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Emerging Trends Shaping The Future Of The Electric Vehicle Industry

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ABSTRACT

India's Electric Vehicle (EV) sector is experiencing rapid growth, fuelled by government incentives, rising environmental concerns and technological advancements. With initiatives like the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, India aims to significantly increase EV adoption, revolutionizing its transportation landscape towards sustainability and innovation. The country has set an ambitious target to elevate EV sales to 30% of private cars, 70% of commercial vehicles, 40% of buses and 80% of two- and three-wheelers by 2030, translating to approximately 80 million EVs on Indian roads, alongside a focus on complete domestic EV production through the 'Make in India' initiative. According to ICRA, India's auto component industry will get investments of Rs. 25,000-30,000 crore (US\$ 2.89-3.46 billion) in FY26 for capacity expansion and EV parts, up from Rs. 15,000-20,000 crore (US\$ 1.73-2.31 billion) in FY25. Due to the nearly low to zero carbon emissions, low noise, great efficiency, and flexibility in grid operation and integration, electric vehicles (EVs) are a viable technology for creating a sustainable transportation industry in the future.

Key Words: Electric Vehicle, FAME Scheme, Government Incentives, Environmental Concerns, Technological Advancements, Financial Year.

INTRODUCTION:

Electric Vehicles (EVs) are powered by one or more electric motors, serving as a clean alternative to conventional fossil fuel engines. The journey of EVs began in the early 1830s with the creation of the first electric carriage, followed by the production of the first electric car in the United States in 1891. Today EVs are pivotal in advancing green energy initiatives and transforming the global economy. Due to the nearly low to zero carbon emissions, low noise, great efficiency and flexibility in grid operation and integration. Electric vehicles are a viable technology for creating a sustainable transportation industry in the future. EVs can be powered externally, such as by energy from off-vehicle sources via a collector system or internally using a battery, fuel cells, or an electric generator. India is growing as a global powerhouse for auto component procurement, with the industry exporting more than 25% of its output annually. India is on course to become the largest EV market by 2030, with increased investment over the next five years.

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TYPES OF EV TECHNOLOGY:

- **Battery Electric Vehicle (BEV):** Runs exclusively on electric motors and battery power (e.g., Tesla Model 3, Nissan Leaf).
- **Hybrid Electric Vehicle (HEV):** Combines an ICE with an electric motor. The battery is charged through braking and the engine, not plugged in (e.g., Toyota Prius).
- **Plug-in Hybrid Electric Vehicle (PHEV):** Features a larger battery than HEVs and can be charged externally, offering a longer electric-only range before switching to gas.
- **Fuel Cell Electric Vehicle (FCEV):** Generates electricity on-board through a chemical reaction between hydrogen and oxygen, producing only water vapor as emission.

KEY COMPONENTS AND SUBSYSTEMS:

- **Battery Management System (BMS):** Manages cell balancing and protects the battery pack to ensure safety and longevity.
- **Electric Motor/Propulsion System:** Converts electrical energy to mechanical movement.
- **Charging Infrastructure:** Conductive (plugin) or wireless (induction) systems that deliver energy to the battery.

SEGMENTS OF ELECTRIC VEHICLES:

1. Passenger Vehicles (4-Wheelers)

This segment is the most competitive with established domestic giants now facing pressure from aggressive global entrants.

- **Tata Motors (Market Leader):** Continues to lead with popular models like the Nexon EV, Tiago EV, Punch EV and recently launched Harrier EV and Sierra EV.
- **MG Motor India:** Holds the #2 position, largely driven by the Windsor EV (using a unique Battery-as-a-Service model) and the compact Comet EV.
- **Mahindra & Mahindra:** Experiencing a "massive surge" in sales with its "Born Electric" (BE) range, including the BE 6 and XEV 9e models.
- **Hyundai & Kia:** Hyundai offers the Kona Electric and Ioniq 5, while Kia focuses on the premium EV6.
- **BYD India:** A growing player in both consumer and fleet markets with the Atto 3, e6 and the Seal luxury sedan.
- **New Entrants:**
 - **VinFast:** Opened its first Indian plant in mid-2025 and quickly outpaced legacy luxury brands in sales by early 2026.
 - **Tesla:** Officially launched in India in July 2025, though vehicles are currently imported as built units rather than locally manufactured.
 - **Maruti Suzuki:** A late entrant that launched its first EV, the e-Vitara, in early 2025.

2. Two-Wheelers (Scooters & Bikes)

The Two-wheeler segment holds the largest volume in the Indian EV market, driven by urban commuting and delivery services.

- **Ola Electric:** The current market leader in electric scooters with its S1 and S1 Pro series.
- **TVS Motor Company:** A major player with the i-Qube electric scooter.
- **Ather Energy:** Known for premium smart scooters like the 450X and the family-oriented Rizta.
- **Bajaj Auto:** Re-entered the segment with the Chetak Electric.
- **Hero Electric:** One of the oldest and largest mass-market players, focusing on affordable models.

- **Others:** Revolt Motors (AI-enabled bikes), Okinawa Autotech, Ampere (Greaves Electric) and Ultraviolette Automotive (performance bikes).

3. Commercial & Three-Wheelers

- **Mahindra Last Mile Mobility:** The leader in electric three-wheelers with the Treo and e-Alfa Mini.
- **Olectra Greentech:** A major manufacturer of electric buses deployed across various Indian states.
- **JBM Auto:** Specializes in electric buses under the Eco-Life brand.
- **Euler Motors:** Focuses specifically on electric cargo three-wheelers for logistics.

4. Supporting Ecosystem (Infrastructure & Batteries)

- **Charging Networks:** Led by Tata Power EZ Charge, Ather Grid and Bolt. Earth.
- **Battery Swapping:** Battery Smart, Yulu and Sun Mobility are key players in urban battery-swapping networks.
- **Component & Battery Manufacturing:** Ola Electric (cell manufacturing), Exide Industries, Amara Raja and Bharat Electronics (BEL).



ADVANTAGES OF ELECTRIC VEHICLES:

- ❖ **Electric vehicles save energy:** The amount of energy from a fuel source that is transformed into actual energy for driving a vehicle's wheels is referred to as energy efficiency. Compared to traditional gas-powered vehicles, AEVs are significantly more efficient. AEV batteries convert 59 to 62 percent of their energy into vehicle movement, compared to 17 to 21 percent for gas-powered vehicles. This means that charging an AEV's battery contributes more to actual vehicle power than filling up at a gas station.
- ❖ **Electric Vehicles reduce emissions:** Emission reduction, including reduced usage of

fuel, is another pro for all-electric vehicles. Because they rely on a rechargeable battery, driving an electric vehicle does not create any tailpipe emissions, which are a major source of pollution in the United States. In addition, the rechargeable battery means much less money spent on fuel, which means all energy can be sourced domestically.

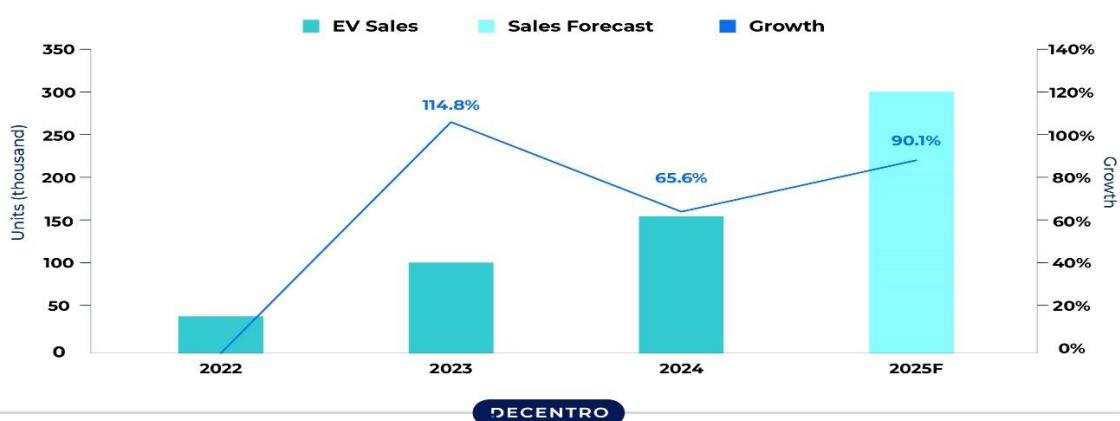
❖ **Electric vehicles are high-performance and low-maintenance vehicles:** - All electric vehicles are high-performance vehicles with quiet, smooth motors that require less maintenance than internal combustion engines. The driving experience can also be enjoyable because AEV motors are responsive and have good torque. AEVs are generally newer than their gasoline-powered counterparts, and they are frequently more digitally connected with charging stations, allowing for charging control via an app.

EV CURRENT DEMAND:

Indian manufacturers plan to debut almost a dozen new EVs in 2025, with a focus on premium models, as EV sales in India increased 20% amid decreasing worldwide demand, with a 30% aim by 2030. India's EV charging network has nearly quadrupled between FY22 and early FY25, reaching nearly five million stations as of July 2025. Public charging stations increased from 5,151 in 2022 to 11,903 in 2023 and 26,367 by early FY25, representing a 72% CAGR.

According to data from the Ministry of Road Transport and Highways' VAHAN portal, sales of electric cars (EVs) in India's luxury category increased by 66% year on year to 2,027 units in the first five months of 2025, up from 1,223 units in the same period in 2024. The Government has reiterated its goal of 30% electric mobility by 2030 and its dedication to EVs.

India's 2025 EV penetration is expected to be 6%
 India Light Vehicle EV Sales, 2022 to 2025



GOVERNMENT INITIATIVES:

India's Government has introduced a series of policies to catalyse EV adoption:

- **Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) Scheme:** Launched in 2015 and expanded in subsequent years, FAME has provided subsidies for EV purchases and charging infrastructure.
- **E-Drive scheme:** Replacing FAME in 2023, this initiative saw its budget surge by 114 percent in 2025 to support charging infrastructure and public transport electrification. In order to strengthen India's EV ecosystem, encourage electric mobility, and lessen reliance on fossil fuels, the Ministry of Heavy Industries created the PM E-DRIVE Scheme with Rs. 10,900 crore (US\$1.28 billion).
- **Production-linked incentives (PLIs):** Incentives for domestic manufacturing of automotive components and batteries have jumped over 700 percent, signal a strategic push for local value addition.
- **New EV policy (2024):** With a \$500 million outlay, this policy aims to attract global investment, tie incentives to local manufacturing, and provide Indian consumers access to advanced EV models.

These measures are designed to attract foreign investment, stimulate domestic manufacturing and accelerate the development of the charging infrastructure.

TAMILNADUELECTRICVEHICLESPOLICY2023:

Tamil Nadu's new 'Electric Vehicles Policy 2023' was launched by the Hon'ble Chief Minister of Tamil Nadu, Thiru. M. K. Stalin, in the presence of industry leaders and key officials. This policy covers manufacturing units engaged in the manufacturing of electric vehicles, EV components, electric vehicle supply equipment (EVSE) and EV charging infrastructure, charging stations and charging point operators and customers purchasing EVs in Tamil Nadu. The EVs incentivized by this policy will need to comply with FAME-IL guidelines issued by the Ministry of Heavy Industry, Government of India. Similarly charging stations would need to comply with the Charging Infrastructure for Electric Vehicles Guidelines and Standards issued by the Ministry of Power, Government of India.

It includes 100% road tax exemptions for EVs until December 2027. This policy shall be valid for a period of 5 years from the date of the policy notification or until a new policy is announced. The Tamil Nadu Electric Vehicles Policy 2023 focuses on supply side policy measures, demand side measures, charging infrastructure, ecosystem development and policy implementation mechanism. It offers incentives for EV manufacturing, investment promotion, electricity tax exemption, stamp duty waiver, employment incentives, green industry incentives, quality certification incentives, interest subvention etc.

CURRENT INVESTMENTS:

VinFast, a Vietnamese electric vehicle manufacturer, has established its first overseas manufacturing in Thoothukudi, Tamil Nadu, making it its third location worldwide. The project will require a phased investment of Rs. 16,000 crore (US\$1.83 billion), of which Rs. 4,300 crore (US\$490 million) will be committed in the first phase. In an effort to increase EV manufacturing capacity, Suzuki Motor said in August 2025 that it will invest US\$8 billion over the course of five to six years in India and started producing its first EV in Gujarat.

CHALLENGES OF ELECTRIC VEHICLES:

- ❖ Major challenges in Purchase of EV include
- ❖ High upfront cost
- ❖ Lack of charging infrastructure
- ❖ Limited range
- ❖ Long charging time
- ❖ Battery life concerns
- ❖ Limited-Service network
- ❖ Safety concerns
- ❖ Low consumer awareness

- Government subsidies

- Lower running costs

- Environmental benefits

CONCLUSION:

India's Electric Vehicle (EV) market is on a rapid growth trajectory, spurred by ambitious government targets, rising consumer awareness and increased investment from domestic and international players. As the world's third-largest automotive market, India is striving to reduce its carbon footprint, cut oil imports and position itself as a global leader in sustainable mobility. Due to its benefits and the immediate need to tackle climate change and energy stability, several nations are promoting EVs. The paper discusses about the electric vehicles (EVs), their advantages and potential, the hurdles to their adoption due to various reasons. Integrating EVs into day-to-day life can create a sustainable and efficient environment with lower operating costs, reduced greenhouse gas emissions and improved air quality. There are supportive policies and regulations, investment in charging infrastructure,

and public education and outreach initiatives. Governments can help by providing financial incentives, mandating minimum EV sales targets and funding charging infrastructure. Public education programs can help overcome obstacles such as range, anxiety and a lack of knowledge about the benefits of

EVs. Battery prices are expected to drop significantly, making EVs more affordable and convenient for consumers. To conclude that switching to EVs can help reduce reliance on fossil fuels and combat climate change.

REFERENCES:

1. <https://www.ibef.org/industry/electric-vehicle>
2. <https://www.mdpi.com/2076-3417/13/10/6016>
3. <https://business.cornell.edu/article/2025/07/indias-emerging-electric-vehicle-market>
4. <https://evreporter.com/tamil-nadu-electric-vehicles-policy>
5. <https://itdp.in/tn-ev-future>
6. <https://decentro.tech/blog/ev-companies-in-india/>
7. <https://www.cheggindia.com/earn-online/electric-vehicles-company-in-india>

