiesel** from non-edible oilseeds and waste oils, promoting a circular economy.

Assessment of Alternate Fuels

Criteria	CNG	LPG	LNG	Ethanol	Bio-Diesel	Methanol	Dimethyl Ether	Hydrogen	Electric
Reduction of CO2 from Base fuel (Gasoline/Diesel)	H	M	H	L	L	L	L	H	M
Reduction in Well-to-wheel CO2 emission	M	L	L	M	H	L	L	M	M
Local Sourcing Possibility	H	L	L	H	M	H	M	M	M
Adaptability in All Vehicle Types	M	L	L	M	L	L	L	L	H
Replace/Blend	Replace	Replace	Replace	Blend	Blend	Blend	Replace	Replace	Replace

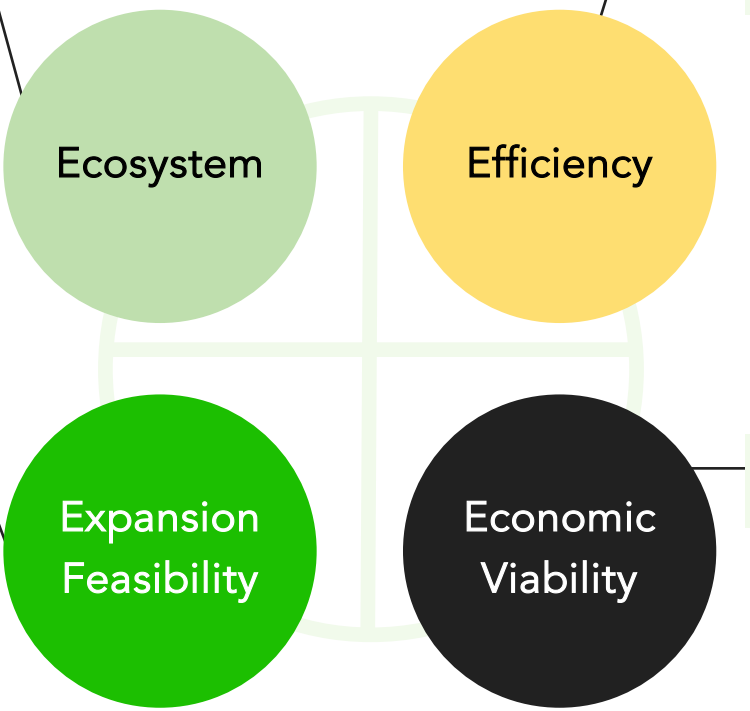
H High M Medium L Low

Source: SIAM Working Paper on Alternate Fuels, Deloitte, Vahan Portal

Electrification Surge:
The Rise of EVs in India

Powering the Shift: Key Drivers Accelerating EV Adoption

The electric vehicle revolution is gaining momentum, driven by advancements in technology, supportive policies, and a growing ecosystem. From urban commuters to sustainability-conscious individuals, EVs are shaping the future of personal mobility in India.



Boosted by collaborative efforts between governments and private players

- **Policy Support:** Govt. schemes like FAME-II and PM E-Drive are focused on accelerated adoption of EVs in India.
- **Public-Private Collaboration:** MoUs between private players (e.g., Tata Power, Ather Energy) and states for charging infrastructure development.

Revolutionary advancements in energy efficiency and battery technology

- **Battery Advancements:** EV batteries in India have reduced costs by 85% over the past 10 years. Local R&D initiatives for solid-state and sodium-ion batteries could further cut costs.
- **Energy Efficiency Innovations:** Regenerative braking systems are now standard in most e-scooters, improving range by up to 15%

Expanding access to EVs and charging networks across urban and rural areas

- **Charging Infrastructure:** India has **operationalized 25,000+** public charging stations, with key metro cities like Delhi and Mumbai having chargers every 3-5 km.
- **EV Accessibility in Rural Areas:** Affordable e-rickshaws and low-cost two-wheelers have penetrated rural markets with tailored solutions for last-mile connectivity.

Affordability driven by innovation and lower operating costs.

- **Cost Savings:** The operational cost of EVs is as low as ₹1/km compared to ₹6-7/km for petrol vehicles.
- **Affordability:** Subsidies and state-level initiatives (e.g., Zero road tax on EVs) in states like Delhi, Maharashtra, and Karnataka further lowers the total cost of ownership.

Source: Invest India, Vahan Portal

Government Initiatives Accelerating EV Adoption in India

India is propelling its transition to electric mobility through a series of strategic policies and commitments. These initiatives aim to reduce carbon emissions, enhance energy security, and position India as a leader in sustainable transportation.

India's Panchamrit (COP 26)*

500 GW Non-Fossil Fuel Energy by **2030**

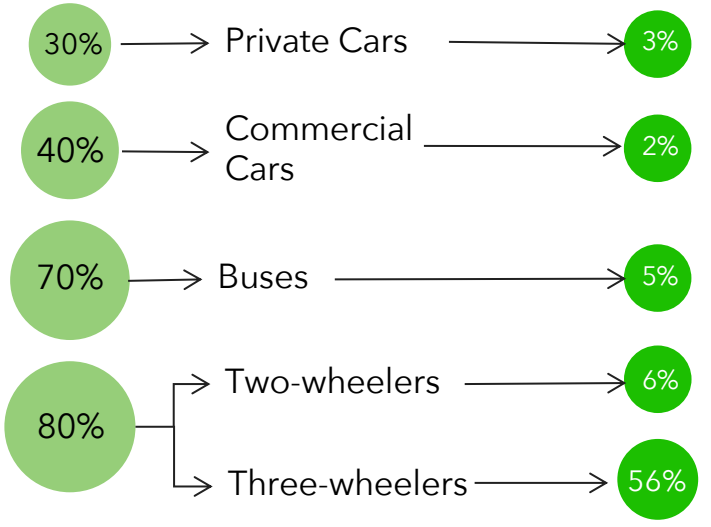
50% Renewable Energy Capacity by **2030**

Reduce 1 Bn Tonnes of CO_2 Emissions by **2030**

45% Reduction in Carbon Intensity of GDP by **2030**

Net Zero by 2070

EV Penetration Targets by 2030 vs Current Penetration rates (YTD FY25)



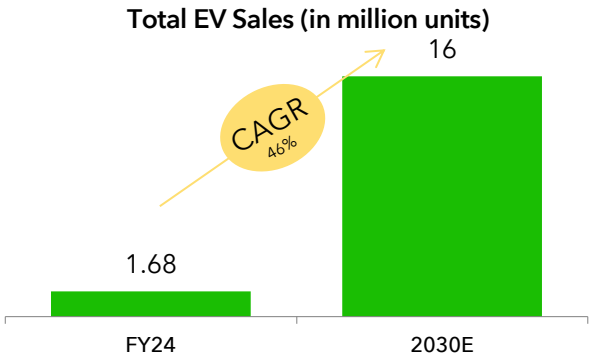
Scheme	Key Features	Latest Progress
FAME-II (2019-2024)	- Incentives for 7,262 e-buses, 15.5 lakh e-2Ws, and 1.55 lakh e-3Ws. - Support for public/shared transport electrification and charging infrastructure.	- As of July 2024: Over **16 lakh EVs** supported with subsidies. Nearly **5,000 e-buses** deployed. Around **7,400 charging stations sanctioned.**
PLI – Advanced Chemistry Cells (ACC)	- Promote domestic manufacturing of advanced battery cells. - Focus on high energy density and storage solutions for EVs.	**- 10 GWh capacity** awarded under the scheme. Boosting localized battery manufacturing to meet EV demand.
PLI – Auto & Components	- Incentives for EV manufacturing, including e-2Ws, e-3Ws, e-4Ws, e-buses, and e-trucks. - Strengthen India's EV supply chain.	- As of March 2024: • Over ₹14,000 Crore invested. • Nearly 30,000 jobs created. • Substantial investment proposals received from the industry
Charging Infrastructure (FAME-II)	- Subsidies for 7,432 charging stations via Oil Marketing Companies (OMCs). - Additional ₹73.5 Crore for upgrading 980 fast-charging stations.	• ₹560 Crore disbursed to OMCs. • **4,853 stations installed.** • Focus on highways and urban areas.
PM E-DRIVE Scheme (2024-2026)	- Comprehensive EV adoption strategy. - Subsidies for e-2Ws, e-3Ws, e-ambulances, e-trucks, e-buses. - Charging infrastructure and testing upgrades.	• **22,100 fast chargers** for e-4Ws, **1,800 for e-buses**, and **48,400 for e-2Ws/e-3Ws** to be deployed. • ₹2,000 Crore allocated for public charging infrastructure.

Source: NITI Aayog, PIB, Ministry of Heavy Industries
**COP 26 – 26th Conference of the Parties to the United Nations Framework Convention on Climate Change*

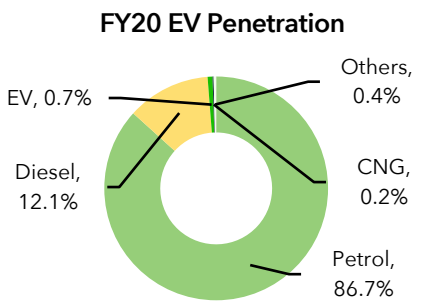
Insights into India's EV Market: Growth and Projections

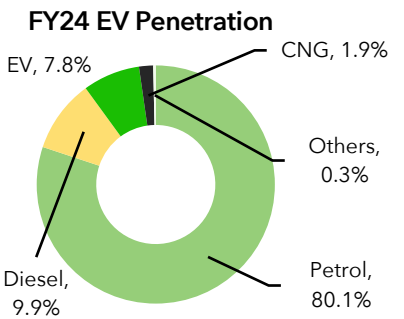
India's automotive sector, contributing 7.1% to the GDP, is steadily transitioning to electric mobility, with EV sales showing CAGR of 76% from FY20 to FY24. Government policies and a target of 30% EV penetration by 2030 are propelling this transformation.

India's EV sales' estimated CAGR of 46% underscores its ambition to align with global sustainability targets.



The rise in EV penetration from 1% to 8% is significant, yet the dominance of petrol-powered vehicles (~80%) indicates room for deeper market penetration, especially in rural and tier-2/3 cities.



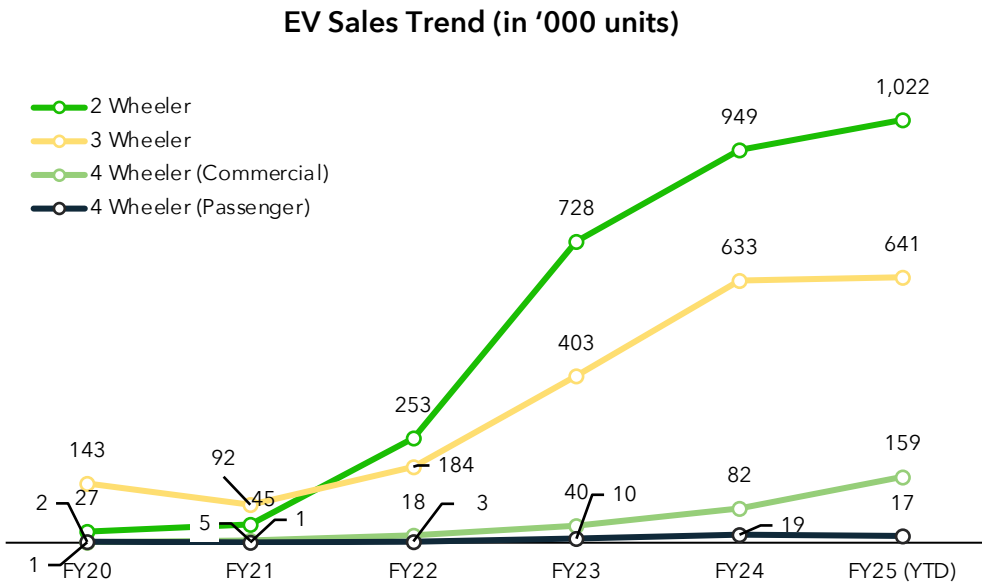


Source: Invest India, Vahan Portal

The sharp increase in sales post-FY21 highlights the impact of govt. schemes and state subsidies for EV adoption. Continued focus on affordability will be key to sustaining this trend.

Electric two-wheelers dominate EV sales, accounting for over 55% in FY24, driven by affordability, government subsidies, and rising demand in urban logistics.

The growth in electric two-wheelers will be driven by electric motorcycles, which is expected to achieve a CAGR of over 100% for the next six years.



Energizing the Future: A Comprehensive View of India's EV Ecosystem

India's electric vehicle ecosystem is a dynamic interplay of manufacturers, energy providers, and facilitators. This interconnected network drives innovation and sustainability, setting the stage for a greener mobility revolution.

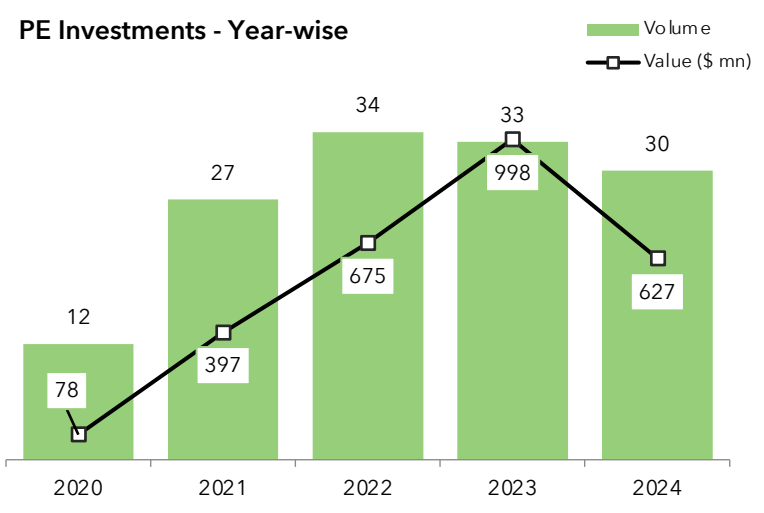
Investment Landscape: Capitalizing on the EV revolution

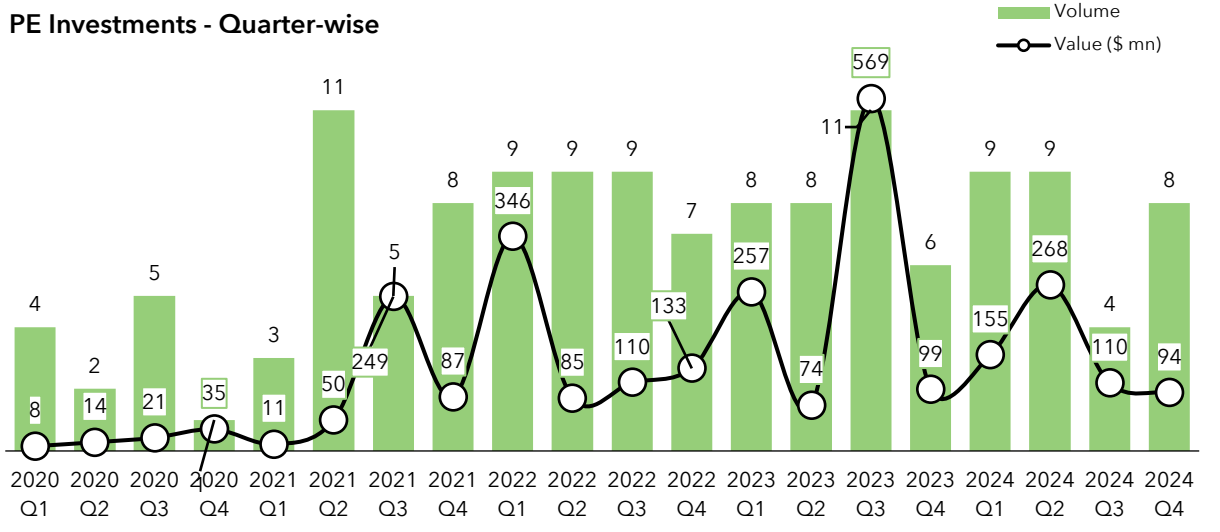
Private Equity Investments in EVs: A Journey of Growth and Fluctuations

PE investments in EVs showcase remarkable growth over the years, with yearly and quarterly trends reflecting dynamic shifts in investor focus and market momentum.

Between **2020 and 2023**, PE investments in EVs surged both in volume and value. Deal volumes grew over **2.7x**, while investment value skyrocketed by more than **12x.** As of **2024**, with **30 deals** valued at **$627 mn**, the market shows a healthy continuation of momentum, albeit at a slightly moderated pace compared to 2023.

Quarterly trends reveal significant changes, such as **Q3 2023**, which reached $569 mn in deal value, a sharp increase compared to $110 mn in **Q3 2022**, marking a **4.8x** rise in value. Similarly, **Q1 2022** stood out with $346 mn, a significant leap compared to $11 mn in **Q1 2021**, showcasing a massive **31x** growth in value. By **Q3 2024**, investments were $110 mn across 4 deals, a significant decline from $569 mn and 11 deals in **Q3 2023**, reflecting a **80%** drop in value and **63%** in deal volumes, indicating a cooling off after peak activity.





Source: VCCEdge

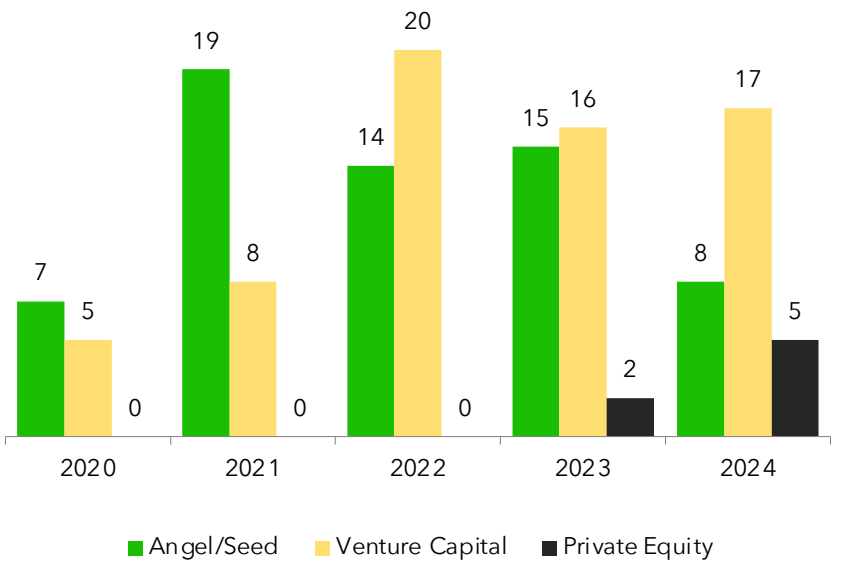
Deal Type Analysis: Evolving Strategies and Shifting Focus

Deal type analysis reveals shifting preferences, with venture capital leading the way and private equity gaining momentum, highlighting evolving funding strategies in the ecosystem.

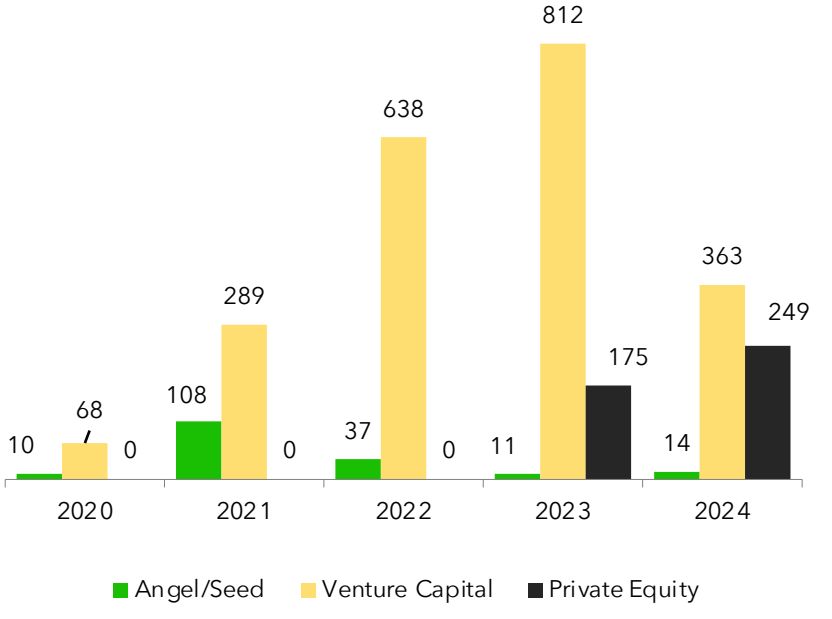
Venture capital deals dominated in 2022 and 2023, with volumes peaking at 20 and 16 deals, respectively, reflecting a consistent focus on scaling ventures. **Angel/Seed** investments were highest in 2021, with 19 deals, but gradually declined to 8 deals in 2024, showing reduced activity in early-stage funding. **Private equity** deals appeared only in 2023, with 2 deals, and increased to 5 in 2024, indicating growing interest in larger, more mature investments.

Venture capital also led in value, skyrocketing from $68 mn in 2020 to a peak of $812 mn in 2023, marking nearly a 12x growth in three years. **Angel/Seed** funding peaked at $108 mn in 2021 but declined steadily to $12 mn in 2024, signaling a shift away from smaller, early-stage funding. **Private equity** made its entry in 2023 with $175 mn, growing to $249 mn in 2024, highlighting increased focus on mature companies in the EV ecosystem.

Deal Type Analysis - By Volume



Deal Type Analysis - By Value ($ mn)



Source: VCCEdge

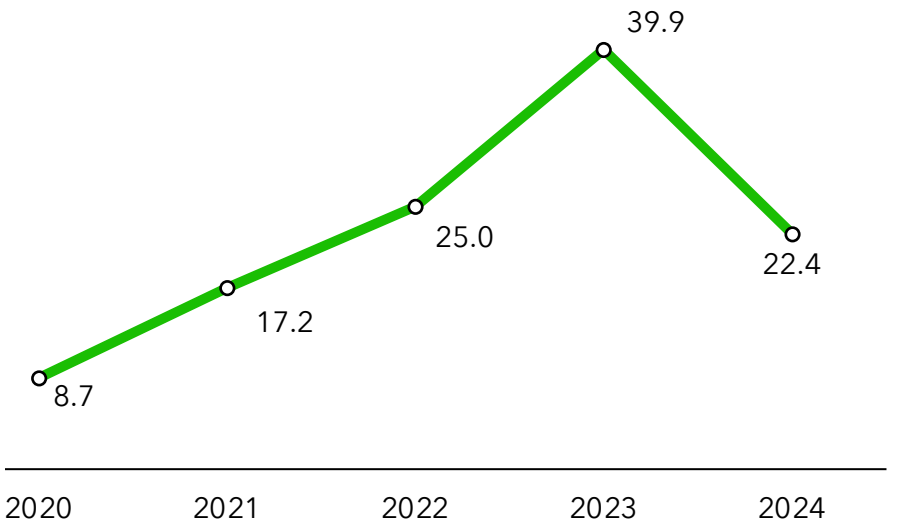
Mean Deal Size: Rising Averages Across Years and Investment Types

Average deal sizes in EV investments highlight steady growth across years, with venture capital driving mid-sized deals and private equity leading high-value transactions.

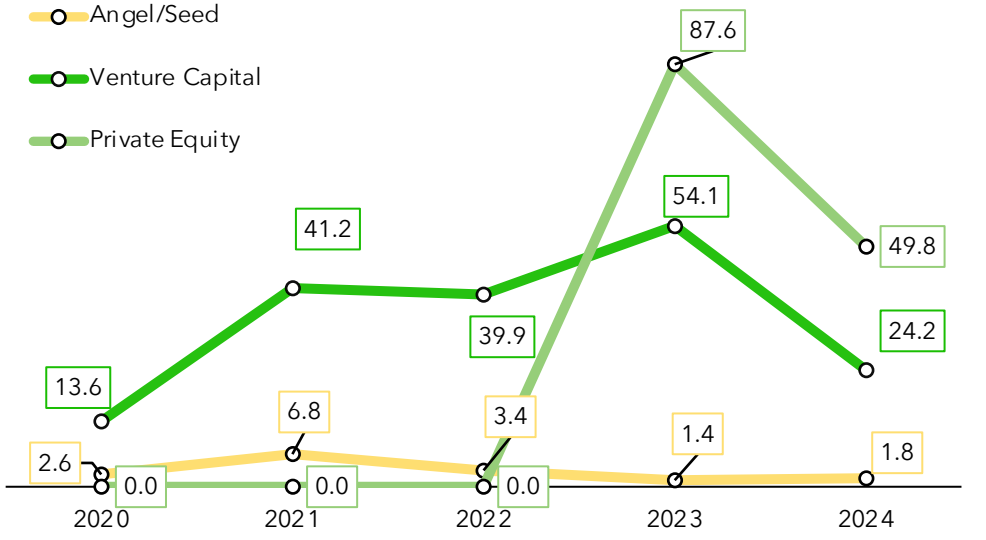
The average deal size in EV investments grew steadily, with a peak of $39.9 mn in 2023, representing a nearly **3.5x** increase over four years. However, 2024 reflects a moderate average of $22.4 mn, indicating a potential shift toward smaller deals or more cautious funding approaches.

Angel/Seed deals maintained small average sizes, peaking in 2021 before stabilizing 2024. **Venture capital** deals consistently grew, reaching a high of $54.1 mn in 2023, showcasing robust investor confidence in scaling ventures. **Private equity** deals debuted strongly in 2023, and continued momentum into 2024, reflecting large-scale funding interest in mature companies.

Mean - Deal Size ($ mn)



Mean - Deal Sub-Type ($ mn)



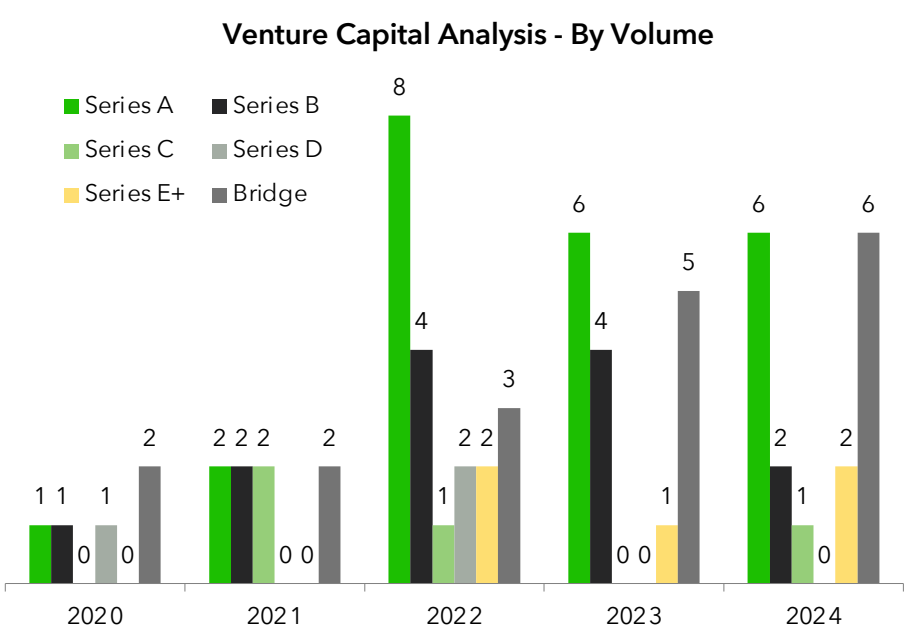
Source: VCCEdge

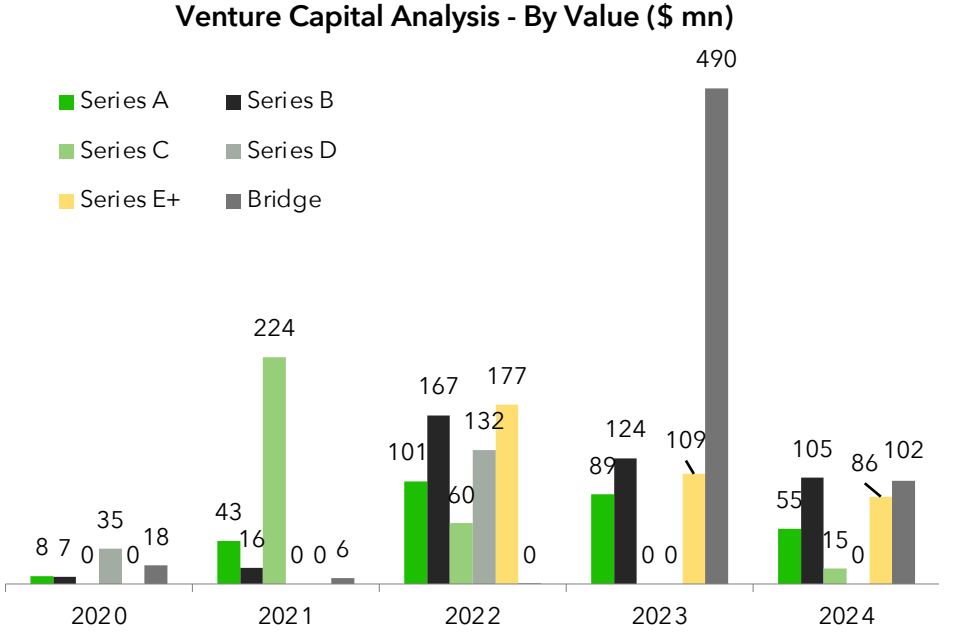
VC Analysis: Steady Early-Stage Funding and Rising Bridge Funding

Venture capital rounds in EV investments highlight steady growth in early-stage funding, while bridge and late-stage rounds gain momentum, reflecting diverse funding strategies in the ecosystem.

Series A rounds have consistently grown in volume, peaking at 8 deals in 2022 and maintaining 6 deals in 2024, reflecting steady early-stage funding. **Series B** activity showed consistent growth until 2023 with 4 deals, before slightly declining to 2 deals in 2024. **Bridge** rounds emerged as a key contributor in later years, peaking at 6 deals in 2024, signaling a preference for interim funding. Late-stage rounds (Series D and E+) remained sparse but showed steady activity since 2022, indicating cautious high-value funding.

Bridge rounds dominated in **2023**, reaching an impressive $490 mn, indicating significant interim funding requirements for scaling companies. **Series A** funding steadily grew, peaking at $101 mn in 2022 before tapering to $55 mn in 2024, highlighting consistent early-stage interest. **Series B** investments saw a dramatic rise to $167 mn in 2022, maintaining a strong $105 mn in 2024. **Late-stage Series E+** rounds peaked at $177 mn in 2022, showcasing robust funding for scaling companies, but declined to $86 mn in 2024.





Source: VCCEdge

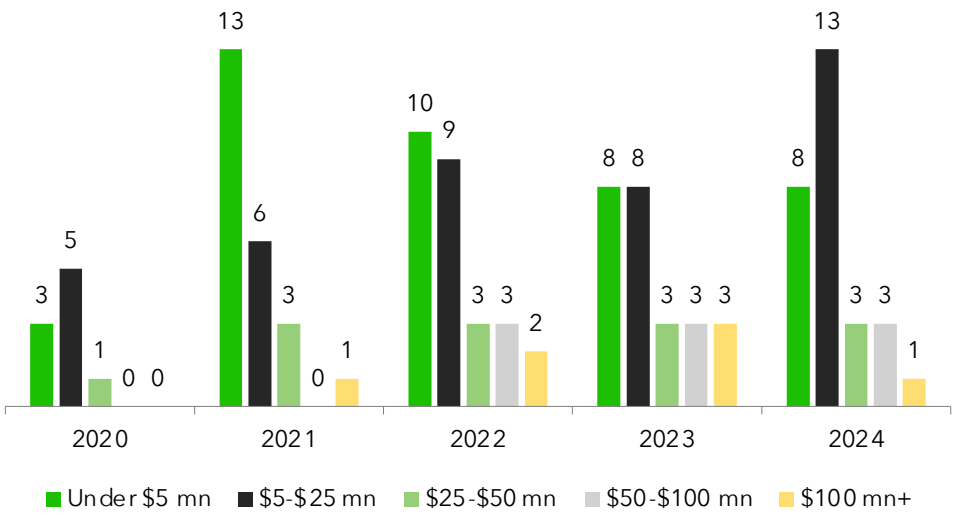
Deal Size Analysis: Strategic Shift Towards Larger Transactions

Deal size analysis showcases a growing shift toward larger transactions, with high-value deals driving growth while mid-sized deals ($5-$25 mn) maintain steady momentum in the ecosystem.

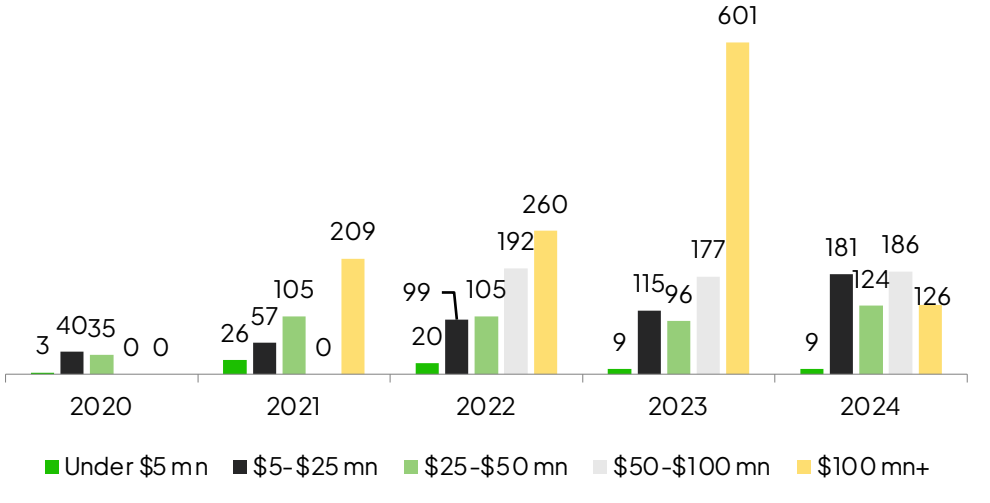
Smaller deals **under $5 mn** dominated in volume through most years, peaking at 13 deals in 2021, but gradually declining to 8 deals in 2024, indicating a shift toward larger deal sizes. Mid-sized deals between **$5-$25 mn** maintained steady growth, reaching 13 deals in 2024, highlighting consistent investor interest in this range. Larger deals of **$50-$100 mn** and **$100 mn+** saw increased activity starting in 2022, peaking at 3 deals each in 2023, signaling growing confidence in higher-value transactions.

In terms of value, mid-sized deals between **$5-$25 mn** steadily grew, jumping from $40 mn in 2020 to $181 mn in 2024, a **4.5x** rise. High-value deals of **$100 mn+** became a dominant driver from 2021 onwards, peaking at $601 mn in 2023, contributing significantly to overall investment growth. Deals in the **$50-$100 mn** range also gained traction from 2022, reaching $186 mn in 2024, reflecting increased allocation toward scaling ventures.

Deal Size Analysis - By Volume



Deal Size Analysis - By Value ($ mn)



Source: VCCEdge

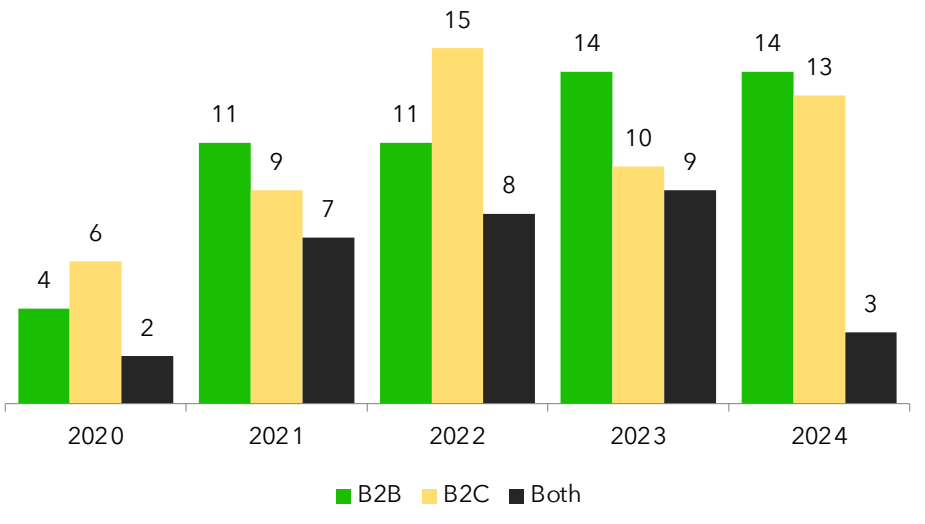
Business Model Analysis: B2C Dominates Value as B2B Matches Volume

EV investment trends reveal a balanced deal volume between B2B and B2C in 2024, yet B2C remains the clear leader in total investment value over the past five years, signaling sustained consumer-driven momentum.

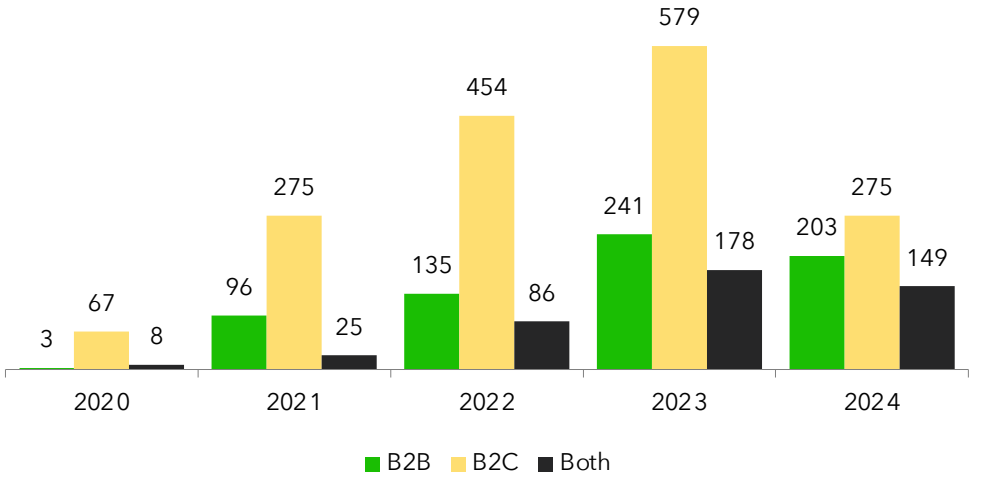
B2B and B2C models have equally driven investment activity over the last 5 years. **B2C** peaked in 2022, while **B2B** showed consistent growth, peaking at 14 deals in 2023 and 2024. Hybrid models combining B2B and B2C saw modest activity, with 9 deals in 2023, but limited representation in 2024, reflecting a focus on single-model investments.

B2C investments led the charge, contributing $1,649 mn in total, peaking at $579 mn in 2023, showcasing strong consumer-focused growth. **B2B** investments showed steady progression, reaching $241 mn in 2023 and totaling $679 mn overall. Hybrid models, while secondary, have grown to contribute a significant $446 mn, with a notable peak of $178 mn in 2023.

Business Model - By Volume

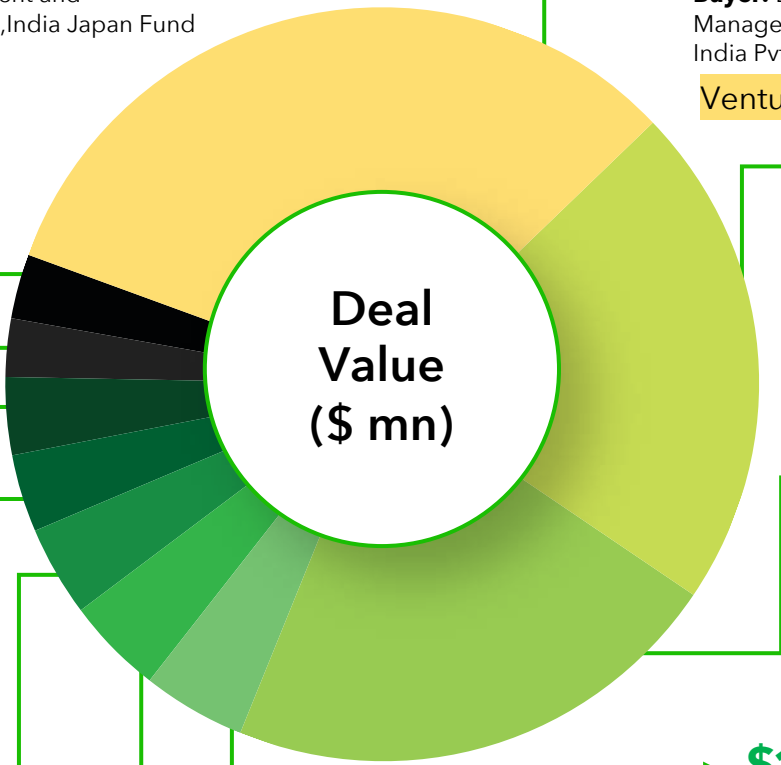


Business Model - By Value ($ mn)



Source: VCCEdge

Key PE Deals in Electric Vehicles (2020-2024)



$71 mn
Announced in: Aug-24
Target: Ather Energy Ltd.
Buyer: National Investment and Infrastructure Fund Ltd.,India Japan Fund
Venture Capital

$389 mn
Announced in: Jul-23
Target: Ola Electric Mobility Ltd.
Buyer: DIG Investment, Tekne Capital Management LLC, Temasek Holdings Advisors India Pvt. Ltd., Tiger Global Management LLC
Venture Capital

$73 mn
Announced in: Mar-23
Target: Mahindra Last Mile Mobility Ltd.
Buyer: International Finance Corp.
Private Equity

$209 mn
Announced in: Sep-21
Target: Ola Electric Mobility Ltd.
Buyer: SoftBank Vision Fund LP, Temasek Holdings Pvt. Ltd., Alpha Wave Ventures, DIG Investment, Edelweiss Private Alternative Investment Fund, VSS Investco Pvt. Ltd.
Venture Capital

$82 mn
Announced in: Aug-22
Target: Yulu Bikes Pvt. Ltd.
Buyer: Magna International Inc., Bajaj Auto Ltd.
Venture Capital

$132 mn
Announced in: Jan-22
Target: Ola Electric Mobility Ltd.
Buyer: Alpha Wave Ventures, Nuvama Private Investments Trust, Alpine Opportunity Fund, Tekne Capital Management LLC, DIG Investment
Venture Capital

$103 mn
Announced in: Feb-23
Target: TI Clean Mobility Pvt. Ltd.
Buyer: Multiples Private Equity Fund III, Tube Investments of India Ltd., State Bank of India
Private Equity

$127 mn
Announced in: Jan-22
Target: Ather Energy Ltd.
Buyer: Hero MotoCorp Ltd., NIIF Strategic Opportunities Fund, GIC Pvt. Ltd., Innoven Capital India Fund
Venture Capital

$109 mn
Announced in: Sep-23
Target: Ather Energy Ltd.
Buyer: Hero MotoCorp Ltd., GIC Pvt. Ltd.
Venture Capital

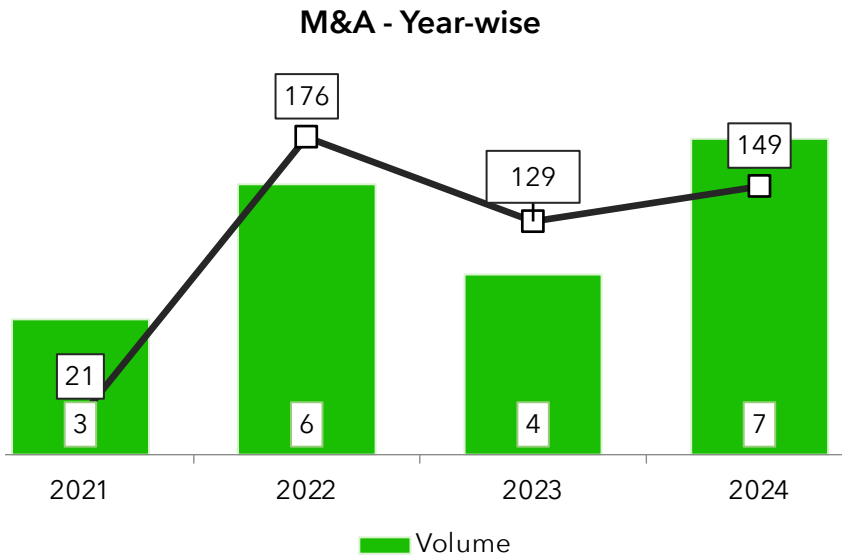
$126 mn
Announced in: May-24
Target: TI Clean Mobility Pvt. Ltd.
Buyer: GEF Capital Partners LLC, M and G Investment Management Ltd.
Private Equity

Source: VCCEdge

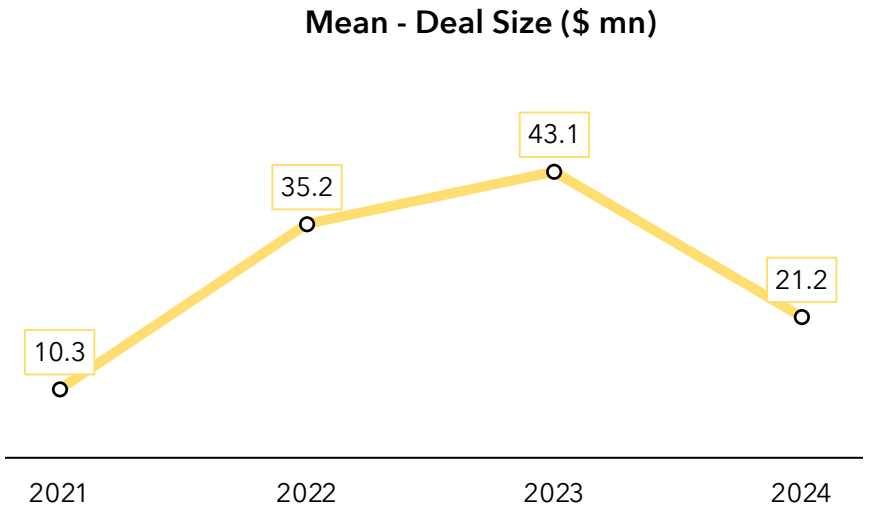
M&A Activity in EVs: Rising Deal Volumes and Strategic Consolidation

M&A activity in EV investments shows consistent growth, with increasing deal volumes and larger transaction sizes reflecting a focus on consolidation and strategic expansion.

M&A activity has steadily increased in volume from 2021 to 2024. Transaction values also saw significant growth, climbing from $21 mn in 2021 to a **high of $176 mn in 2022,** with 2024 reflecting strong activity at $149 mn, indicating sustained momentum in consolidation efforts.



The mean deal size for M&A transactions grew sharply from $10.3 mn in 2021 to a peak of $43.1 mn in 2023, reflecting a **trend towards larger transactions.** However, 2024 shows a decline of over 50%, suggesting a shift towards moderately sized deals or a broader spread of transaction values.



Source: VCCEdge

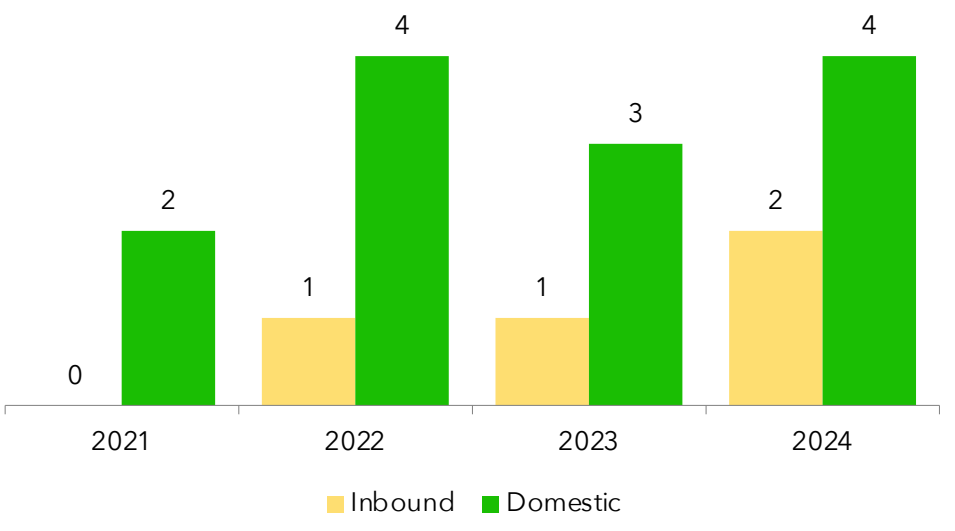
M&A Deal Type Analysis: Domestic Strength & Growing Inbound Interest

M&A deal types in EV ecosystem highlight domestic M&A dominance in deal activity, while inbound transactions steadily rise, driven by high-value international interest.

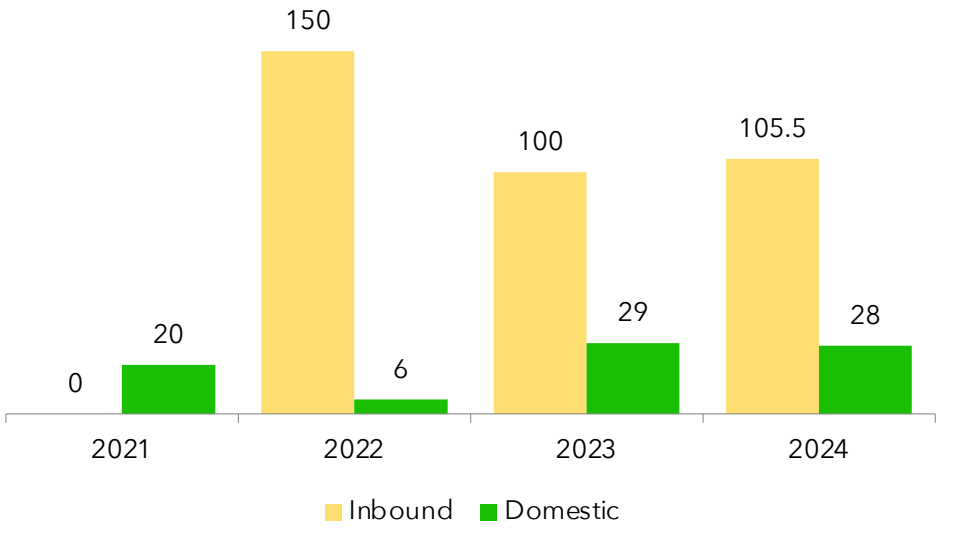
Domestic M&A deals consistently dominated the activity, highlighting a preference for local consolidation. **Inbound deals** showed gradual growth, with 1 deal each in 2022 and 2023, increasing to 2 deals in 2024.

Inbound M&A deals significantly **outpaced domestic deals** in terms of value, peaking in 2022 and remaining strong at $106 mn in 2024, underlining international investors' focus on high-value transactions. Domestic deal values fluctuated, with a peak at $29 mn in 2023, reflecting smaller-scale local transactions.

Deal Type Analysis - By Volume



Deal Type Analysis - By Value ($ mn)



Source: VCCEdge

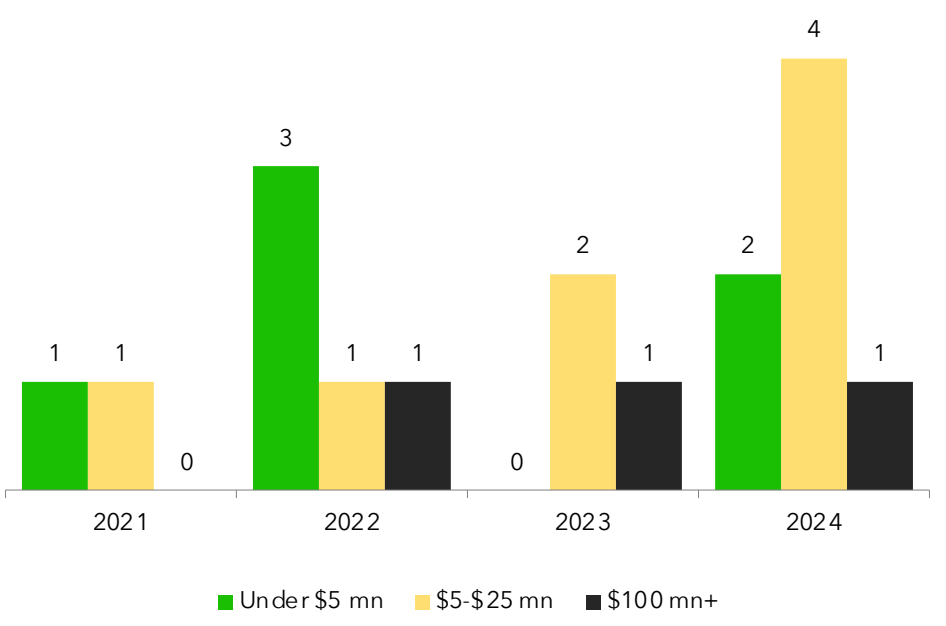
M&A Deal Size Analysis: Steady Mid-Sized Deals Growth

M&A transactions' deal sizes in the EV ecosystem highlight steady growth in mid-sized transactions, while high-value deals consistently drive significant investments in recent years.

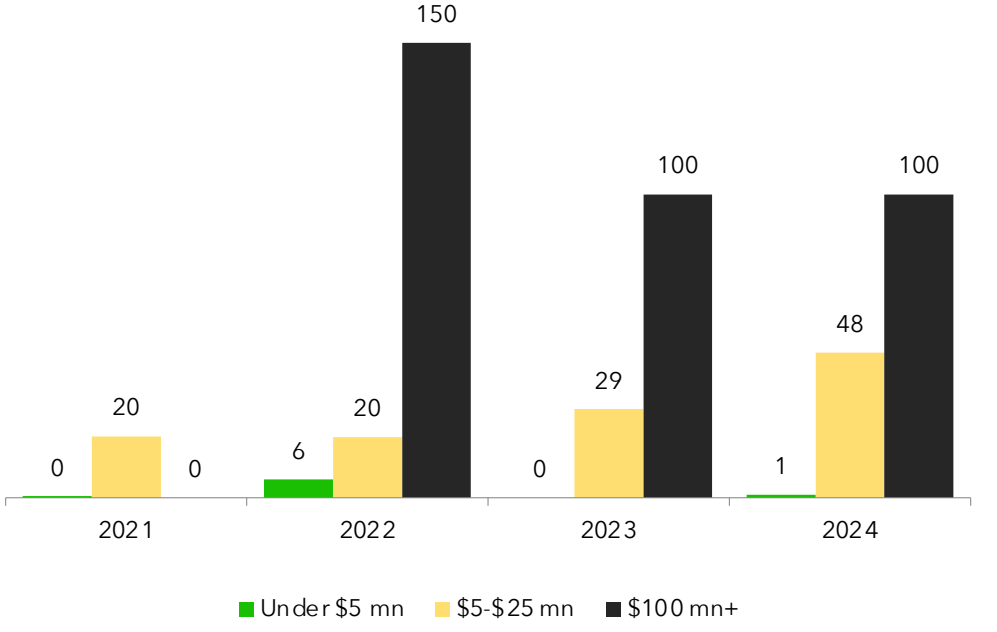
Deals in the **$5-$25 mn** range showed consistent growth in last few years, indicating sustained interest in mid-sized transactions. High-value deals of **$100 mn+** appeared consistently since 2022, with 1 deal each year, reflecting ongoing investor focus on strategic, large-scale transactions. Smaller deals **under $5 mn** saw moderate activity, peaking at 3 deals in 2022.

Mid-sized deals in the **$5-$25 mn** range dominated total investment, growing steadily from 2021 to 2024, reflecting their role in fueling growth-stage companies. Large deals of **$100 mn+** led the value segment, contributing $150 mn in 2022 and maintaining consistent contributions of $100 mn in 2023 and 2024, highlighting strong confidence in strategic investments.

M&A Transactions Deal Size - By Volume

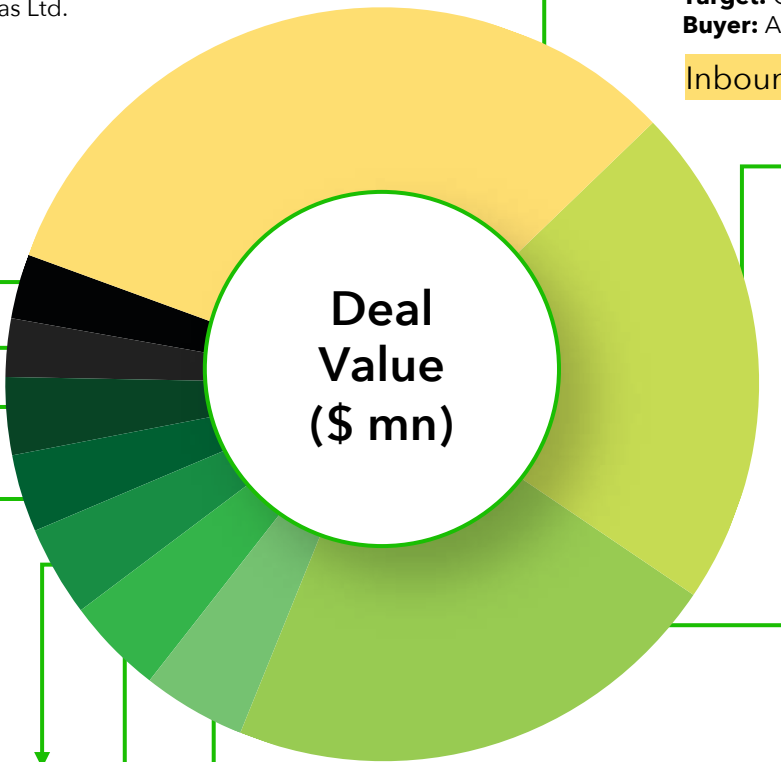


M&A Transactions Deal Size - By Value ($ mn)



Source: VCCEdge

Key M&A Deals in Electric Vehicles (2020-2024)



$12 mn
Announced in: Feb-24
Target: 3EV Industries Pvt. Ltd.
Buyer: Mahanagar Gas Ltd.
Domestic

$150 mn
Announced in: May-22
Target: Greaves Electric Mobility Pvt. Ltd.
Buyer: Abdul Latif Jameel Company Ltd.
Inbound

$12 mn
Announced in: Aug-23
Target: Tirex Transmission Pvt. Ltd.
Buyer: Gulf Oil Lubricants India Ltd.
Domestic

$100 mn
Announced in: Dec-23
Target: Pinnacle Mobility Solutions Pvt. Ltd.
Buyer: Mitsui and Co., Ltd., VDL Groep
Inbound

$15 mn
Announced in: Jun-24
Target: Ather Energy Ltd.
Buyer: Hero MotoCorp Ltd.

$100 mn
Announced in: Sep-24
Target: JBM Ecolife Mobility Pvt. Ltd.
Buyer: Asian Development Bank, Asian Infrastructure Investment Bank
Inbound

$16 mn
Announced in: Sep-24
Target: Greenfuel Energy Solutions Pvt. Ltd.
Buyer: Lumax Auto Technologies Ltd.
Domestic

$20 mn
Announced in: Apr-21
Target: Revolt Intellicorp Pvt. Ltd..
Buyer: RattanIndia Enterprises Ltd.
Domestic

$17 mn
Announced in: Dec-23
Target: Ather Energy Ltd.
Buyer: Hero MotoCorp Ltd.
Domestic

$20 mn
Announced in: Aug-22
Target: Mecpower Mobility Pvt. Ltd.
Buyer: Indigrid Technology Pvt. Ltd.

Source: VCCEdge

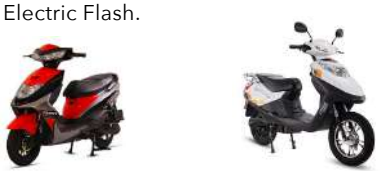
Electric Two-Wheelers: Powering the Transformation

Mapping the Electric Two-Wheeler Landscape

Electric two-wheelers are revolutionizing urban commutes, offering sustainable, cost-effective, and high-performance alternatives to traditional vehicles. With diverse categories catering to varied needs, the industry is set for unparalleled growth.

Low-Speed Electric Two-Wheelers

- Typically speed-capped at 25 km/h and exempt from registration and licenses.
- Ideal for tier-2 and tier-3 cities, catering to budget-conscious buyers.
- **Examples:** Ampere Reo, Hero Electric Flash.



Electric Scooters

- Designed for urban commuting with low speeds and affordable pricing.
- Equipped with user-friendly designs, lightweight frames, and easy charging options.
- **Examples:** Ola S1, Ather 450X, PURE EV Etrance.

Electric Motorcycles

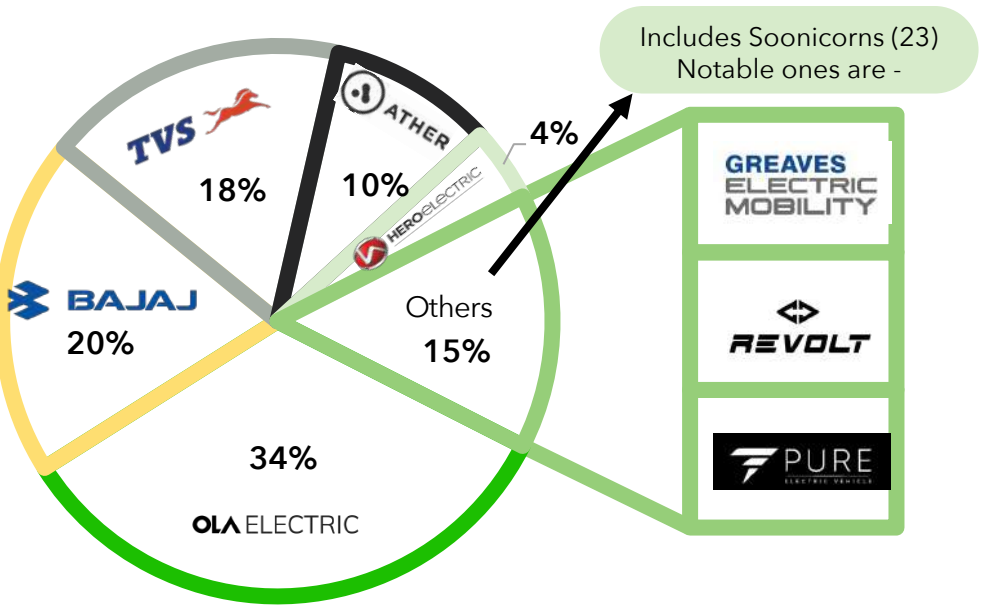
- High-speed options catering to performance-focused users.
- Feature advanced designs, powerful motors, and extended range for long rides.
- **Examples:** PURE EV Etryst 350, Revolt RV400.

Shared Electric Two-Wheelers Fleet

- Electric two-wheelers used in shared mobility services like ride-sharing and rentals.
- Promotes sustainable urban transportation with on-demand availability.
- **Examples:** Zypp Electric, Yulu Miracle.

Unicorns	Year Founded	Unicorn Year
OLA ELECTRIC	2010	2015
ATHER	2013	2024

Market Share of E2W OEMs

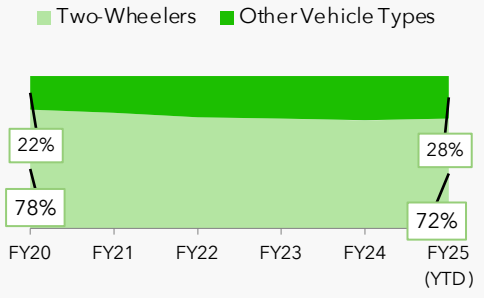


Source: Vahan Portal, VCCEdge

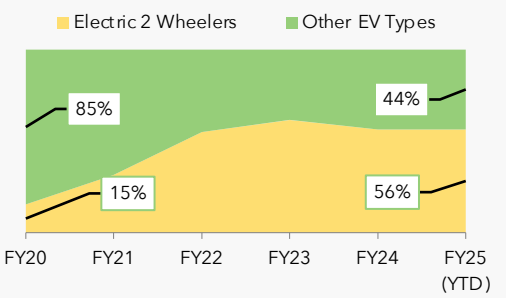
Transforming Mobility: The Growth of Electric Two-Wheelers in India

India's electric two-wheeler market is on the brink of an exponential growth curve, driven by increasing consumer demand, government incentives, and sustainability goals.

Electric two-wheelers are rapidly growing as a share of the EV market, showcasing their rising acceptance and potential. With two-wheelers dominating the overall automobile market, E2Ws have a significant opportunity to capture a larger share.



Two-Wheelers' Share in Automobiles



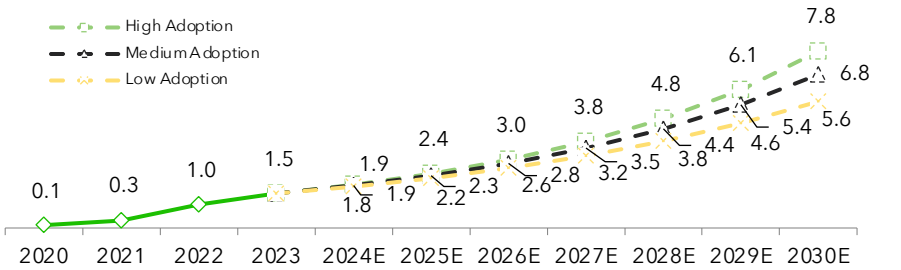
Electric Two-Wheelers' Share in Total Electric Vehicles

Electric two-wheelers are steadily increasing their share of the total two-wheeler market. The rise is being driven by favorable policies like the FAME-II scheme and cost competitiveness of EVs versus traditional ICE vehicles.

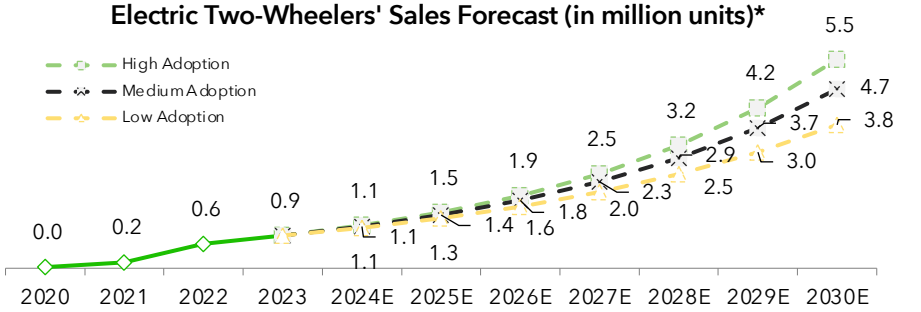
Electric Two-Wheelers' Share in Total Two-Wheelers

With a CAGR above 25%, India's E2W market is set to achieve exponential growth by 2030. Projections showcase the rise of urban and rural adoption, signaling widespread acceptance of electric mobility.

Electric Vehicles' Sales Forecast (in million units)



Electric Two-Wheelers' Sales Forecast (in million units)*



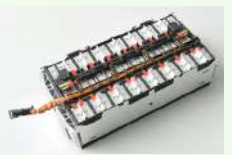
Source: Vahan Portal, EV Dashboard by Clean Mobility Shift

High Adoption – 30% EV penetration as suggested by NITI Aayog, Medium Adoption – 25%, Low Adoption – 20%

Innovations Shaping EV Two-Wheelers' Battery Technology in India

The Indian EV battery market is on a remarkable growth trajectory, projected to surge from $16.77 billion in 2023 to $27.70 billion by 2028. This evolution is driven by cutting-edge innovations like solid-state batteries, advanced BMS, and battery swapping technologies that redefine safety, efficiency, and convenience in EVs.

Current Battery Technologies

	Lithium-Ion Batteries (Li-ion)	Lithium Iron Phosphate (LFP) Batteries
Cathode Component	 Lithium Cobalt Oxide or Nickel Manganese Cobalt	 Lithium Iron Phosphate
Advantages	• High energy density • Lightweight • Longer lifespan • Fast charging • Efficient performance.	• Enhanced safety due to thermal stability • Longer cycle life compared to traditional Li-ion
Challenges	• Expensive • Sensitive to temperature • Requires advanced management systems	Slightly lower energy density than standard Li-ion
Use Case	The most widely used battery technology in Indian two-wheelers	Considered a safer alternative in two-wheelers

Emerging Innovations

Solid-State Batteries

- **Innovation:** Replace liquid electrolytes with solid ones.
- **Advantages:** Higher energy density, faster charging, improved safety.
- **Challenges:** High development cost, limited commercial readiness.
- **Current Status:** In development; startups and manufacturers like Ola Electric are investing in R&D.

Battery Swapping Technology

- **Innovation:** Quick replacement of discharged batteries with fully charged ones.
- **Advantages:** Reduces downtime, eliminates range anxiety.
- **Challenges:** Requires infrastructure investment and standardization.
- **Current Status:** Already set up by companies like SUN Mobility, Battery Smart etc..

Advanced Battery Management Systems (BMS)

- **Innovation:** Ensures efficient battery performance and safety.
- **Advantages:** Improves battery efficiency, safety, and longevity.
- **Challenges:** Complex integration into existing systems.
- **Current Status:** Actively developed with app-based monitoring systems.

Recycling and Raw Material Sourcing

- **Innovation:** Reclaim valuable materials from used batteries.
- **Advantages:** Reduces dependency on imports, minimizes environmental impact.
- **Challenges:** Logistics and scalability of recycling infrastructure.
- **Current Status**: Initiatives undertaken for localized lithium sourcing and recycling programs.

Source: EV Pedia, India Brand Equity Foundation (IBEF)

Driving Innovation: Case Studies from Electric Two-Wheelers Industry

Case Study: PURE EV's Journey in Electric Mobility

Company Overview

Founded in 2015 by Dr. Nishanth Dongari and Rohit Vadera, PURE EV is a Hyderabad-based electric vehicle startup incubated at IIT Hyderabad. The company focuses on developing electric two-wheelers (E2Ws) and energy storage solutions tailored for the Indian market.

Journey of Innovation and Growth

2015

Founded by Dr. Nishanth Dongari and Rohit Vadera at IIT Hyderabad.

Dr. Nishanth Dongari (Founder)

Rohit Vadera (Co-Founder & CEO)

2018

Entered into lithium battery manufacturing business.

2019

Raised seed funding and started EV manufacturing under the brand PURE EV.

2020

Launched its first high-speed electric scooter 'EPluto7G'

2021

Launched its first electric motorcycle 'ETRYST 350'

2023

Released its first Impact Report highlighting the impact of electric vehicles on health & wellbeing of the community.

2024

Raised $8 mn in Series A funding; Plans to expand into Middle-East and African markets.

"Pure EV was founded keeping in mind the aspirational needs of Indian customers to deliver to them a reliable, cost-effective scooter that also speeds up the transition from petrol to EVs in the two-wheeler mobility segment."

- **Rohit Vadera, CEO of Pure EV**

Source: Company Website, PURE EV Impact Report, ET Auto, VCCEdge

Case Study: PURE EV's Journey in Electric Mobility

Innovation in Motion: Why PURE EV Stands Out

- In-House Battery Manufacturing: One of the few electric two-wheeler OEMs in India with the capability to produce its own batteries, ensuring quality control and cost efficiency.
- Research & Development: Demonstrated commitment to innovation with over 100 intellectual property filings, focusing on advancing battery technology and electric mobility solutions.

PURE EV's Market Presence

80
Outlets

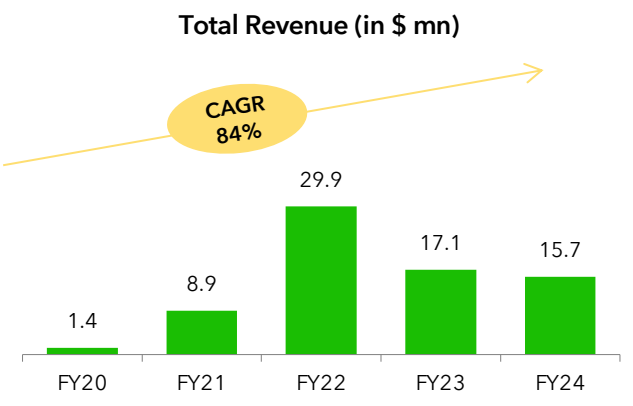
15
States

4000
Units per month – Manufacturing Capacity

Global Expansion

Exporting its products to South Asia and has partnered with **Arva Electric** to expand its e-motorcycle sales in the Middle-East and Africa

Financial Performance



Transforming Lives with Sustainable Mobility

80%
PURE EV customers clock a daily commute of more than 40Km

Rs. 450 cr.
Total savings in running costs by PURE EV customers

20%
Less Lithium consumption per km than other e-2W peers

Rs. 60K
Savings per customer

Source: Company Website, PURE EV Impact Report, ET Auto, VCCEdge

Case Study: Ather Energy's Journey in Electric Mobility

Company Overview

Founded in 2013 by Tarun Mehta and Swapnil Jain, Ather Energy is a Bengaluru-based electric vehicle startup focusing on smart electric scooters and charging infrastructure. The company offers electric scooters under the name Ather Rizta, Ather 450 and Ather 450 Apex.

Tarun Mehta

(Co-Founder)

Swapnil Jain

(Co-Founder)

Journey of Innovation and Growth

2014

Raised angel/seed funding from Venkatachary Srinivasan and Technology Development Board Seed Fund

2016

Set up first manufacturing plant; Received funding from Hero MotoCorp to accelerate product development

2018

Launched its first product, Ather 450, and unveiled AtherGrid

2021

Commissioned second manufacturing plant in Hosur

2023

Installed 1000 fast charging stations across India

2024

Became second company in EV space to enter the 'Unicorn' club

2024

Ather files for Rs. 4,000 cr. IPO at $2bn valuation

Source: Company Website, Autocar, VCCEdge

Case Study: Ather Energy's Journey in Electric Mobility

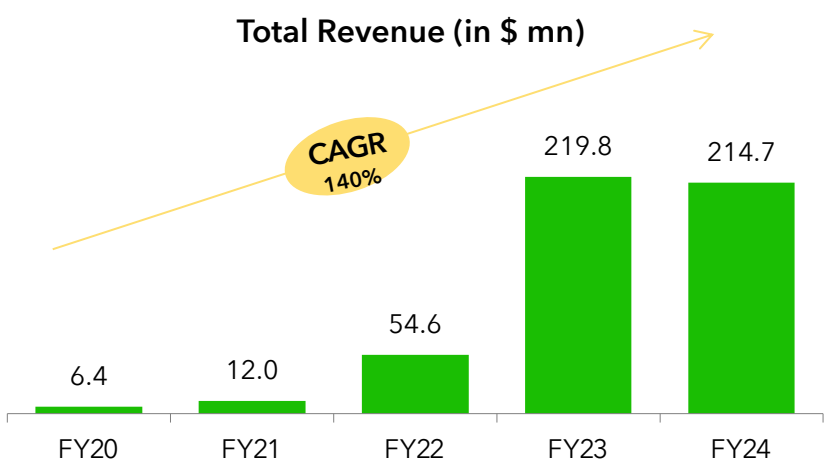
Leading the Charge with Innovation: Why Ather Energy Stands Out

- **AtherGrid Charging Network:** Pioneered India's first public charging network for electric vehicles, "AtherGrid," with fast-charging points in over 100 cities.
- **In-house Battery Technology:** Ather Energy designs and manufactures its own lithium-ion battery packs, focusing on reliability and efficiency tailored to Indian conditions.
- **Connected Ecosystem:** Ather scooters are integrated with IoT, allowing for remote monitoring, diagnostics, and smartphone connectivity via the Ather app.

Ather's Market Presence

100+	Cities	25	States	4.2 lakh	Units per annum – Manufacturing Capacity

Financial Performance



ESG in Action

Environment

- **Renewable Energy:** 13% energy from renewables.
- **GHG Reduction:** 230 MT CO_2 emissions avoided via logistics optimization.

Social

- **Community Impact:** 1,148 hours of volunteering; 500+ children supported.
- **Diversity & Inclusion:** 47% women in factory roles; gender-neutral facilities.

Governance

- **Ethics Training:** 99.2% employees trained in the Code of Ethics.
- **Safety Excellence:** 0.81 Lost Time Incident Rate; 88% safety issue closures.

Source: Company Website, Autocar, VCCEdge

PURE®

About PURE:

PURE, incubated at i-TIC, IIT Hyderabad, is a pioneer in climate technology, developing innovative energy storage and electric mobility products to offer seamless consumer experience. Our robust portfolio of over 120 patents underscores our commitment to pushing the boundaries of technology and delivering unparalleled performance. With a strong presence across India, including over 80 dealerships and a thriving community of over 80,000 customers, PURE is at the forefront of an energy and mobility revolution.

VCC EDGE

About VCCEdge:

VCCEdge is India's premier financial research platform providing comprehensive data and information to subscribers for deal origination, deal structuring and valuations, gaining market insights, carrying out due diligence, and tracking competition. The platform has in-depth profiles of private and public companies, including detailed financials, deals including private equity, venture capital, M&A, equity capital market issues and debt offerings, key developments, and detailed data on investors and their portfolios.