ATLIQ MOTORS

Electric Vehicles

Market Analysis

Understanding EV Market of India

Presented By:
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Agenda

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Introduction

The market for electric vehicles (EVs) has grown significantly in India in recent years due to favorable government policies, growing environmental consciousness, and technological breakthroughs. **India's EV sales increased by more than 200% in 2023** alone, indicating a dramatic shift in the country's transportation preferences toward more environmentally friendly options.

Given that AtliQ Motors, a major player in the North American automotive industry, wants to increase its market share in India, where it now stands at less than 2%, a thorough market analysis is needed. Insights into **customer behavior, market dynamics, and the competitive environment gained from this research** will help AtliQ Motors plan ahead and take a greater share of the rapidly growing Indian EV industry.

Problem Statement

AtliQ Motors, a prominent automotive giant from the USA, has achieved a significant market share of 25% in the electric and hybrid vehicles segment in North America over the past five years.

As part of their strategic expansion plans, they aim to introduce their bestselling electric vehicle models in India, where their **current market share is less than 2%**. To ensure a successful entry into the Indian market, Bruce Haryali, the Chief of AtliQ Motors India, has commissioned a **detailed market study of the existing EV/Hybrid market in the country.**

The objective of this project is to analyze sales data from FY 2022 to 2024, identify key trends, and provide actionable insights that will inform AtliQ Motors' market strategy, competitive positioning, and growth opportunities in India.

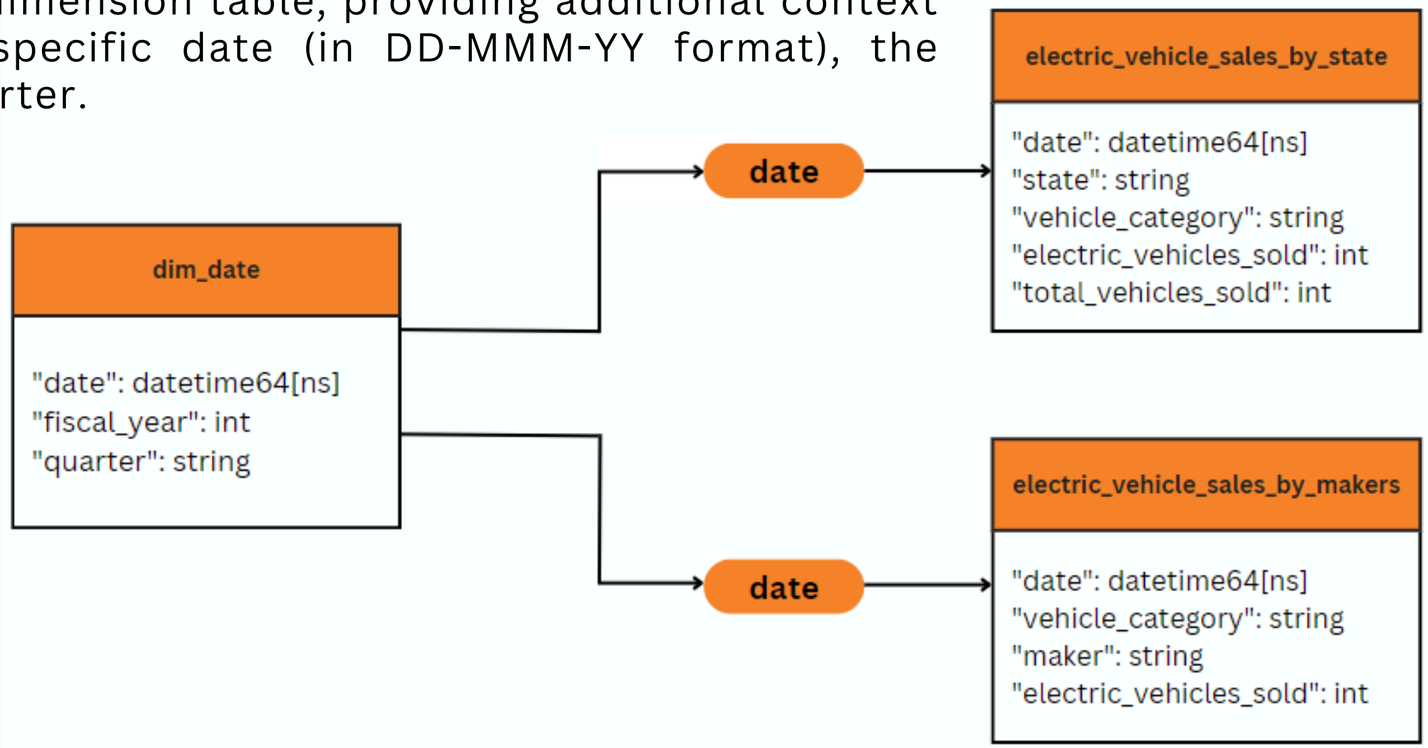
Data Source

The dataset is taken from the **Vahan Sewa**. Thanks to the Vahan Sewa for providing datasets for public access which is a great learning asset - feel free to explore them here: Vahan Sewa

The **electric_vehicle_sales_by_state.csv** dataset provides monthly records of electric vehicle sales across different states in India. The **electric_vehicle_sales_by_makers.csv** dataset details monthly sales data categorized by vehicle manufacturer.

The **dim_date.csv** dataset serves as a date dimension table, providing additional context for time-series analysis. It includes the specific date (in DD-MMM-YY format), the corresponding fiscal year, and the fiscal quarter.

These datasets provide a comprehensive foundation for analyzing electric vehicle sales trends across different states, manufacturers, and time periods, enabling a detailed and insightful market analysis for AtliQ Motors' strategic decision-making.



Tools Used

- **Python** — For Data cleaning & Exploratory Data Analysis (EDA)
- **Pandas** — For Data manipulation and analysis
- **Matplotlib** — For Data Visualization
- **Power BI** — For presenting the analysis Using Dashboard
- **GitHub** — For Documentation and Repository Management

Data Analysis

Key Performance Indicators

Analysis Period
2022 - 2024

Total EVs sold
20.66 lakhs

EV Market Penetration Rate
3.61%

Total Revenue
₹ 39,200 cr

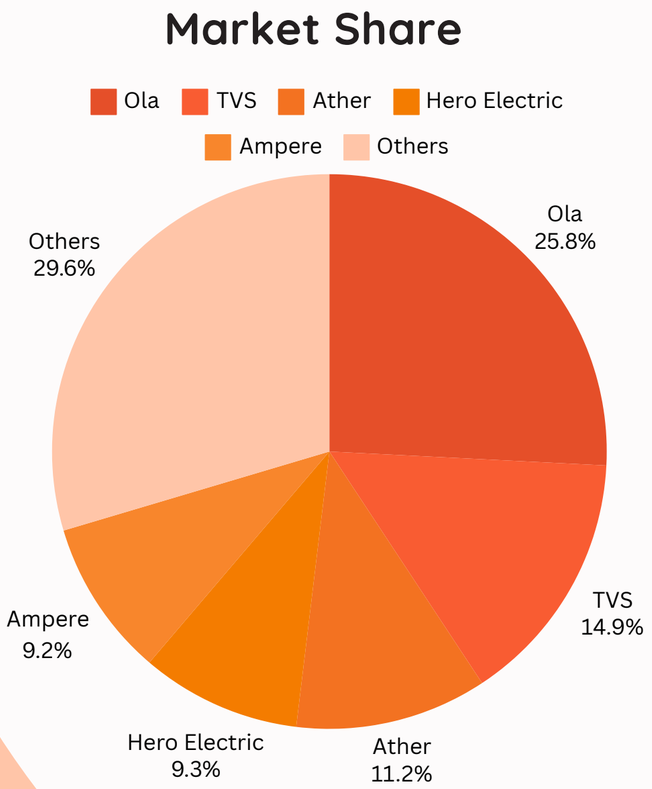
Number of EV manufacturers
26

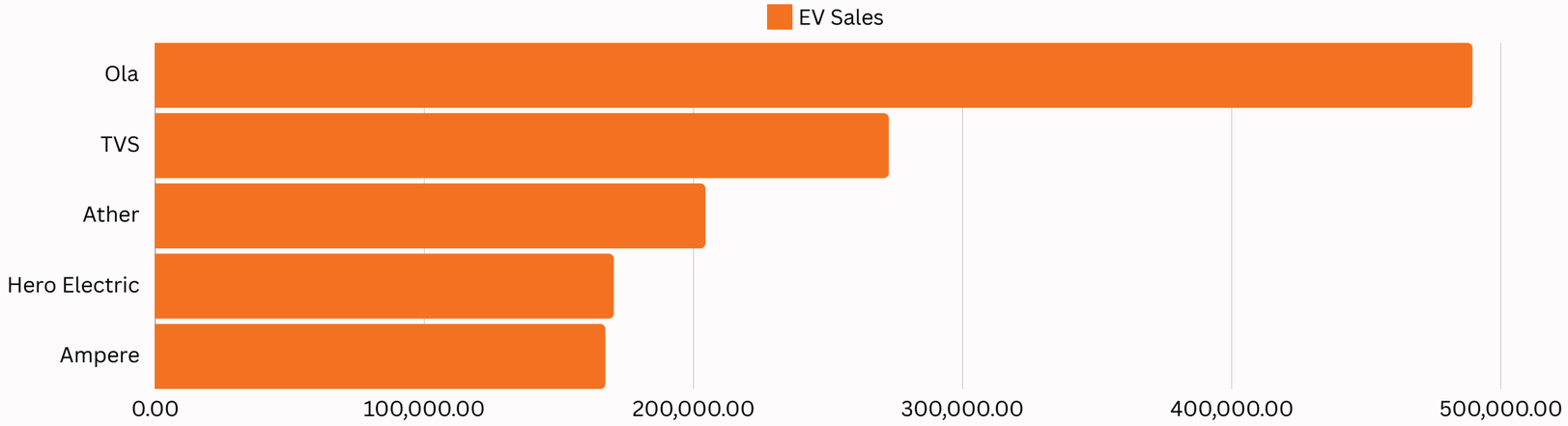
Average EVs sold per year
2531.9

EV Market CAGR
0.94

Revenue Growth of EV market
324.92%

Top 2 Wheeler EV Manufacturers



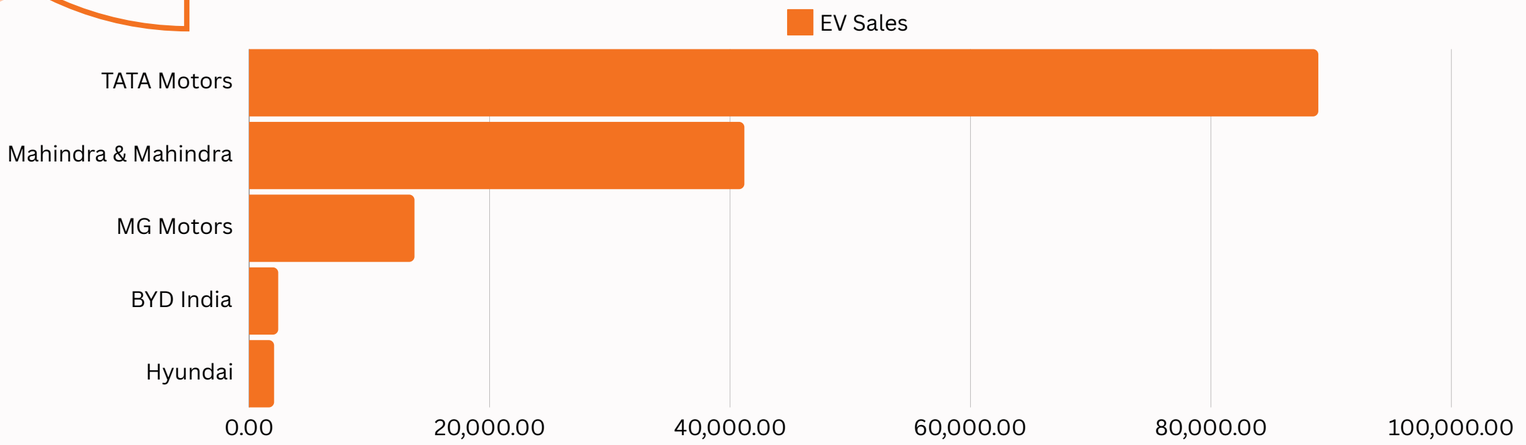


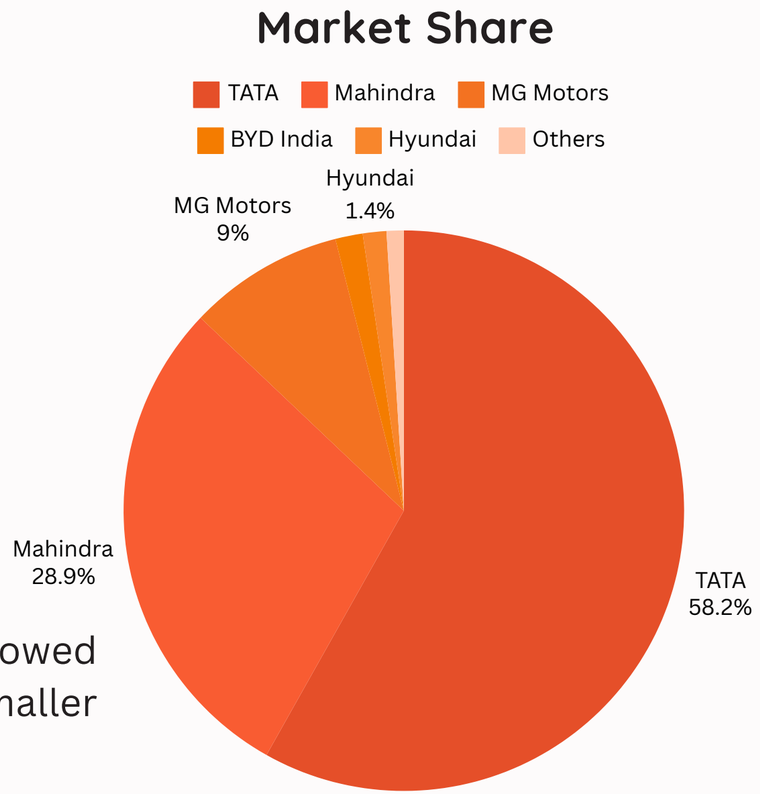
In the 2-wheeler market, **Ola Electric leads with a commanding 26.8% market share**, followed by TVS (14.92%), Ather (11.19%), Hero Electric (9.33%), and Ampere (9.16%).

This concentration of market share among a few manufacturers suggests that **new market entrants will face stiff competition** from well-established brands with strong brand recognition, extensive distribution networks, and significant consumer trust.

For new players, penetrating this market will require innovative strategies, such as offering unique value propositions, competitive pricing, or focusing on niche markets to differentiate themselves from the dominant players.

Top 4 Wheeler EV Manufacturers



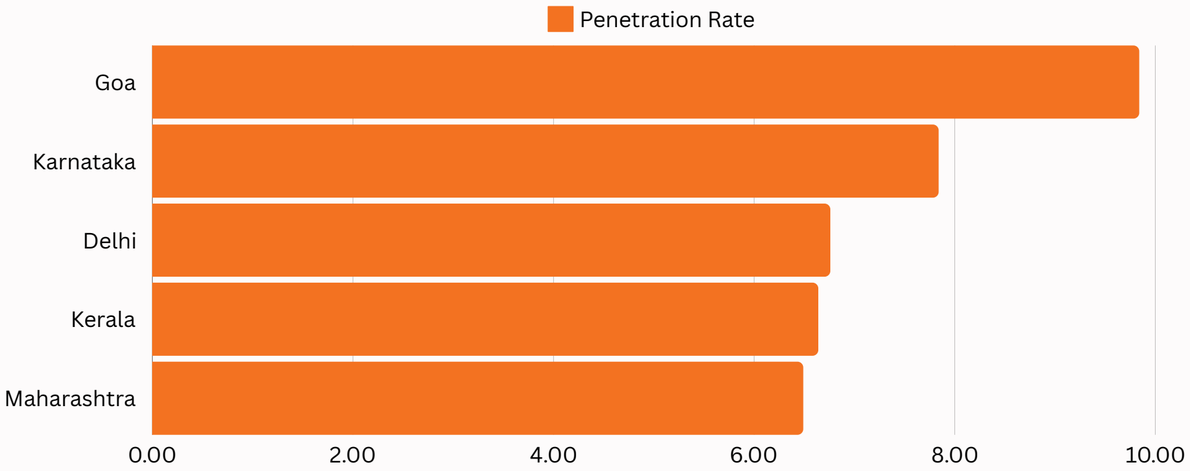


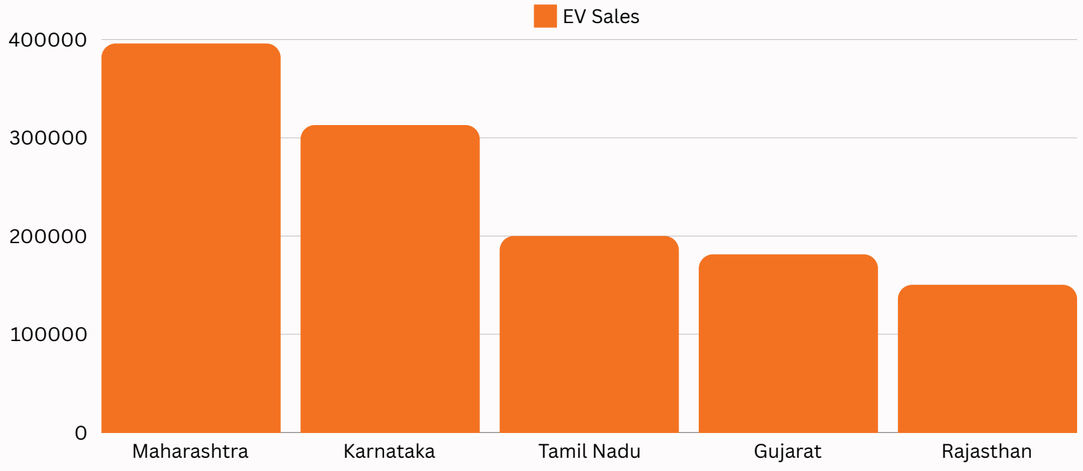
In the 4-wheeler segment, **Tata Motors dominates with a 58.15% market share**, followed by Mahindra & Mahindra (26.93%). MG Motor, BYD India, and Hyundai have smaller shares of 8.99%, 1.58%, and 1.36%, respectively.

Tata Motors' overwhelming presence, combined with Mahindra's significant share, indicates a highly competitive landscape. New entrants in this segment will **need to invest heavily in brand building, technological innovation, and establishing a strong supply chain** to compete effectively.

Given Tata Motors' and Mahindra's established reputation and consumer base, new players may also need to explore strategic partnerships or focus on emerging trends such as electric SUVs or affordable electric vehicles to carve out a space in the market.

Regional Market Conditions





Goa (9.8%), Karnataka (7.8%), Delhi (6.8%), Kerala (6.6%), Maharashtra (6.5%) lead in EV penetration. **High penetration rates indicate strong consumer acceptance and established infrastructure**, making these states attractive for new entrants. However, competition may be intense, requiring innovative strategies to gain market share.

Maharashtra, Karnataka, Tamil Nadu, Gujarat, Rajasthan lead in EV sales. These states have **significant market potential due to high sales volumes**. New players should prioritize entering these **markets to leverage existing demand and infrastructure**. However, they must differentiate themselves to compete effectively against established brands.

These regions not only have a strong existing market but also benefit from robust infrastructure and supportive government policies. These states are not only current leaders but are also projected to remain top performers by 2030.

01 Top and Bottom 3 makers for FY 2023 and 2024 in terms of the number of 2-wheelers sold.

Top Makers for FY 2023

maker	electric_vehicles_sold
OLA ELECTRIC	152,583
OKINAWA	96,945
HERO ELECTRIC	88,993

Bottom Makers for FY 2023

maker	electric_vehicles_sold
PURE EV	11,556
BEING	11,018
JITENDRA	8,563

Top Makers for FY 2024

maker	electric_vehicles_sold
OLA ELECTRIC	322,489
TVS	180,743
ATHER	107,552

Bottom Makers for FY 2024

maker	electric_vehicles_sold
BATTRE ELECTRIC	4,841
REVOLT	7,254
KINETIC GREEN	9,585

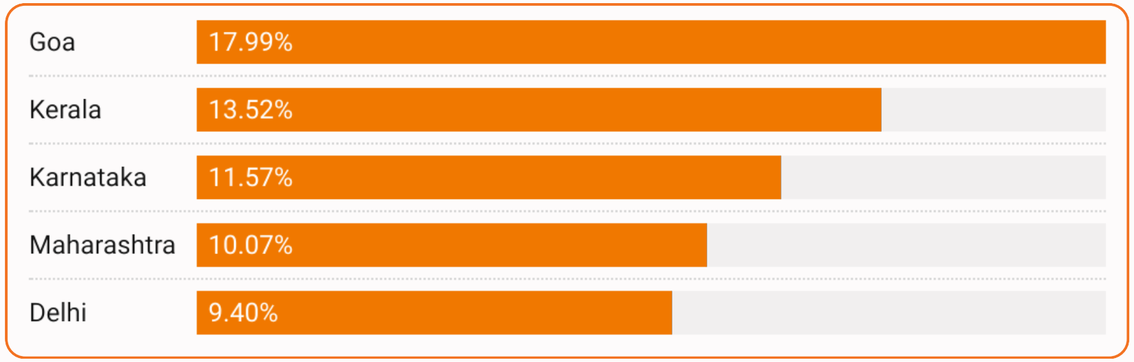
OLA ELECTRIC has demonstrated a significant market presence and growth, maintaining the top spot in both fiscal years. Their sales more than doubled from 2023 to 2024.

TVS and ATHER have shown impressive performance in FY 2024, indicating their successful strategies in capturing market share.

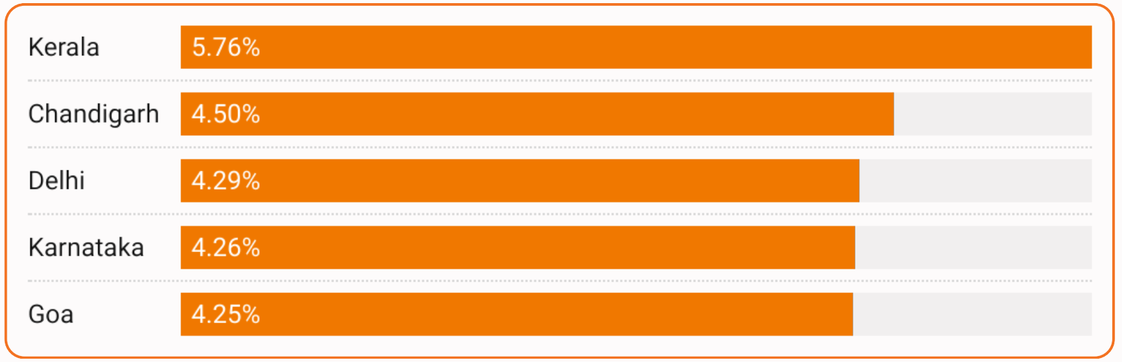
The bottom three makers in both fiscal years show much lower sales figures, indicating challenges in market penetration, brand recognition, or competitive positioning.

02 Top 5 States with the Highest Penetration Rate in 2-wheeler and 4-wheeler EV Sales in FY 2024.

States with highest penetration rate in 2-Wheelers



States with highest penetration rate in 4-Wheelers



Goa, Kerala, Karnataka and Delhi appears in the top ranks for both 2-wheelers and 4-wheelers, indicating a robust market for EVs in the states. This success can be attributed to a combination of state initiatives, public awareness, and possibly incentives for EV adoption. This indicates potential growth markets where focused efforts can lead to increased market share for EV manufacturers.

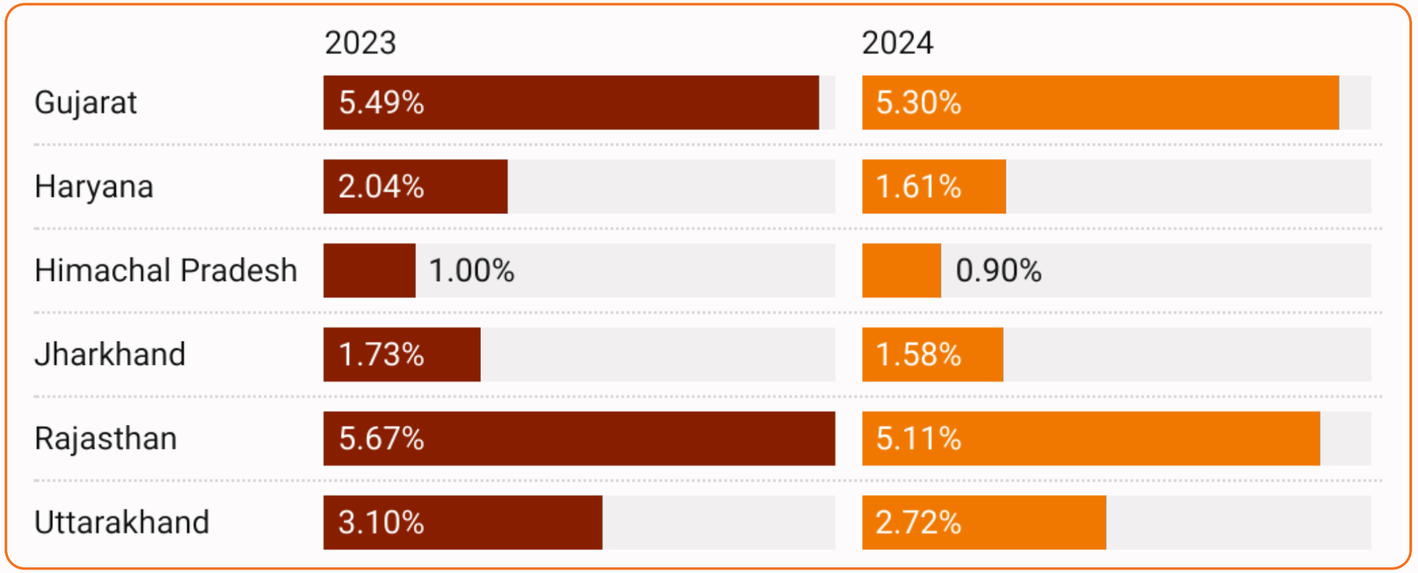
2-wheelers have significantly higher penetration rate than 4-wheelers in most of the states. This attributes to lower purchasing and operational costs, accessibility in urban traffic, versatility to used in urban and rural areas alike and government incentives.

03 List the states with negative penetration (decline) in EV sales from 2022 to 2024

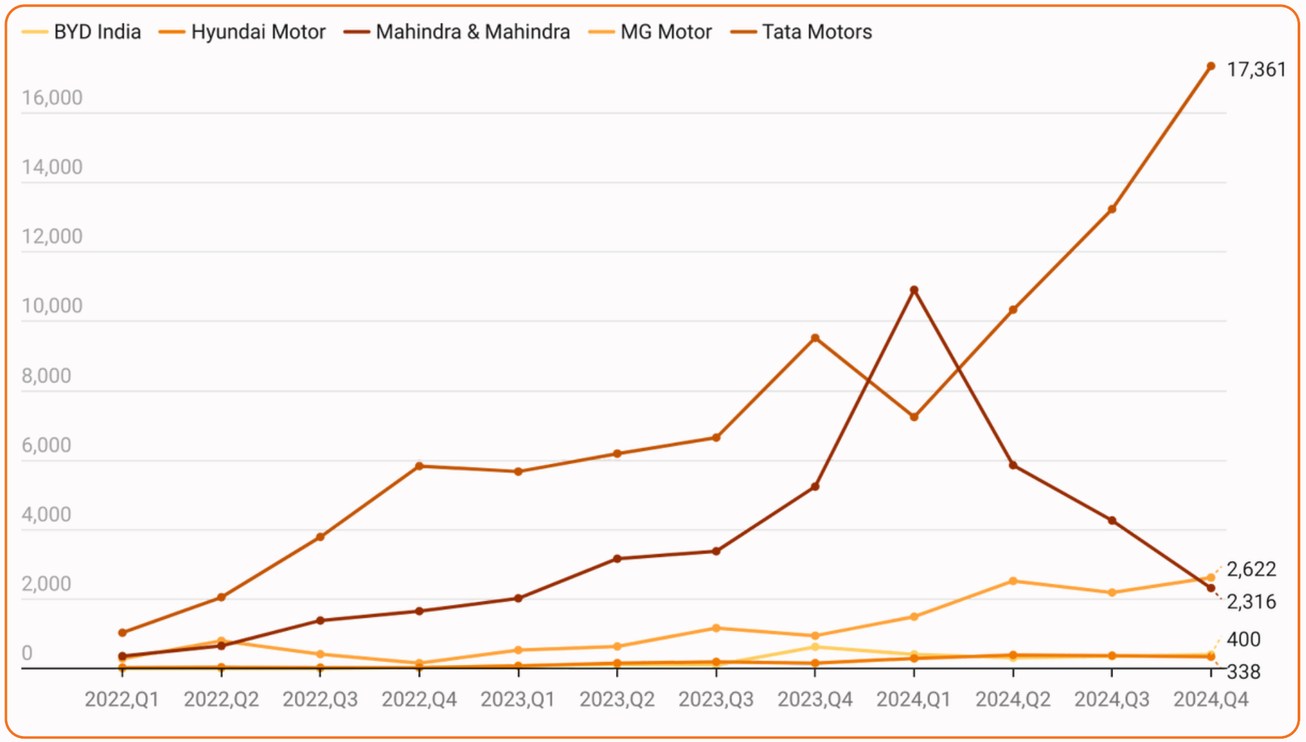
Andaman & Nicobar Islands was the only region which had a negative penetration in EV sales from 2022 to 2023, indicating more than 17% decline.

But 2024 shows several states with negative penetration in comparison to 2023, those are as follows:

state	Percentage Decline (%)
Gujarat	3.38%
Haryana	20.90%
Himachal Pradesh	10.80%
Jharkhand	8.45%
Rajasthan	9.87%
Uttarakhand	12.42%



04 Quarterly Trends Based on Sales Volume for the Top 5 EV Makers (4-wheelers) from 2022 to 2024.



Tata Motors leads the market in sales volume of 4-wheeler EVs. The launch of new models such as the Tata Nexon EV Max (May 2022), Tata Harrier EV (Auto Expo 2023), and Tata Punch EV (2023) has significantly boosted their sales.

Mahindra & Mahindra's sales have been steadily increasing, with a notable surge in Q1 of FY 2024. This consistent performance highlights their strong market presence and customer acceptance.

For other **manufacturers like Hyundai, MG Motor, and BYD India, sales have been gradually and consistently increasing**, indicating effective strategic planning and market expansion efforts.

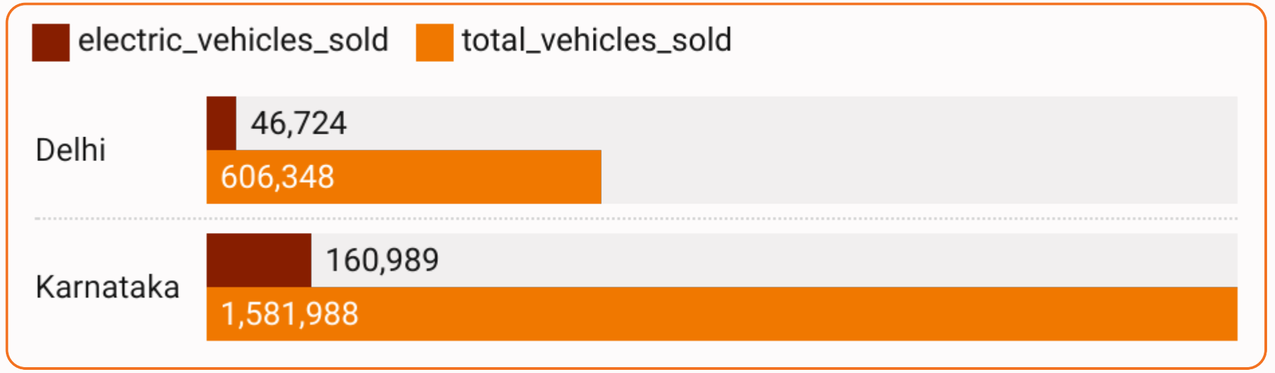
05 How do the EV sales and penetration rates in Delhi compare to Karnataka for 2024?

The **significant lead in both absolute sales numbers and penetration rate highlights Karnataka as a crucial market for EVs**.

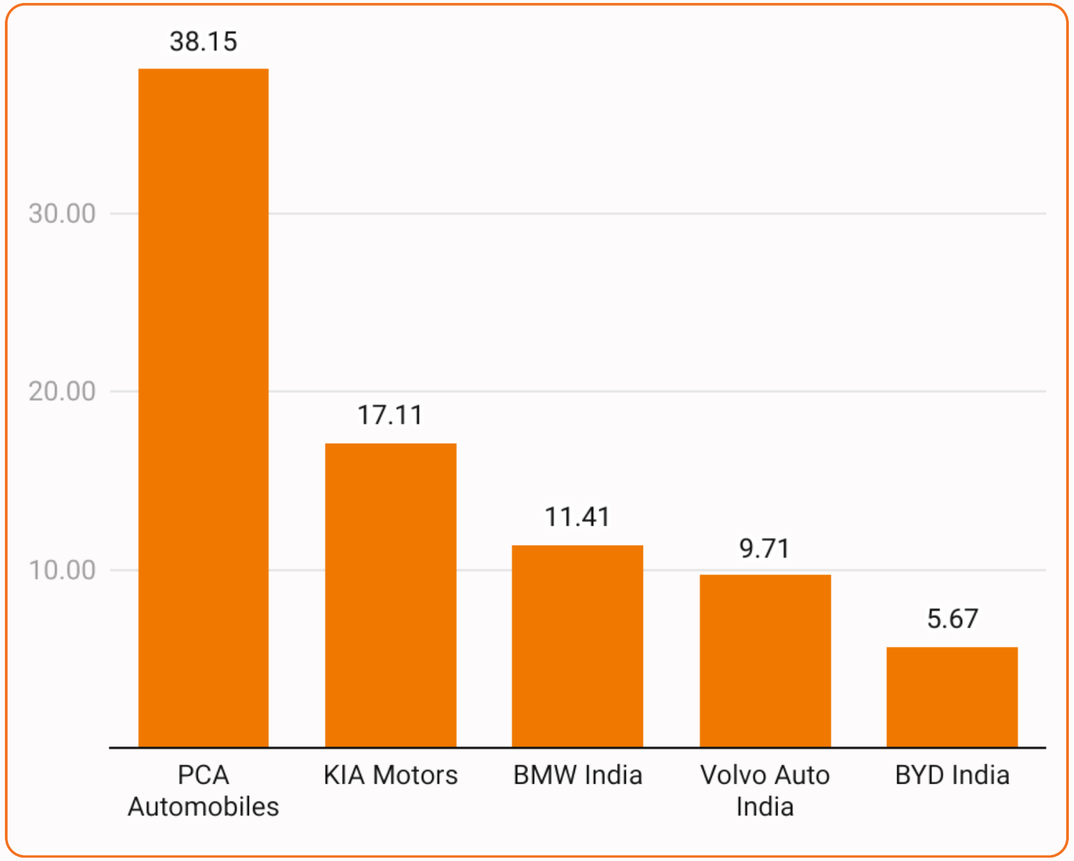
The state’s proactive stance on EV adoption, including favorable government policies, public-private partnerships, and investment in charging infrastructure, has likely contributed to these figures.

Despite having a lower penetration rate and fewer vehicles sold compared to Karnataka, Delhi still shows substantial sales numbers.

Enhancing infrastructure, providing more incentives, and increasing consumer awareness could help boost EV adoption in Delhi.



06 Compounded Annual Growth Rate (CAGR) in 4-wheeler units for the Top makers from 2022 to 2024

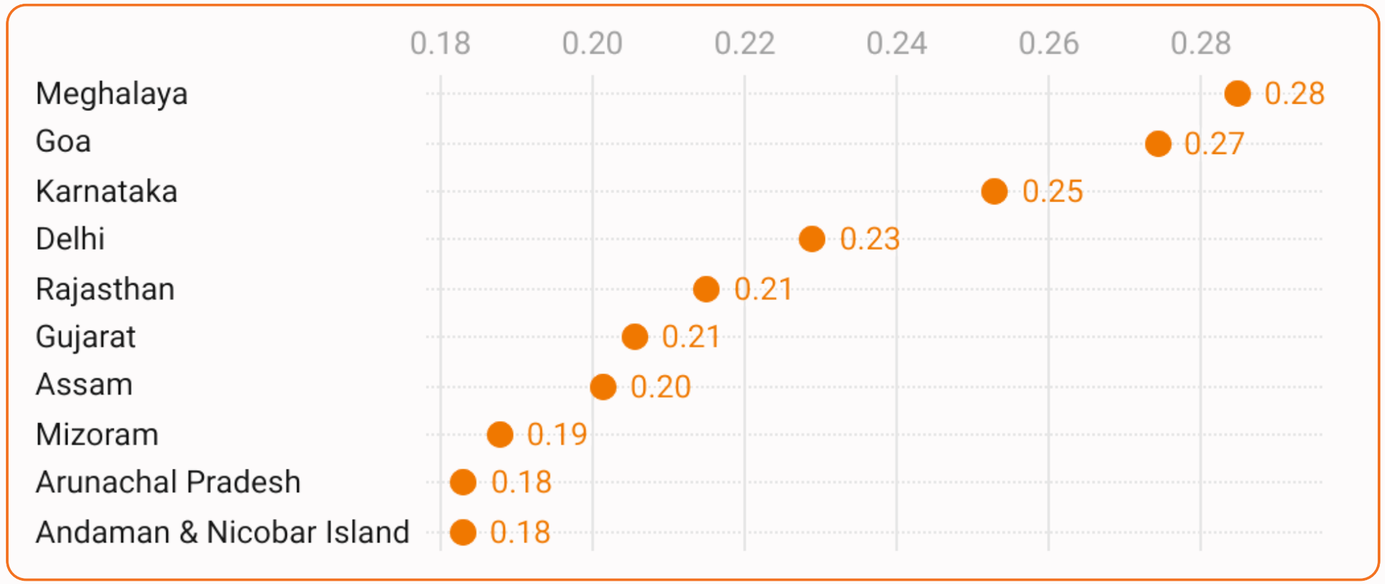


The top 5 makers with the highest CAGR are diverse in their offerings, ranging from mainstream to luxury vehicles. This diversity indicates that the Indian market is receptive to various types of 4-wheeler EVs, from affordable to high-end models.

maker	CAGR
PCA Automobiles	38.15
KIA Motors	17.11
BMW India	11.41
Volvo Auto India	9.71
BYD India	5.67

07 Top 10 States that had the Highest CAGR from 2022 to 2024 in Total Vehicles Sold.

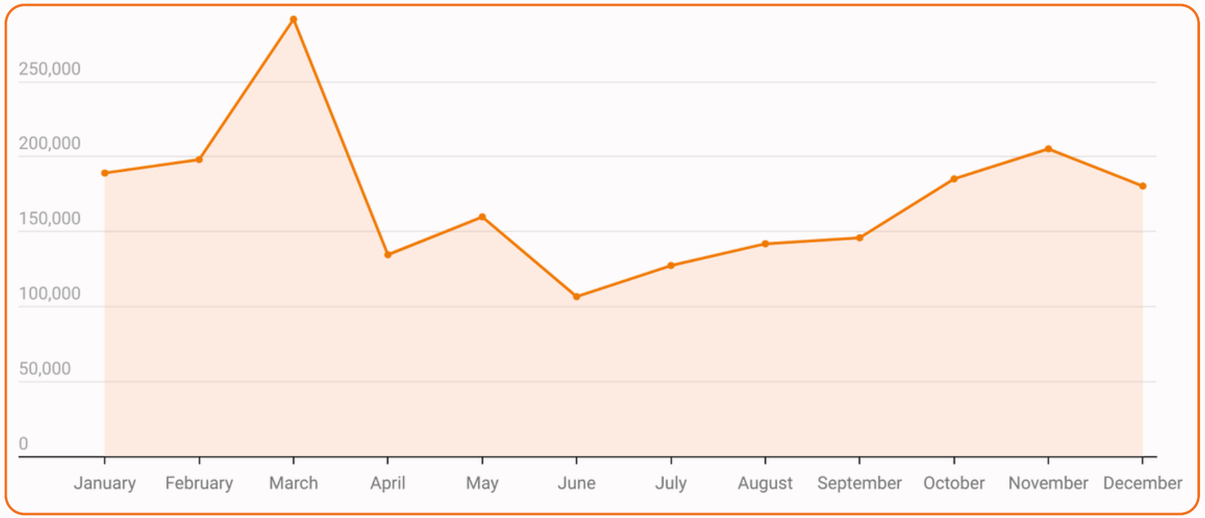
state	CAGR
Meghalaya	0.28
Goa	0.27
Karnataka	0.25
Delhi	0.23
Rajasthan	0.21
Gujarat	0.21
Assam	0.20
Mizoram	0.19
Arunachal Pradesh	0.18
Andaman & Nicobar Island	0.18



- **Many high-growth states are from less urbanized or northeastern regions**, indicating that these emerging markets are becoming increasingly significant for vehicle sales.
- States like **Delhi and Karnataka highlight urban centers with tech-savvy populations and strong policy support for EVs**.
- In contrast, states like Rajasthan and Assam showcase growth in both urban and rural areas, suggesting diverse market dynamics.

08 The Peak and Low Season Months for EV Sales based on the data from 2022 to 2024.

Q1,Q4 are the best performing quarters with March being the best performing month. and Q2,Q3 are the weak performing quarters with June being the weakest month.

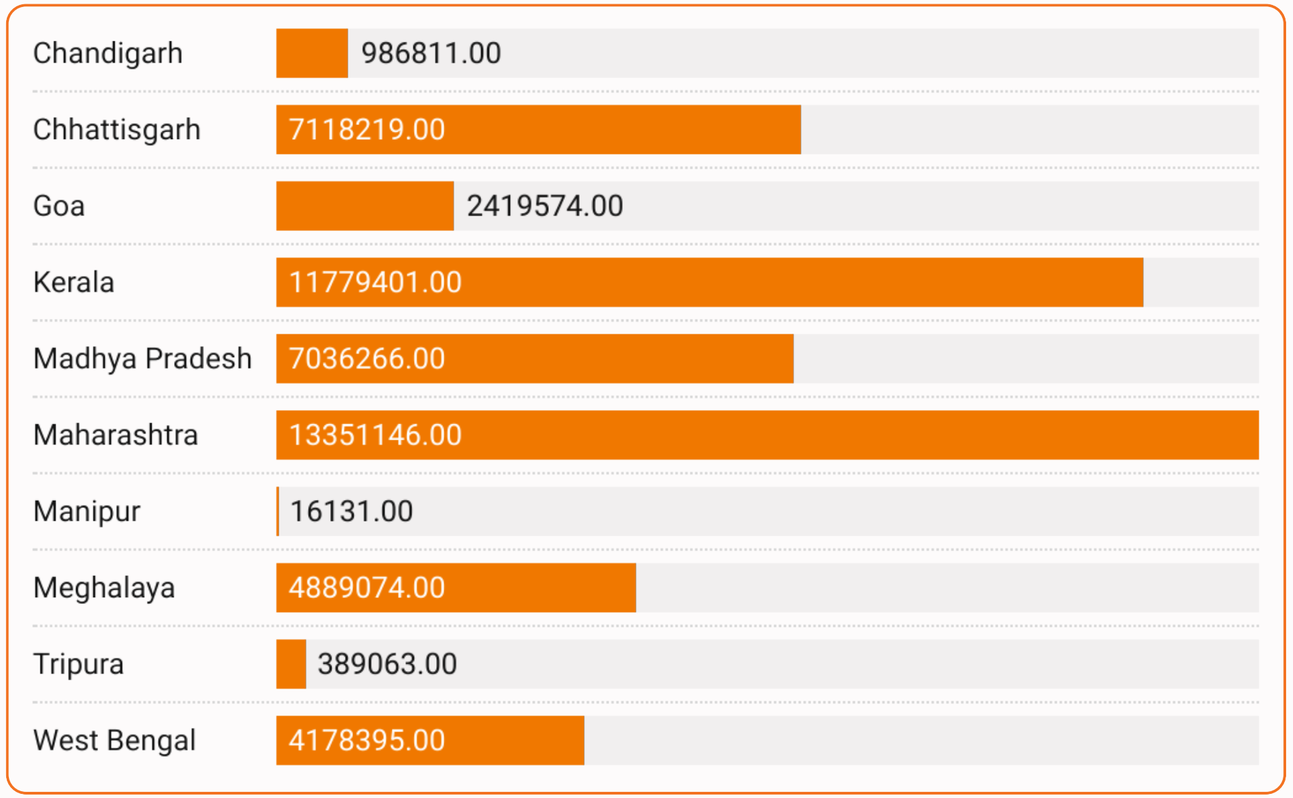


Reasons for Trends:

- **Festivals**: October/November and March/April surges in the sales denote the festival season in India, often associated with new purchases, including vehicles.
- **Financial Year-End**: The high sales in March could be driven by businesses and individuals making purchases to manage tax liabilities, claim depreciation benefits, or utilize year-end budgets.
- **Seasonal Factors**: Sales tend to dip in June due to the onset of the monsoon season, which can affect consumer mobility and spending patterns.
- **Pre-Summer Purchases**: Increased sales in February might be driven by consumers preparing for the summer months, opting for new vehicles before the heat peaks.

09 What is the Projected EV Sales for the Top 10 States by Penetration Rate in 2030 based on CAGR?

state	Projected Sales
Chandigarh	986,811
Chhattisgarh	7,118,219
Goa	2,419,574
Kerala	11,779,401
Madhya Pradesh	7,036,266
Maharashtra	13,351,146
Manipur	16,131
Meghalaya	4,889,074
Tripura	389,063
West Bengal	4,178,395



States like Maharashtra, Madhya Pradesh and Kerala show high potential, focusing on these markets along with collaborating on EV infrastructure development, offering range of EV models and marketing and partnerships will be very helpful in leveraging these projections.

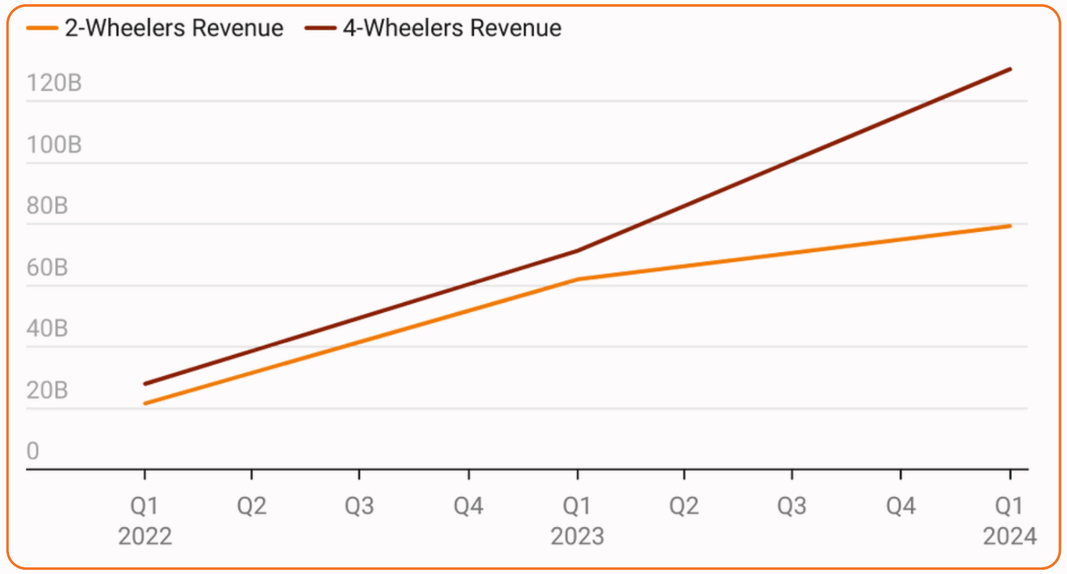
10 Revenue growth rate of EVs in India for 2022 vs 2024 and 2023 vs 2024

Revenue Growth Rate 2022-24

2-Wheelers	4-Wheelers
269.27 %	367.78 %

Revenue Growth Rate 2023-24

2-Wheelers	4-Wheelers
28.13 %	83.08 %



The substantial growth rate in both 2-wheelers and 4-wheelers revenue from 2022 to 2024 indicates a **booming market for EVs in India**. This growth reflects increased consumer adoption, likely driven by government incentives, rising fuel prices, and greater environmental awareness. The **4-wheelers segment shows a significantly higher revenue growth rate compared to the 2-wheelers segment from 2023 to 2024**. This suggests that the 4-wheelers market is rapidly expanding.

Primary Reasons for Customers Choosing 4-wheeler EVs in 2023 and 2024

Cost Savings

Lower Running Costs: EVs have significantly lower fuel costs compared to traditional combustion engine vehicles.
Maintenance Savings: EVs have fewer moving parts, leading to reduced maintenance expenses.
Long-term Financial Benefits: Lower operational costs over the vehicle's lifespan make EVs more economically attractive.

Environment Concerns

Reduction in Pollution: EVs produce zero tailpipe emissions, contributing to improved air quality.
Climate Change Mitigation: Using EVs helps reduce the carbon footprint, aligning with global and national efforts to combat climate change.
Sustainability: The adoption of EVs supports sustainable development goals and encourages the use of renewable energy sources.

Government Incentives

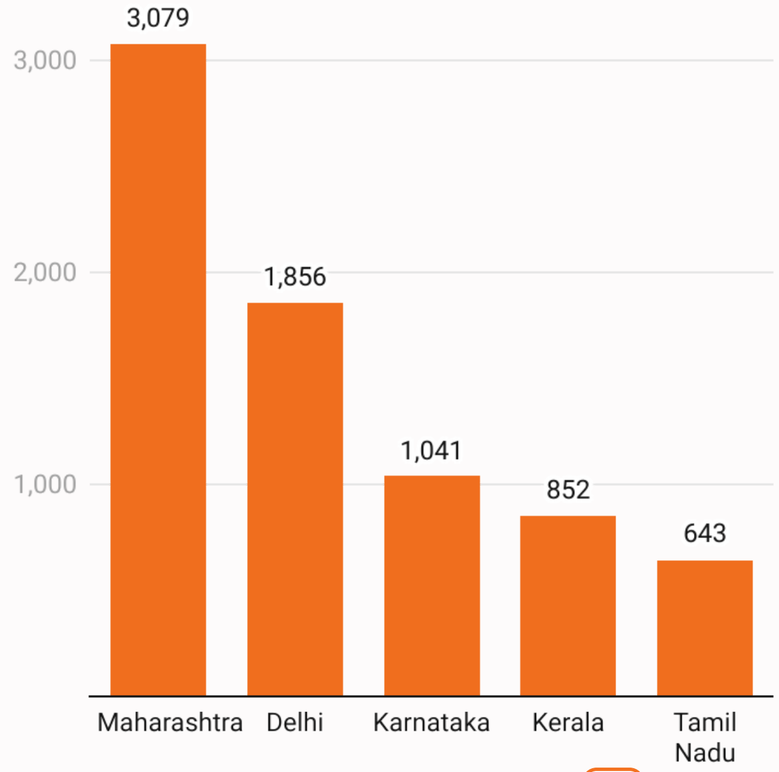
Subsidies and Tax Benefits: The Indian government offers various financial incentives, including subsidies and tax rebates, to promote the adoption of EVs.
Reduced Registration Fees: Lower or waived registration charges for EVs make them more financially appealing.
Charging Infrastructure Development: Government initiatives to enhance the EV charging infrastructure make the transition to EVs more convenient for consumers.

Do charging stations infrastructure corelate with EV Sales and Penetrations Rate?

- If we examine the top five states by the total number of charging stations, **states like Maharashtra, Delhi, Karnataka, and Kerala also rank highly in terms of total EV sales and penetration rates** compared to other states.

- As of February 2024, **India has a total of 12,146 charging stations**, with the majority located in these five states. Maharashtra alone, with 3,076 charging stations, accounts for approximately 25% of the total.

- States with **robust charging infrastructure contribute to higher EV sales** and better penetration rates because a well-distributed network of charging stations **reduces range anxiety, encourages consumer confidence**, and makes EV ownership more practical. Additionally, these states often have supportive government policies, incentives, and urban planning that prioritize EV adoption.



Which Indian States are ideal to start a EV Manufacturing Units ?

- **Maharashtra**: The state has implemented a robust **Electric Vehicle Policy (2021)** that offers significant financial incentives, including **subsidies on capital investment and reductions in electricity tariffs specifically for EV manufacturers**. As of 2024, Maharashtra has set aside ₹930 crores for the development of EV infrastructure, including manufacturing units. The state is also committed to **providing land at concessional rates, with additional subsidies for battery manufacturing and R&D activities**. Maharashtra's ease of doing business is supported by a comprehensive **single-window clearance system** that streamlines the process.

- **Tamil Nadu**: The state provides an array of financial incentives under its **Electric Vehicle Policy (2019)**, which includes **capital subsidies up to 15%, a 50% subsidy on land costs**, and a **full reimbursement of stamp duty** on land registration. Tamil Nadu's **strategic location, with its well-developed port infrastructure**, makes it particularly advantageous for companies looking to export EV components or vehicles.

- **Karnataka**: Karnataka is a pioneering state in the EV sector, being the first in India to roll out a comprehensive EV policy back in 2017. The policy offers various incentives, including a **15-20% capital subsidy, concessions on land acquisition, and tax exemptions for up to ten years**. Additionally, the state **supports R&D activities through grants and by promoting public-private partnerships**. Karnataka's capital, Bengaluru, is providing access to a **tech-savvy workforce and a thriving startup ecosystem**.

Recommendations

Target High-Performing States for Initial Launch: Focus on Maharashtra, Karnataka, Tamil Nadu, Gujarat, and Rajasthan, as these states exhibit the highest EV sales and penetration rates. These regions not only have a strong existing market but also benefit from robust infrastructure and supportive government policies.

Align with States Showing High Penetration and Projected Growth: Prioritize States like Goa, Karnataka, Delhi, Kerala, and Maharashtra, which have the highest EV penetration rates (ranging from 6.5% to 9.8%). These states are not only current leaders but are also projected to remain top performers by 2030.

Capitalize on Seasonal Sales Trends: Plan Major Launches and Promotions in Q1 and Q4, particularly around March and October/November, to coincide with peak sales periods driven by festivals and fiscal year-end purchases.

Mitigate Seasonal Dips: Develop strategies to address lower sales in Q2 and Q3, such as introducing special offers or enhancing marketing efforts during the monsoon-affected months like June.

Enhance Infrastructure in High-Traffic Areas: Strengthen charging infrastructure and support services in these high-sales states to further boost EV adoption.

Recommendations

Analyze Market Share Leaders: In the two-wheeler segment, companies like Ola, TVS, and Ather dominate, while Tata Motors leads in the four-wheeler market. Identify niches or underserved segments where your products can offer unique value propositions.

Innovate in Product Offerings: Develop vehicles that cater to specific consumer needs or preferences that are not fully addressed by existing market leaders.

Leverage Government Subsidies and Incentives: Take full advantage of state-specific subsidies, tax exemptions, and incentives for EV manufacturing and infrastructure development. For instance, Maharashtra offers land at concessional rates and subsidies for battery manufacturing.

Address Range Anxiety: Expand charging infrastructure in targeted states to alleviate consumer concerns about vehicle range and charging accessibility.

Promote Reliability and After-Sales Service: Establish strong after-sales support networks to enhance customer satisfaction and build long-term brand loyalty.

Summary

Market Overview	Indian EV market is rapidly growing, with significant regional disparities in EV adoption. High sales concentration in states like Maharashtra, Karnataka, and Tamil Nadu.
Manufacturer Analysis	Few manufacturers dominate with high sales; others struggle with minimal market presence. Notable growth observed in leading manufacturers' sales from FY2022 to FY2024.
Regional Insights	States with higher vehicle sales correlate strongly with higher EV adoption. Certain states consistently outperform others in EV sales, driven by infrastructure and economic factors.
Market Concentration	2-Wheelers: Ola Electric leads; competitive landscape with a few dominant players. 4-Wheelers: Tata Motors and Mahindra & Mahindra dominate; new entrants must innovate or focus on niche markets.

Limitations

The **analysis is based on only three years of data**, which may not capture long-term trends and market shifts.

It **focuses heavily on EV sales**; a more comprehensive market understanding would **require deeper customer analysis, product comparison, and overall market dynamics**.

Key factors such as **model pricing, vehicle features, range, after-sales service, and manufacturers' presence in different states were not considered** in this study.

Important customer-related factors like **service ratings, financial background, vehicle usage patterns, and specific use cases of EVs were not factored** into the analysis.

Geopolitical or regulatory factors (like subsidies, changing regulations) that can influence the EV market weren’t addressed.

Environmental impact analysis, such as how local factors like infrastructure or charging station distribution, affect EV adoption rates, was not part of this project.

Appendix

- GitHub Repository (Link)
- Dataset (Link)
- Data Analysis - python(.ipynb) file (Link)
- Power BI Dashboard (Link)
- Analysis Report (Link)
- Representation Video (Link)

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THANK YOU

For Your Time...

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