

Maheswari Public School

INFORMATIC PRACTICES

***PROJECT FILE SESSION 2023-24***

ACKNOWLEGEMENT

I would like to express my gratitude towards my Information Practices teacher MRS MANISHA NARUKA for her valuable guidance and nonstop support during this project. As well as, I am grateful to our principal SMT. RITA P. TANEJA for providing me with the beautiful opportunity to work on this Project. I would also like to thank my parents and friends for encouraging me during the course of this project. Finally, I would like to thank the CBSE board for giving me this great opportunity to do this project

CERTIFICATE

This is to certify that Aryan Khandelwal, student of class 12thA2 has successfully completed the research on the project “Trend of electric vehicle in India using Data Visualization” under the guidance of MRS MANISHA NARUKA during the year 2024-25. The certified student has been dedicated throughout her research and completed her work before the given deadline without missing any important details from the project. It is also certified that this project is the individual work of the student and can be submitted for evaluation.

Teacher’s Signature.

Principal Signature.

External Examiner:

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| iNTRODUCTION TO PYTHON | wHAT IS PYTHON  Python is a popular programming language. It was created by Guido van Rossum, and released in 1991. It is  used for:   * **web development (server-side)** * **software development,** * **mathematics,** * **system scripting. shyam khandelwal** |

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| what python can do | 1. Python can be used on a server to create 2. web applications. 3. Python can be used alongside software to create workflows. 4. Python can connect to database systems. It can also read and modify files. 5. Python can be used to handle big data and perform 6. complex mathematics. Python can be used for rapid prototyping, or for production-ready software development. |

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| Why python | Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc).    Python has a simple syntax similar to the English language.  Python has syntax that allows developers to write programs with fewer lines than some other programming languages.  Python runs on an interpreter system, meaning that code can be executed as soon as it is written. This means that prototyping can be very quick.  Python can be treated in a procedural way, an object-oriented way or a functional way. |

***Objective***

**the quote speaks, Data visualization helps to derive information insights from data sources in a better way.**

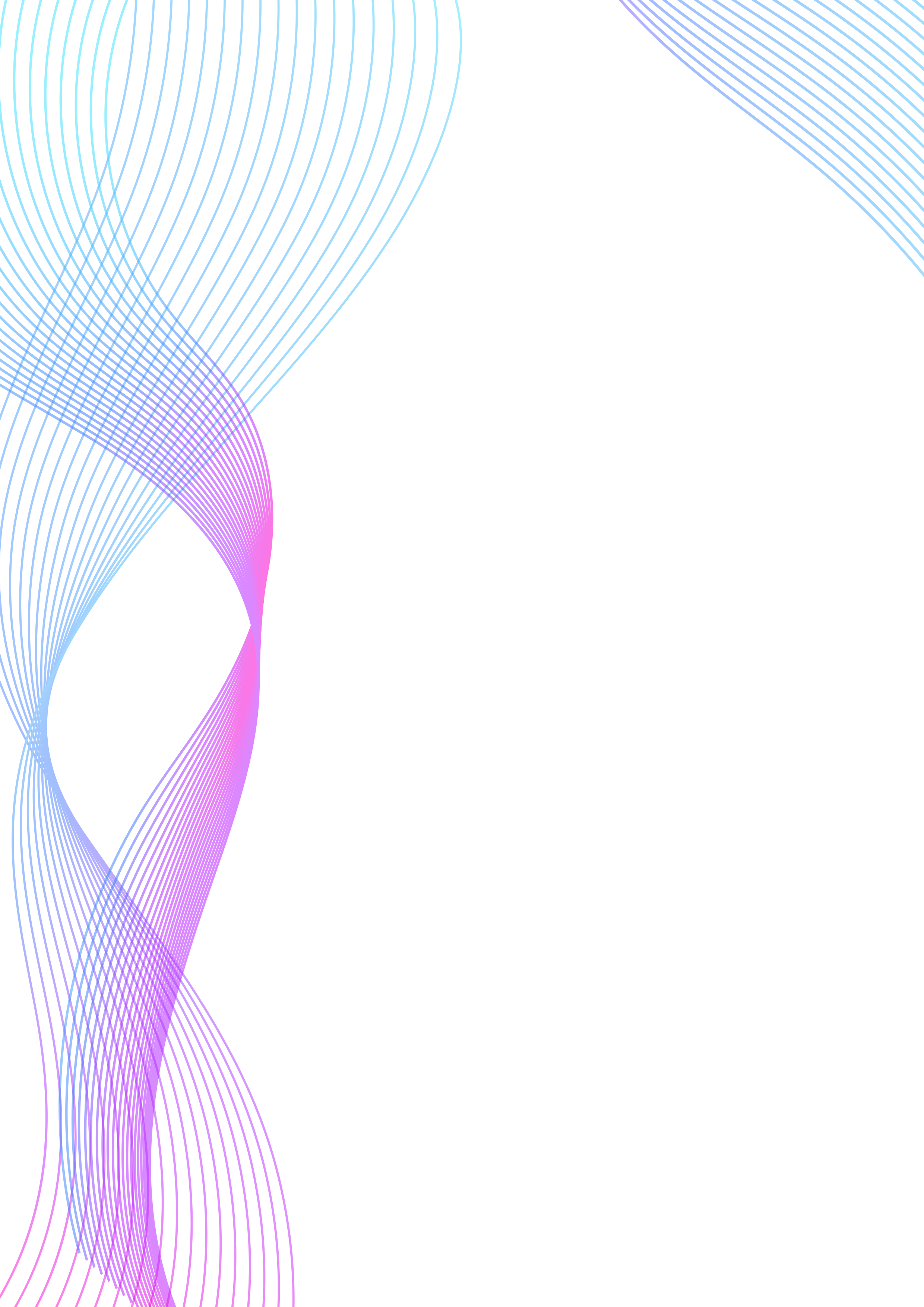
**SO, through this, I want to display Trend and sales report of electric vechile in india for last 4 year report [2020-23]**

“**EVERY PICTURE TELL STORY** “



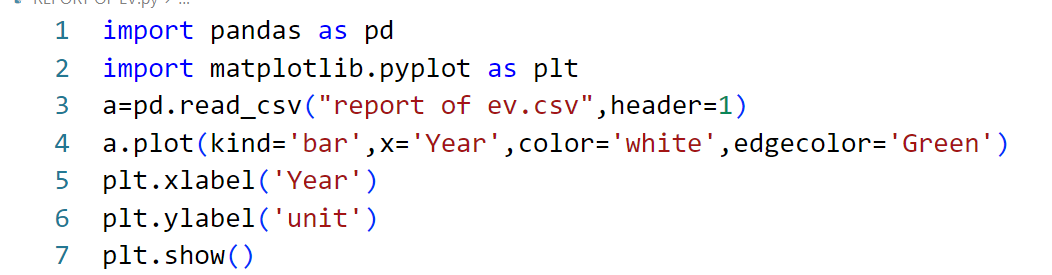
The Trend of Electric Vehicles in India

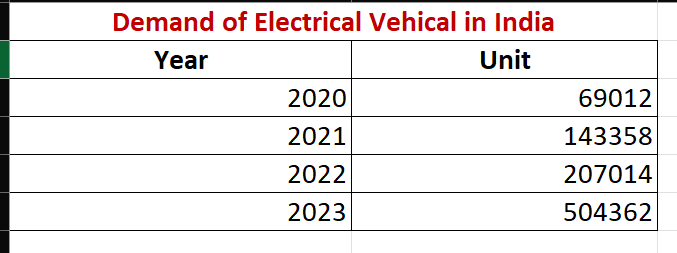
Analysis



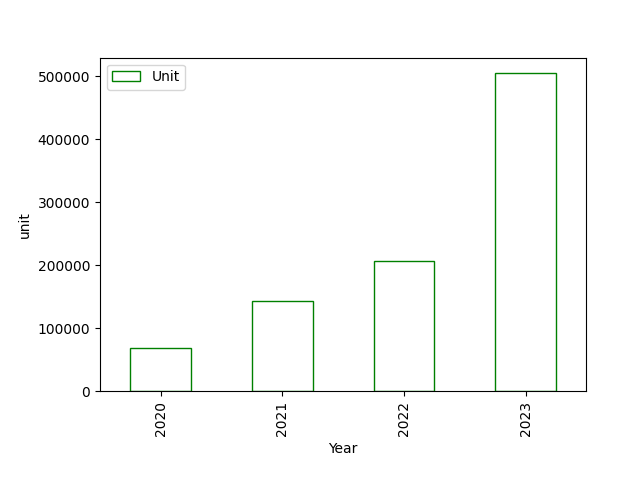
Demand of electrical vehical in india

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**Analysis**

The provided data shows the demand for electric vehicles (EVs) in India over a span of four years:

- In 2020, the demand for electric vehicles in India was 69,012 units.

- This demand surged in 2021, reaching 143,358 units, indicating a significant increase.

- By 2022, the demand further rose to 207,014 units, continuing the upward trend.

- In 2023, there was a substantial leap in demand, skyrocketing to 504,362 units.

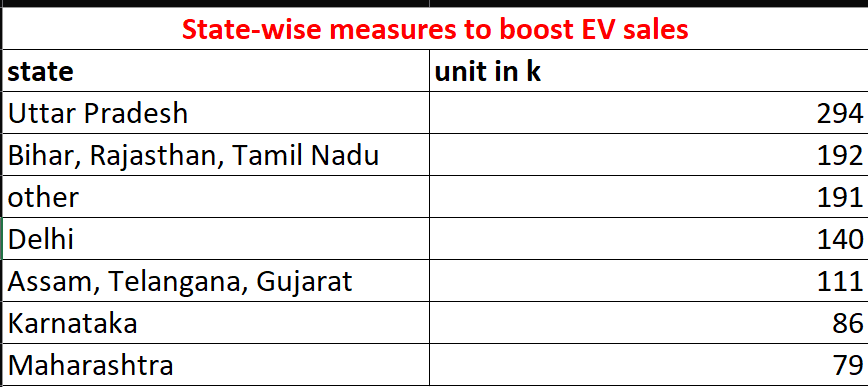
This data suggests a remarkable growth in the adoption of electric vehicles in India over the specified period. Factors contributing to this increase could include governmental incentives, growing awareness of environmental concerns, advancements in EV technology, and the expansion of EV infrastructure across the country.

Demand of electrical vehical in india

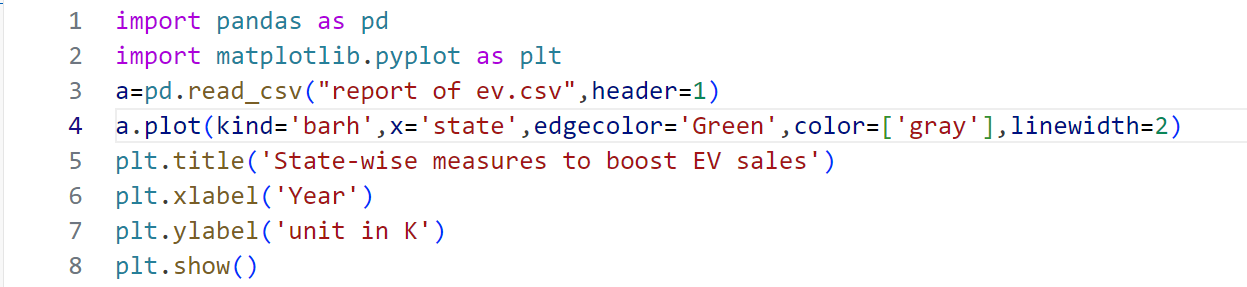
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State-wise measures to boost EV sales

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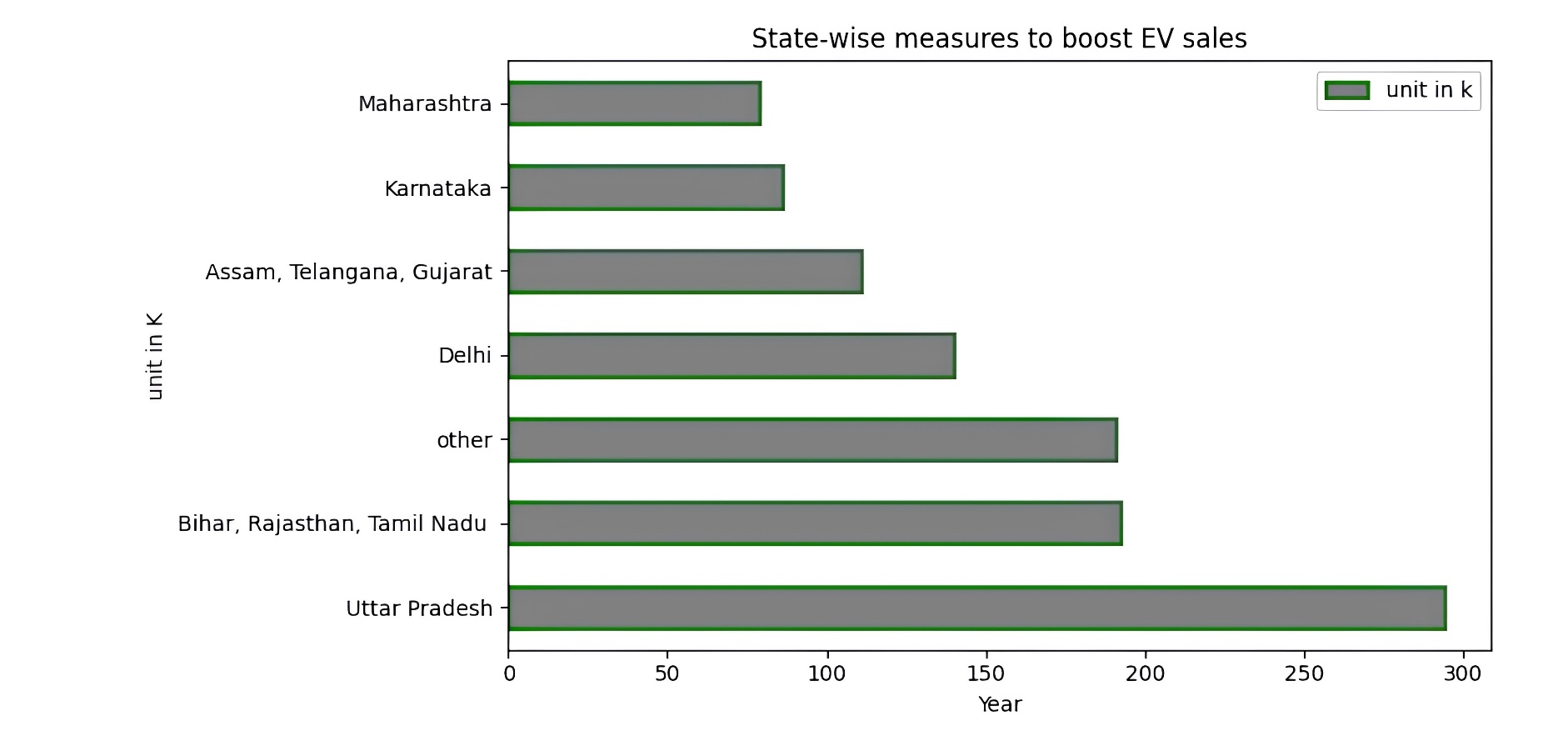
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**OUTPUT**

**Analysis**



The data indicates varying levels of electric vehicle (EV) sales across different Indian states:

- **Uttar Pradesh** leads with 294k units, likely due to government incentives and rising environmental awareness.

- **Bihar, Rajasthan, and Tamil Nadu** follow closely with 192k units, showing a collective interest in EV adoption.

- **Other states** collectively contribute 191k units, suggesting scattered but significant interest nationwide.

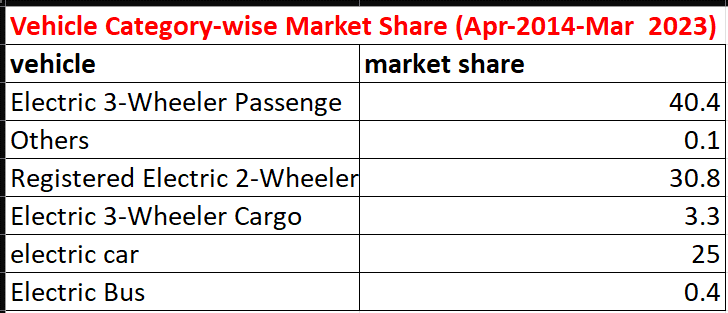
- **Delhi's** 140k units indicate moderate adoption despite pollution concerns.

- **Assam, Telangana, and Gujarat** show moderate interest with 111k units.

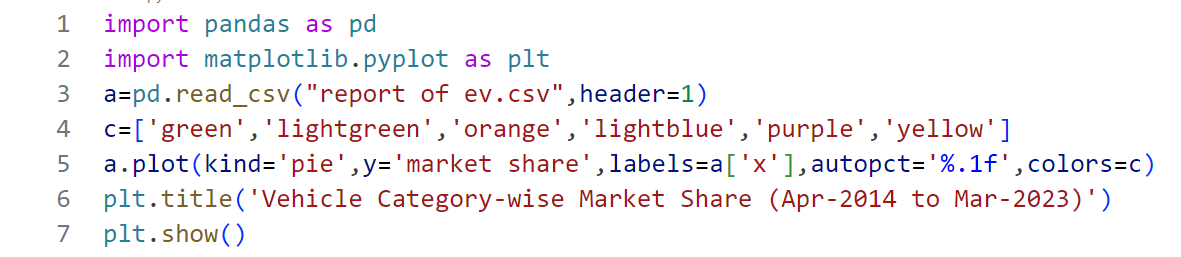
- **Karnataka, Maharashtra, and other st**ates exhibit varying levels of interest, highlighting opportunities for targeted strategies to boost EV sales nationwide.

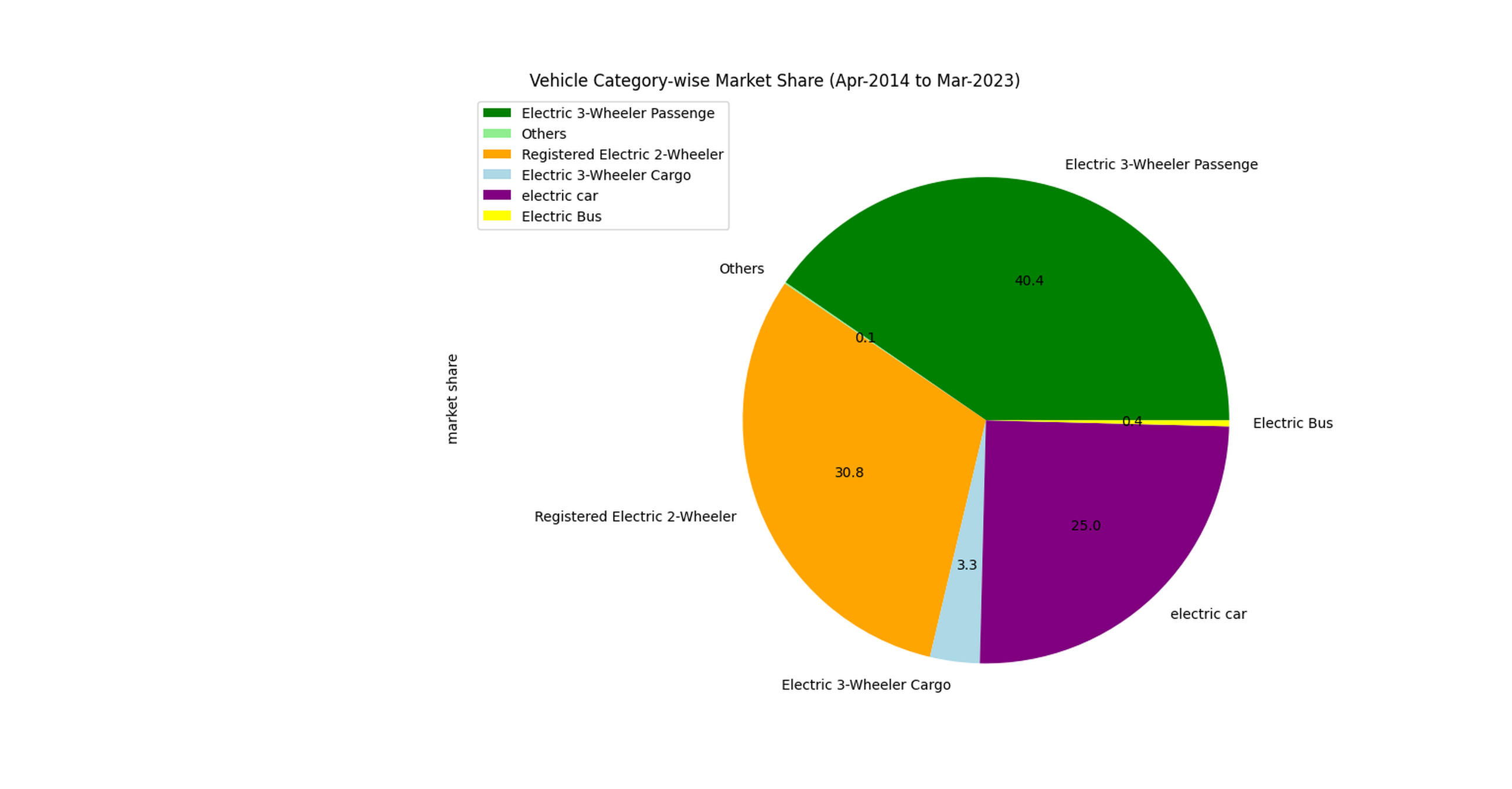
Vehicle Category-wise Market Share (Apr-2014-Mar2023)

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**OUTPUT**

**Analysis**

The data from April 2014 to March 2023 shows:

1. **Electric 3-Wheelers Lead**: They hold the largest share (40.4%), preferred for short urban commutes.

2. **Rise of Electric 2-Wheelers**: They account for 30.8%, indicating growing acceptance, driven by fuel prices and incentives.

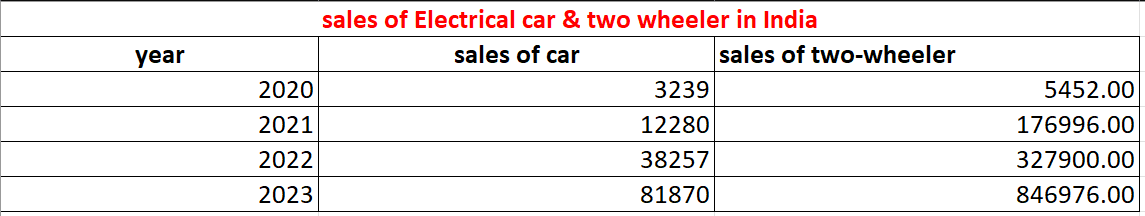
3. **Electric Cars on the Horizon**: With a 25% share, they show promise despite being smaller compared to traditional vehicles.

4. **Challenges for Buses and Cargo 3-Wheelers** Their shares are low (0.4% and 3.3% respectively), likely due to infrastructure and cost issues.

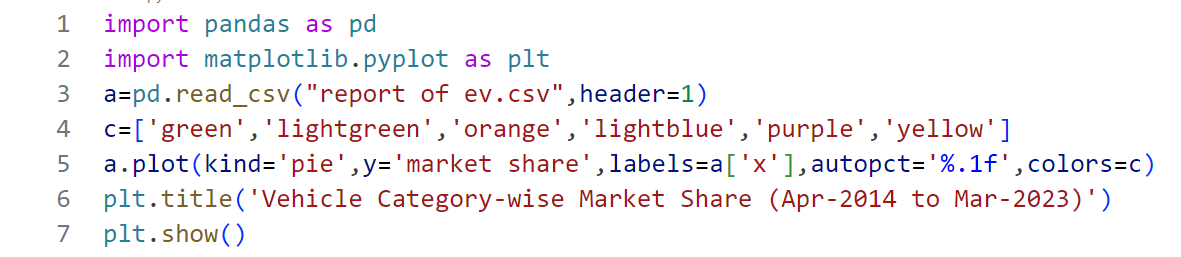
5. **Niche Market for Others**: Including bikes and specialty vehicles, they contribute only 0.1%.

Vehicle Category-wise Market Share (Apr-2014-Mar2023)

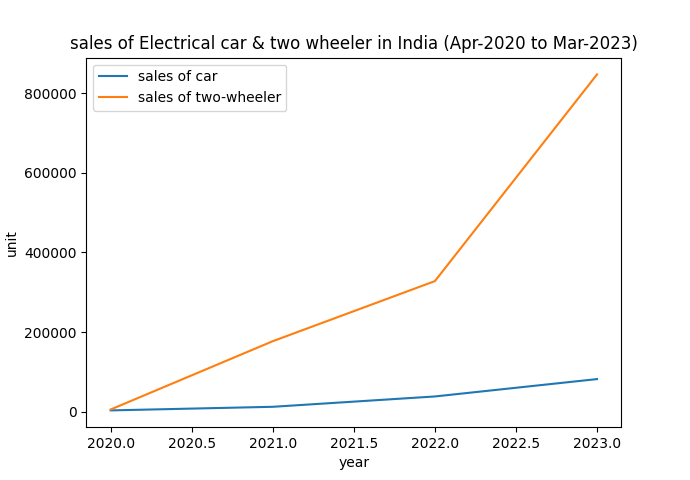
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**Analysis**

In just a few years, electric cars and two-wheelers have become more popular in India. In 2020, only a few thousand electric cars were sold, along with about 55,000 electric two-wheelers. But by 2023, these numbers had skyrocketed. Over 81,000 electric cars and nearly 847,000 electric two-wheelers were sold. This big jump shows that more people are choosing electric vehicles.

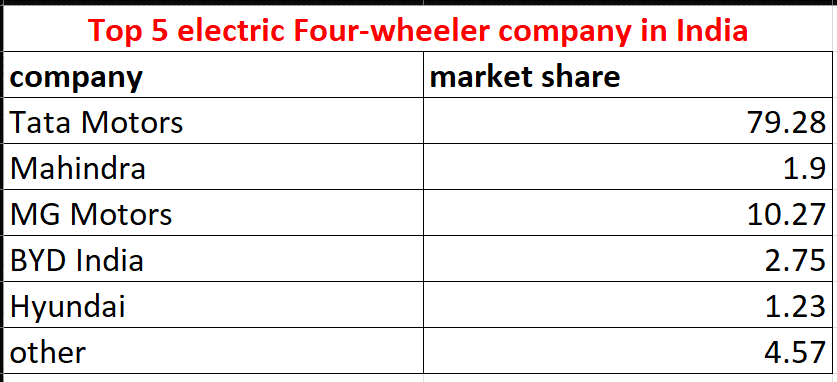
The reasons for this increase are clear. People are worried about pollution and want cleaner ways to travel. Also, the government is supporting electric vehicles with incentives and policies.

But there are still challenges. More charging stations are needed, and electric vehicles need to become cheaper. People also worry about how far they can travel on a single charge.

In short, while electric vehicle sales in India have grown a lot, there's still work to do to make them even more popular.

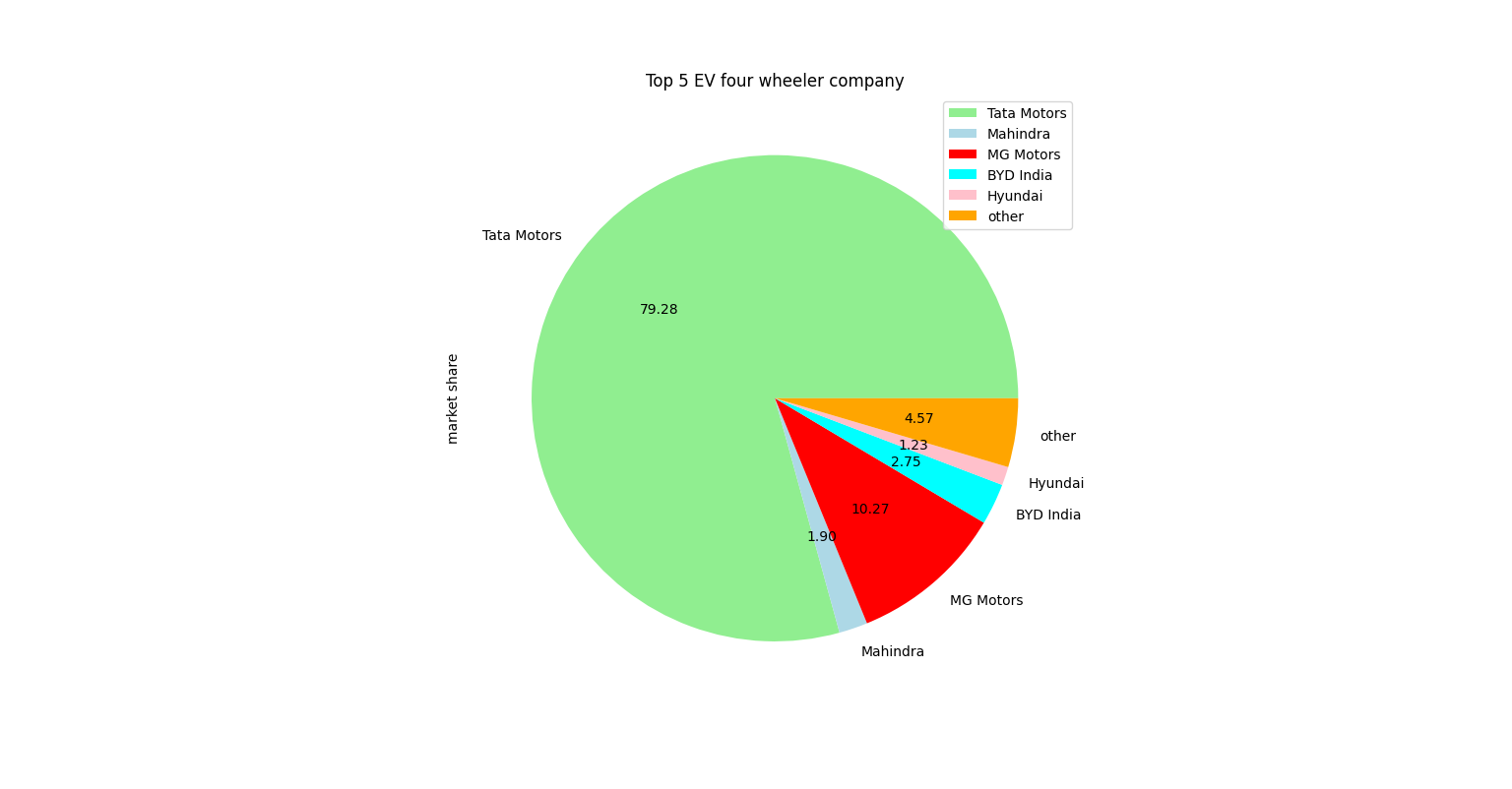
Vehicle Category-wise Market Share (Apr-2014-Mar2023)

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**Analysis**

1. **Tata Motors**: Leading with a 79.28% market share, Tata Motors dominates the Indian electric four-wheeler market. Their strong presence and early entry into the EV space with models like the Nexon EV and Tigor EV have been well-received.

2. **MG Motors**: Holding a 10.27% market share, MG Motors is a distant second. Despite being new to the Indian market, their models such as the MG ZS EV and MG Hector EV have quickly gained popularity.

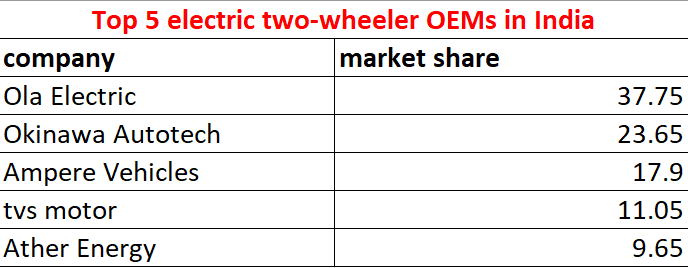
3. **BYD India**: With a 2.75% market share, BYD India is growing but still behind the top two. Their models, including the BYD e1 and BYD e2, are gaining traction.

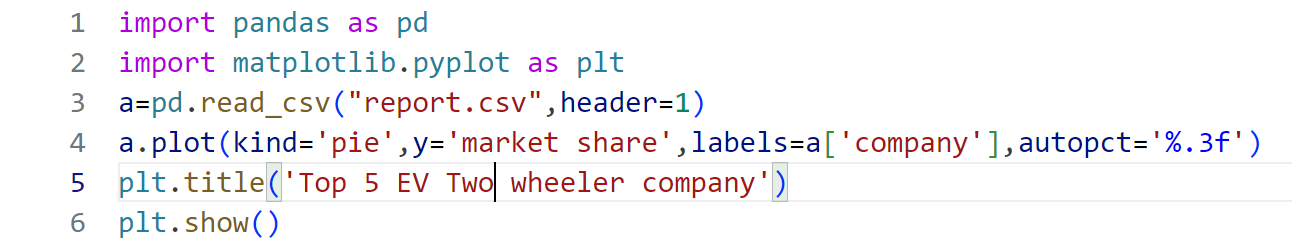
4. **Hyundai**: At a 1.23% market share, Hyundai is expanding its EV range with the Hyundai Kona Electric and Hyundai Ioniq Electric but remains behind in market share.

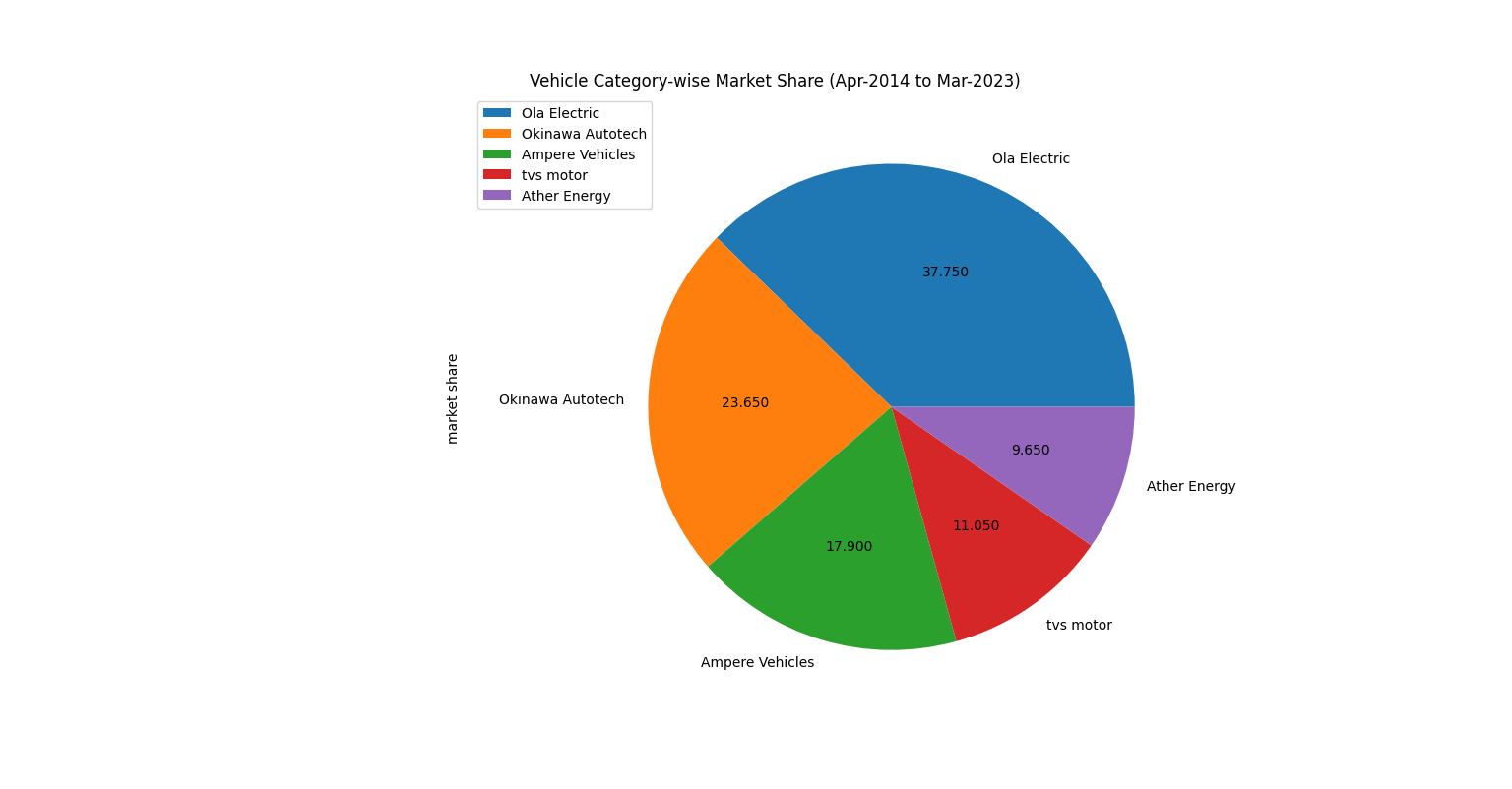
5. **Mahindra**: With a 1.9% market share, Mahindra, despite being an early mover with models like the Mahindra e-Verito and e-Supro, is struggling to keep pace with the top competitors.

Vehicle Category-wise Market Share (Apr-2014-Mar2023)

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Top 5 EV three- wheeler company

**Analysis**

The data reveals that Ola Electric is the clear market leader in the Indian electric two-wheeler market, with a staggering 75.5% market share. This is not surprising, given that Ola Electric is a subsidiary of Ola, one of the largest ride-hailing companies in India, which has a strong presence in the country.

**Okinawa Autotech** is the second-largest player in the market, with a 47.3% market share. The company has been a pioneer in the development of electric two-wheelers in India and has a wide range of products, including the Okinawa Praise and Okinawa Ridge.

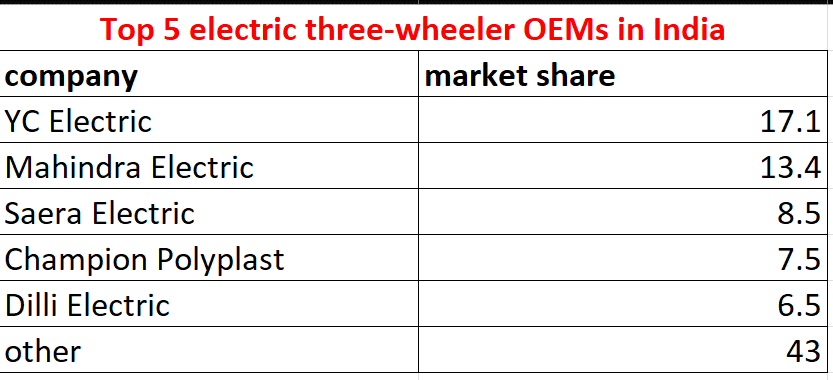
**Ampere Vehicles** is another significant player in the market, with a 37.8% market share. The company has been focused on developing affordable and accessible electric two-wheelers, and has launched several popular models, including the Ampere Reo and Ampere V48.

**Tvs Motor** is the fourth-largest player in the market, with a 22.1% market share. The company has been investing heavily in electric two-wheeler technology and has launched several new models in recent years.

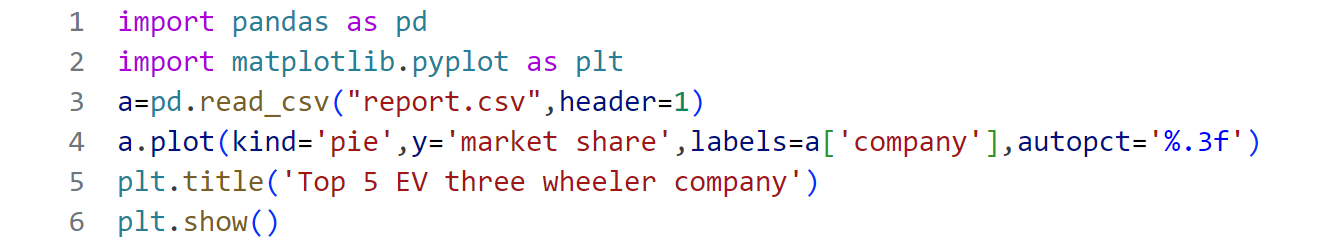
**Ather Energy** is the fifth-largest player in the market, with a 19.3% market share. The company has been gaining popularity in recent years, thanks to its innovative products, including the Ather 450 and Ather 340.

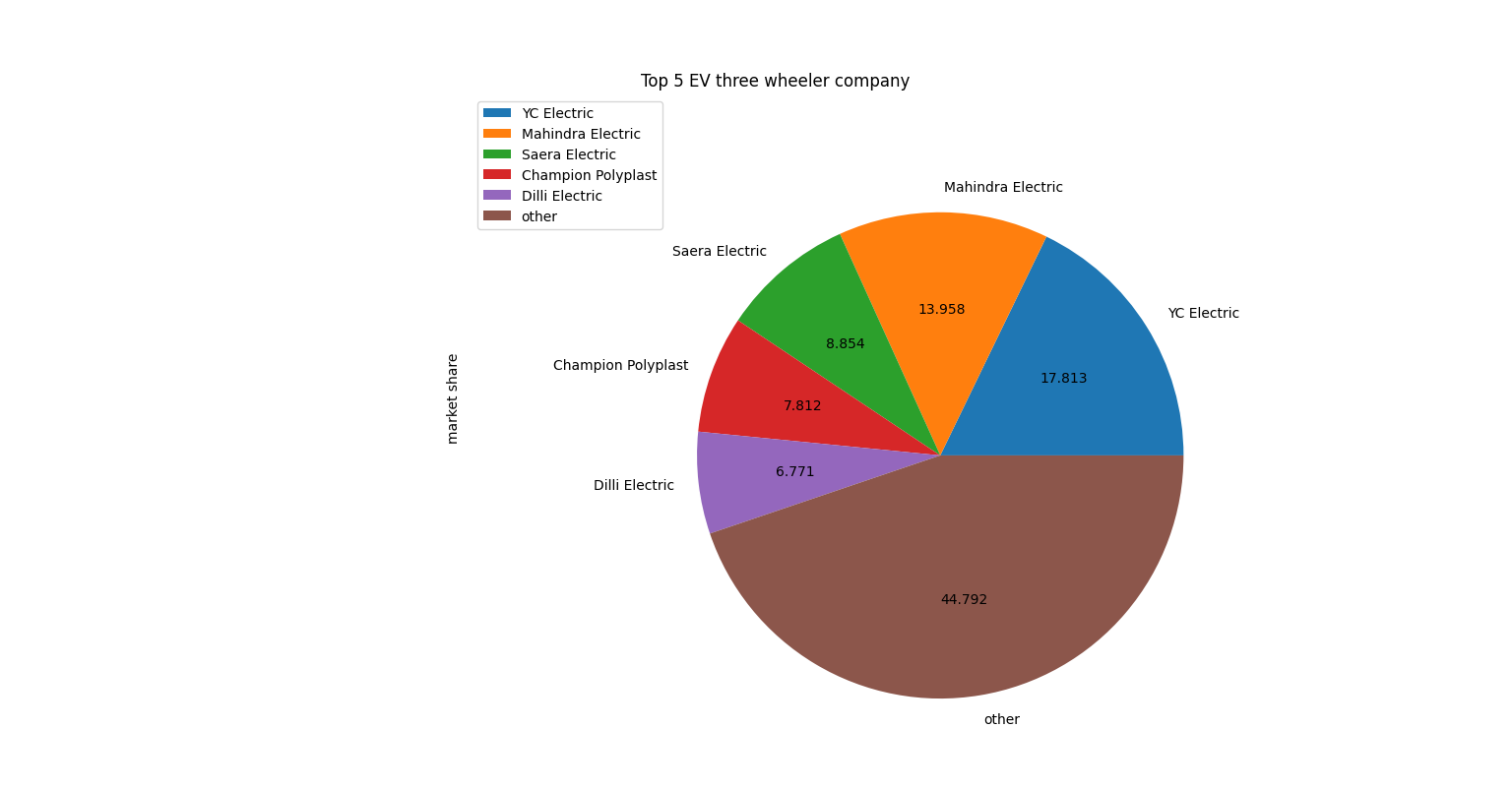
Vehicle Category-wise Market Share (Apr-2014-Mar2023)

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**OUTPUT**

Top 5 EV three- wheeler company

These five OEMs dominate the Indian electric three-wheeler market, accounting for a combined market share of around 42.5%. The remaining 43% of the market is shared by other OEMs and smaller players.

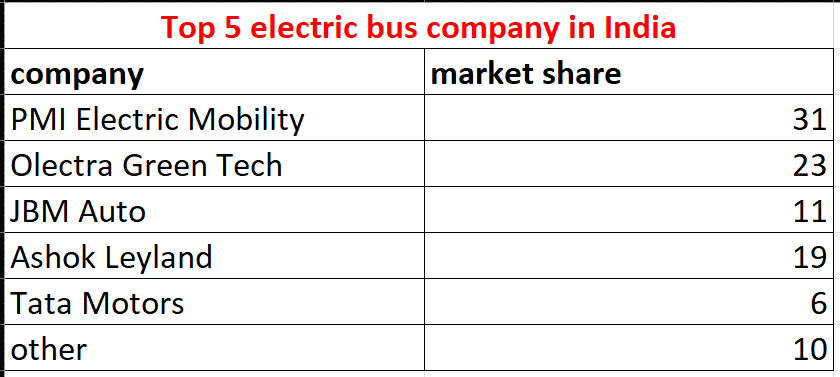
The dominance of these five OEMs can be attributed to their strong brand presence, extensive dealership networks, and wide range of products catering to different customer segments. They have also invested heavily in research and development, manufacturing, and marketing to stay competitive in the market.

In conclusion, the Indian electric three-wheeler market is dominated by a few prominent OEMs, with YC Electric leading the pack. The competition is intense, and smaller players will need to innovate and adapt to remain relevant in the market. As the demand for electric vehicles continues to grow, it will be interesting to see how these OEMs evolve and respond to changing customer needs and regulatory requirements.

**Analysis**

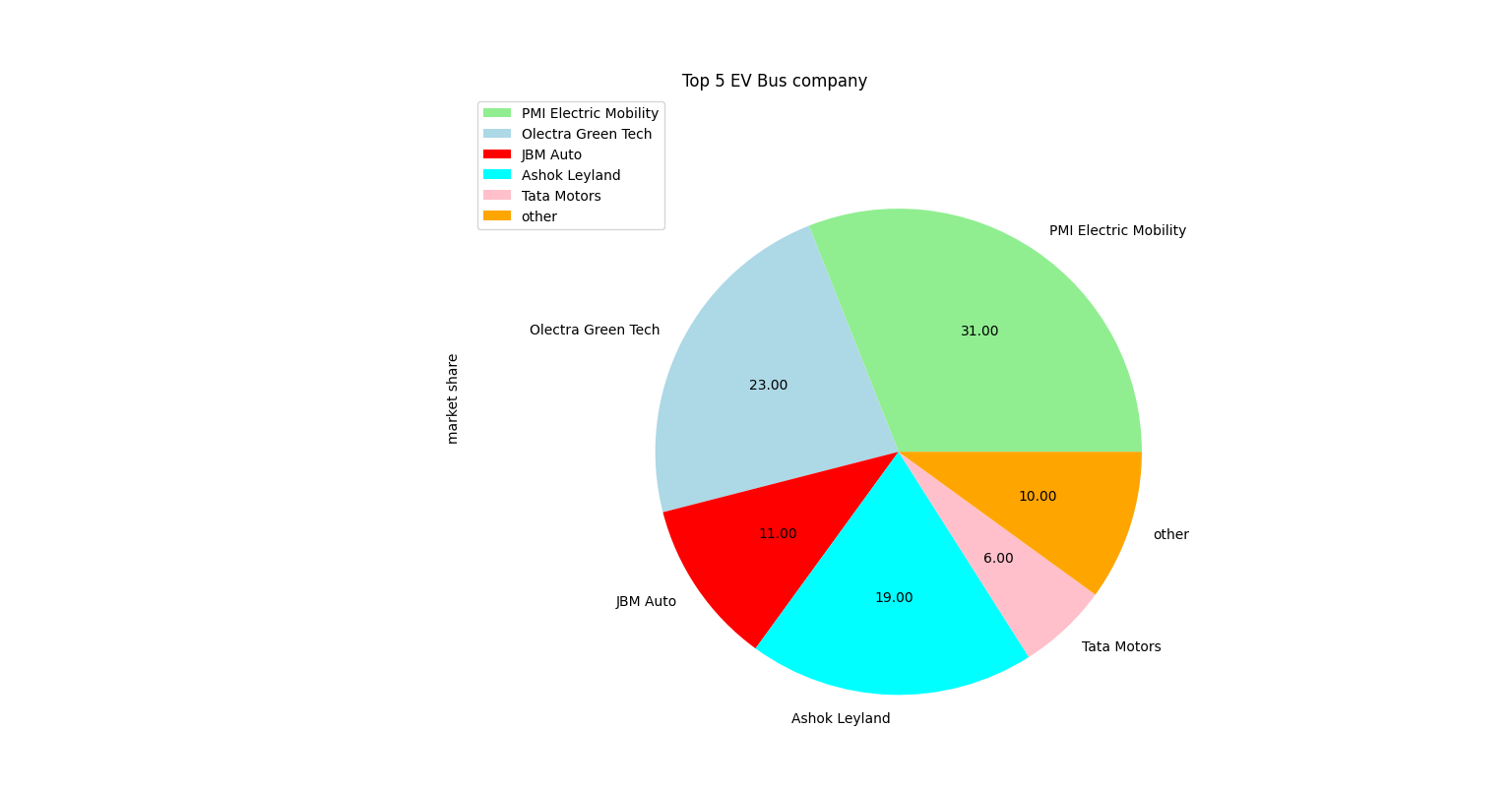
Vehicle Category-wise Market Share (Apr-2014-Mar2023)

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**OUTPUT**

**Analysis**

1. **PMI Electric Mobility**: Leading with a 31% market share, PMI Electric Mobility dominates due to its specialized focus on electric buses and a diverse product range, including the PMI Star and PMI Eagle.

2. **Olectra Green:** TechHolding a 23% market share, Olectra Green Tech is a pioneer in India's electric bus development, known for popular models like the Olectra STAR and Olectra PRO.

3. **JBM Auto**: With an 11% market share, JBM Auto is a smaller but rapidly advancing player, having introduced several new electric bus models in recent years.

4. **Ashok Leyland**: Commanding 19% of the market, Ashok Leyland has been expanding its electric bus lineup, featuring models such as the Ashok Leyland e-Bus and EcoLife.

5. **Tata Motors**: Despite being a major automotive company, Tata Motors holds a 6% market share in the electric bus segment, lagging behind others in adopting electric bus technology.

Overall, the data suggests that PMI Electric Mobility is the clear leader in the Indian electric bus market, followed by Olectra Green Tech and JBM Auto. Ashok Leyland and Tata Motors are also significant players in the market, but have smaller market shares.

The electric vehicle (EV) market in India is experiencing rapid growth, driven by government incentives, technological advancements, and increased environmental awareness. EV sales soared from 69,012 units in 2020 to 504,362 units in 2023, with Uttar Pradesh leading state-wise adoption at 294k units, followed by Bihar, Rajasthan, and Tamil Nadu. Electric three-wheelers dominate the market with a 40.4% share, followed by two-wheelers at 30.8%. Tata Motors and Ola Electric lead in the four-wheeler and two-wheeler segments, respectively. Despite this growth, challenges like insufficient charging infrastructure and high costs persist. Addressing these through enhanced infrastructure, financial incentives, public awareness, collaborative efforts, and regulatory support is crucial for sustaining momentum and solidifying India's position as a global EV leader.

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CONCLUSION