ELECTRIC VEHICLE (EV) SPHERE IN INDIA: AN URGENCY FOR LEGISLATIVE MECHANISM TO MAINTAIN CHECKS AND BALANCES ON VEHICLE MANUFACTURERS AND A CALL FOR ENHANCING POLICIES & INFRASTRUCTURE TOWARDS ITS IMPLEMENTATION

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ABSTRACT

Change is the only Constant, and this holds for the automotive industry in India. Currently, India stands in the Automobile Sector with the third highest market share in the world, and with an ever-expanding scope of growth, the future holds very lucrative prospects for this industry. The sphere of transportation is undergoing a transition phase with vehicle manufacturers slowly transitioning towards Electric Vehicles (EVs) from the regular Internal Combustion Engine (ICE) Vehicles. By 2026, it is expected that the rate of sales in India of Electric Vehicles (EVs) will increase by 35% rate of growth annually. India's efforts towards promoting Electric Vehicles (EVs) can be traced back to the year 2015 during the United Nations Climate Change Conference, when it made a promise to lessen carbon footprints emitted by it and work towards a sustainable energy infrastructure system. Keeping in mind the fluctuating oil prices from time to time and given the ghastly consequences of Environment Pollution that result from conventional petrol & diesel vehicles, commitment has been made by the Government of India that within the year 2030, 30% of the sales figure would be generated from the sales of new Electric Vehicles (EVs). India has stood firm at its commitments, but how far these can be feasible is uncertain, given the number of hurdles that the Electric Vehicle (EV) Sector is facing as of now. This paper emphasises the reshaping of legalities that exist by constituting an effective and rigid framework for the safe operability of Electric Vehicles (EVs), reassuring customers alongside boosting the policy and infrastructure requirements vital to turn the Electric Vehicle (EV) dream into a reality.

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Keywords: Electric Vehicles (EVs), Sustainable Energy Infrastructure System, Environmental Pollution, Safe Operability.

INTRODUCTION

Technological advancements have significantly transformed India's automotive manufacturing industry. Now one of the world's fastest-growing markets, the Indian automotive sector is a substantial contributor to the nation's economy. The Electric Vehicle (EV) segment within this industry is particularly dynamic. Valued at USD 7.025 billion in 2021, the Indian EV market is projected to surge to USD 30.415 billion by 2027. This exponential growth underscores India's potential to emerge as a global leader in electric mobility. Recognising this potential, EV companies are increasingly adopting advanced manufacturing technologies to accelerate the adoption of e-mobility solutions.[1]

With the rise in advancement of technology alongside the rapid degradation of the environment, the automotive industry has significantly shifted to Electric Vehicles (EVs). Unlike traditional internal combustion engine vehicles, EVs rely on electric motors powered by batteries. This fundamental difference offers several advantages, including reduced greenhouse gas emissions and improved energy efficiency. However, ongoing research is exploring alternative technologies, such as solid-state batteries and hydrogen fuel cells, which promise even greater performance and efficiency. The EV market encompasses a diverse range of vehicle types, each with its unique characteristics and applications.[2]

While Electric Vehicles (EVs) are generally considered a more environmentally friendly option compared to conventional automobiles, their overall environmental impact is contingent upon several factors. These factors encompass the manufacturing processes, the source of electricity used for charging, and the end-of-life management of batteries.[3] The road transportation sector remains a significant contributor to global greenhouse gas emissions. Electric Vehicles (EVs) are increasingly seen as a key solution to mitigate these emissions. India's 2023 Union Budget

[1] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.
[2] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.
[3] Sakshar Law Associates – Sakshi Shairwal and Vaishnavi Chandrakar, 'E-vehicles and their alignment with environmental law in India' (Lexology, 30 May 2022) <https://www.lexology.com/library/detail.aspx?g=448800bd-ff88-4820-9708-7a0c427db0fc> accessed 10 November 2024.

and the E-Mobility Mission reflect the government's commitment to promoting EV adoption. In recent years, India has implemented a series of policies and regulations to foster the EV ecosystem, covering areas such as domestic manufacturing, emissions reduction, waste management, charging infrastructure, and battery technology.[4]

The Indian government has identified Electric Vehicles (EVs) as a strategic solution to address the twin challenges of poor air quality and substantial oil import expenditure. The government aims to significantly increase the deployment of EVs on Indian roads by 2030, leveraging their cost-effectiveness and environmental benefits.[5] The Indian Electric Vehicle (EV) market is poised for substantial growth, with an estimated compound annual growth rate of 35% projected until 2026.[6] NITI Aayog, India's leading policy think tank, projects a substantial increase in electric vehicle (EV) adoption by 2030.[7]

The Government of India (GOI) is actively promoting the adoption of Electric Vehicles (EVs) through the implementation of eco-friendly policies and regulations.[8] In March 2011, the Government of India launched the National Mission on Electric Mobility to accelerate the adoption of Electric Vehicles (EVs) in the country.[9] This resulted in the formulation of the Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME) scheme, which has played a pivotal role in accelerating the adoption of Electric Vehicles (EVs) in India. FAME-I, the initial phase, provided direct financial support, including subsidies, grants, and R&D funding, to specific projects aimed at promoting electric mobility and developing supporting infrastructure. FAME-II, launched in 2019 with a substantial budgetary allocation of INR 10,000 crore, aims to significantly scale up the adoption of Electric Vehicles (EVs) across

[4] Arpita Garg, Abhishek Tiwari, Deborshi Barat and Ameesha Tripathi, 'E-Vroom! An Overview of the Electric Vehicle (EV) Sector in India' (S&R Associates, 9 February 2023) <https://www.snrlaw.in/e-vroom-an-overview-of-the-electric-vehicle-ev-sector-in-india/> accessed 10 November 2024.
[5] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[6] Sakshar Law Associates – Sakshi Shairwal and Vaishnavi Chandrakar, 'E-vehicles and their alignment with environmental law in India' (Lexology, 30 May 2022) <https://www.lexology.com/library/detail.aspx?g=448800bd-ff88-4820-9708-7a0c427db0fc> accessed 10 November 2024.
[7] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[8] Arjun Goswami, Varun Mehta and Avinash Das, 'Charging Up the EV Sector through Policy Reform' (Cyril Amarchand Mangaldas, 23 August 2021) <https://corporate.cyrilamarchandblogs.com/2021/08/charging-up-the-ev-sector-through-policy-reform/> accessed 10 November 2024.
[9] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-in-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.

various segments, including two-wheelers, three-wheelers, four-wheelers, and buses. It also focuses on expanding charging infrastructure and fostering a robust ecosystem for electric mobility. Despite substantial government support and industry investments, the adoption of Electric Vehicles (EVs) in India has been slower than anticipated. Currently, EVs account for only 3% of total vehicle sales in the country.[10]

While Electric Vehicles (EVs) are poised to be the primary driver of future mobility, technological advancements must be synergised with supportive regulatory frameworks, attractive investment incentives, and the development of standardised charging infrastructure. These interconnected factors are essential for overcoming challenges and realising the full potential of the EV market. For instance, stimulating demand necessitates a combination of sales incentives, robust charging infrastructure, and clear safety regulations.[11]

LEGAL AND REGULATORY GOVERNANCE OF ELECTRIC VEHICLES (EVS) IN INDIA

Currently, India lacks a dedicated, comprehensive legal framework specifically designed for Electric Vehicles (EVs).[12] The Central Motor Vehicle Rules (CMVR) of 1989 establish the minimum technical requirements and safety standards that all vehicles sold in India, including Electric Vehicles (EVs), must adhere to. The Central Motor Vehicle Rules (CMVR) of 1989 originally mandated that all vehicles, including electric vehicles (EVs), must be equipped with a tyre repair kit, a tyre pressure monitoring system (TPMS), and an additional spare tyre. However, a 2000 amendment to the CMVR relaxed this requirement. Vehicles equipped with a tyre repair kit and TPMS are now exempt from carrying an additional spare tyre. This modification is particularly advantageous for EVs, as it frees up valuable space that can be utilised for larger batteries, increasing the vehicle's range.[13] The Indian government has implemented a policy allowing the sale and registration of Electric Vehicles (EVs) without pre-installed batteries. These EVs must undergo stringent roadworthiness tests conducted by

[10] Arjun Goswami, Varun Mehta and Avinash Das, 'Charging Up the EV Sector through Policy Reform' (Cyril Amarchand Mangaldas, 23 August, 2021) <https://corporate.cyrilamarchandblogs.com/2021/08/charging-up-the-ev-sector-through-policy-reform/> accessed 10 November 2024.
[11] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.
[12] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[13] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.

accredited agencies as outlined in the Central Motor Vehicle Rules, 1989. By decoupling the battery cost from the vehicle's initial purchase price, this policy aims to reduce the upfront cost of EVs, particularly for two-wheelers and three-wheelers. This strategy is expected to enhance the affordability and accessibility of electric mobility in India.[14] While EV conversion is permissible in India, it must strictly adhere to the guidelines issued by the Automotive Research Association of India (ARAI). Only ARAI-certified conversion kits are authorised for use in transforming conventional vehicles into Electric Vehicles. The Government of India has designated the Automotive Research Association of India (ARAI) as a leading testing and certification agency under Rule 126 of the Central Motor Vehicle Rules of 1989. ARAI plays a crucial role in developing automotive standards and regulations in India.[15]

The Ministry of Road Transport and Highways, in a notification dated October 18, 2018, exempted battery-operated vehicles, methanol-fuelled vehicles, and ethanol-fuelled vehicles from the permit requirement under Section 66(1) of the Motor Vehicles Act, 1988.[16] The Ministry of Housing and Urban Affairs amended the Model Building Bye-Laws in the year 2016 to incorporate provisions for Electric Vehicle (EV) charging infrastructure. This amendment required the inclusion of charging infrastructure in new construction projects.[17] Additionally, the Model Building Bye-Laws for EV Charging Infrastructure, 2016, provide guidelines for the establishment of charging stations across the country.[18] The amended Model Building Bye-Laws mandate that both residential and commercial properties must allocate at least 20% of their parking space for Electric Vehicle (EV) charging infrastructure.

[14] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[15] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.
[16] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-in-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.
[17] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.
[18] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.

Additionally, these properties will need to accommodate an increased power load to support the charging points.[19]

The Electricity Act 2003 requires a license for activities like transmission, distribution, and trading of electricity. However, charging EV batteries doesn't involve these activities. Therefore, charging stations do not need a license under the Electricity Act, 2003.[20] According to the EV Bye-Laws, individuals setting up public charging stations are not required to obtain a specific license, provided that the stations adhere to the technical and performance standards established by the Ministry of Power (MoP) and the Central Electricity Authority (CEA).[21]

The Energy Conservation Act, 2001, was amended in the year 2022 to enhance energy efficiency regulation. Key changes included empowering the central government to establish a carbon credit trading scheme and expanding the Act's scope to cover vehicle emissions. Additionally, the penalties for vehicle manufacturers who violate fuel consumption norms have been increased to up to INR 50,000 per unit sold.[22] The Battery Waste Management Rules, 2022, impose extended producer responsibility (EPR) obligations on manufacturers, sellers, and importers of batteries, including those used in Electric Vehicles. This means that producers are responsible for collecting and recycling or refurbishing the batteries they introduce into the market. Producers can either undertake these responsibilities themselves or authorise other entities to do so.[23]

[19] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.
[20] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.
[21] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[22] Arpita Garg, Abhishek Tiwari, Deborshi Barat and Ameesha Tripathi, 'E-Vroom! An Overview of the Electric Vehicle (EV) Sector in India' (S&R Associates, 9 February 2023) <https://www.snrlaw.in/e-vroom-an-overview-of-the-electric-vehicle-ev-sector-in-india/> accessed 10 November 2024.
[23] Arpita Garg, Abhishek Tiwari, Deborshi Barat and Ameesha Tripathi, 'E-Vroom! An Overview of the Electric Vehicle (EV) Sector in India' (S&R Associates, 9 February 2023) <https://www.snrlaw.in/e-vroom-an-overview-of-the-electric-vehicle-ev-sector-in-india/> accessed 10 November 2024.

ELECTRIC VEHICLES (EVS) EXISTING POLICY FRAMEWORK

The Indian government has been actively promoting the adoption of Electric Vehicles (EVs) through various initiatives. Some of the key government initiatives to promote EV adoption include:

Faster Adoption and Manufacturing of Electric Vehicles (FAME-I) Scheme [1st April, 2015 – 31st March, 2019]: The Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME-I) scheme, launched on March 13, 2015, allocated INR 8.95 billion for subsidies aimed at stimulating demand, developing infrastructure, and promoting technological advancements in the Electric Vehicle (EV) sector.[24] The Department of Heavy Industry developed the FAME-I scheme to foster the production of Electric and Hybrid Vehicle Technologies and ensure their sustainable growth.[25]

Faster Adoption and Manufacturing of Electric Vehicles (FAME-II) Scheme [1st April 2019 – 31st March 2024]: The Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME-II) scheme, launched on April 1, 2019, allocated INR 100 billion towards four key areas: technology development, demand creation, pilot projects, and charging infrastructure. FAME-II prioritises domestic manufacturing of EVs, batteries, and other components, with a specific focus on reducing battery costs, an area not addressed in FAME-I.[26] The FAME-II scheme aims to stimulate demand for Electric Vehicles (EVs) in India. A key focus of the scheme is to provide affordable and eco-friendly public transportation options for the general public.[27]

Production Linked Incentive (PLI) Scheme: This scheme aims at overcoming cost disadvantages, achieving economies of scale, and establishing a robust domestic supply chain for AAT products. By promoting domestic manufacturing and attracting investments, the PLI

[24] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[25] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.
[26] Acuity Law, 'FAQS on Indian Laws Related to Electric Vehicles' (Acuity Law) <https://acuitylaw.co.in/wp-content/uploads/2024/04/FAQ-27-EV-in-India.pdf> accessed 10 November 2024.
[27] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.

scheme is expected to generate jobs and elevate India's position in the global automotive value chain.[28]

Charging Infrastructure for Electric Vehicles Guidelines, 2022: The Ministry of Power updated its guidelines and standards for EV charging infrastructure in November 2022.[29] The Charging Infrastructure for Electric Vehicles Guidelines, 2022, establish a standardised framework for the deployment and operation of public charging stations across India. These guidelines outline the technical specifications that charging stations must meet to ensure safety, reliability, and interoperability.

Several additional policies contribute to India's comprehensive legal framework for Electric Vehicles (EVs):

GST Reduction - The central government reduced the GST rate on Electric Vehicles (EVs) from 12% to 5% and on EV charging infrastructure from 18% to 5%, making EVs more affordable.

Phased Manufacturing Programme (PMP) - The PMP, introduced in 2019, outlines a phased duty structure for EVs and their components, encouraging domestic manufacturing and reducing reliance on imports.

Draft Policy on Battery Swapping - This policy promotes battery swapping as a solution to reduce the upfront cost of EVs. It sets technical and operational standards for battery swapping stations and outlines potential government support mechanisms to incentivise battery swapping and EV adoption.[30]

[28] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.
[29] Arpita Garg, Abhishek Tiwari, Deborshi Barat and Ameesha Tripathi, 'E-Vroom! An Overview of the Electric Vehicle (EV) Sector in India' (S&R Associates, 9 February 2023) <https://www.snrlaw.in/e-vroom-an-overview-of-the-electric-vehicle-sector-in-india/> accessed 10 November 2024.
[30] Rachika Agrawal Sahay, Siddhant Satapathy, Aarvi Singh and Sakshi Sharma, 'Electric Vehicle Industry in India: A Regulatory Overview' (Live Law, 5 September 2022) <https://www.livelaw.in/lawschool/articles/electric-vehicle-industry-national-mission-of-electric-mobility-ministry-of-heavy-industries-and-public-enterprises-electric-vehicles-scheme-in-india-project-implementation-and-sanctioning-committee-ministry-of-power-208409> accessed 10 November 2024.

ELECTRIC VEHICLES (EVs) COMPLIANCE WITH ENVIRONMENTAL LEGISLATIONS IN INDIA

India's commitment to environmental protection and sustainable resource use is deeply rooted in its constitutional framework and international obligations, such as the Nationally Determined Contribution Targets. Article 51A of the Constitution mandates every citizen to protect the environment and show compassion for all living beings. Additionally, Article 48A directs the state to work towards environmental preservation and the protection of forests and wildlife. In many instances, the government has formulated environmental pollution-tackling Schemes. One such instance is Delhi's odd-even Scheme, which began in the year 2016 to brace the Impact of Air Pollution from vehicular emissions, and this situation was an eye-opener for policymakers to move towards the medium of Electric Vehicles (EVs). As the popularity of EVs continues to rise, it is crucial to evaluate whether existing environmental regulations are adequately equipped to address the unique challenges and opportunities presented by this emerging technology.

The impact of Electric Vehicles (EVs) and their alignment with key environmental protection laws in India are as follows:

E-Vehicle and Greenhouse gas emissions: The Air (Prevention and Control of Pollution) Act of 1981 mandates the preservation of air quality and sets limits on emissions from various sources, including vehicles. The Supreme Court of India has further recognised the fundamental right to a clean environment, underscoring the importance of air quality for public health. To address air pollution concerns, India has implemented various measures, such as promoting the use of cleaner fuels like CNG and the adoption of Electric Vehicles (EVs). EVs, when powered by renewable energy sources, significantly reduce greenhouse gas emissions compared to traditional gasoline or diesel vehicles. While the manufacturing process of EVs may have a higher initial environmental impact, their overall lifecycle emissions are significantly lower than those of internal combustion engine vehicles. The transition to EVs aligns with the objectives of the Air (Prevention and Control of Pollution) Act by contributing to improved air quality and reduced pollution levels.

Batteries used in EVs are detrimental to the environment: While Electric Vehicles (EVs) are touted as a greener alternative to traditional gasoline-powered vehicles, their environmental impact is not without its complexities. One major concern is the environmental cost associated

with the production and disposal of EV batteries. These batteries rely on rare earth elements like lithium, nickel, and cobalt, which are often extracted through environmentally harmful mining practices. Cobalt mining, in particular, has been linked to significant environmental damage, including water pollution and air pollution from smelting processes. Additionally, the manufacturing process of EV batteries is energy-intensive and can contribute to greenhouse gas emissions. The disposal of used batteries also poses environmental risks if not handled properly. While EVs offer significant benefits in terms of reduced tailpipe emissions and improved air quality, it is crucial to consider their entire lifecycle impact. As the EV industry continues to grow, it is imperative to develop sustainable mining practices, efficient battery recycling technologies, and robust environmental regulations to mitigate the negative consequences associated with EV production and disposal.

The Hazardous Waste generated by Electric Vehicles (EVs): Electric Vehicles (EVs) are becoming increasingly popular, but their widespread adoption raises concerns about the environmental impact of battery disposal. Lithium-ion batteries, which power most EVs, contain hazardous materials like cobalt, lithium, and nickel. India currently lacks a comprehensive framework for the safe disposal and recycling of these batteries. The existing E-waste Management Rules do not specifically address the disposal of Li-ion batteries, leading to the risk of improper disposal in landfills. This can result in the release of toxic substances into the environment, including water and soil pollution. To address this issue, India needs to develop a robust regulatory framework for EV battery recycling. This includes stricter E-waste Management Rules, investment in recycling infrastructure, consumer awareness campaigns, and international cooperation. By taking proactive measures, India can ensure the sustainable growth of the EV industry while minimising its environmental impact.

The Tripura High Court, in the case of Smt. Sudipa Nath vs. Union of India & Others has directed the State of Tripura to take immediate action to implement the FAME India Phase II program and develop a comprehensive electric vehicle policy. The court emphasised the importance of promoting electric vehicles as a means of environmental conservation and reducing reliance on carbon-based fuels. It noted that the Union Government has been actively promoting electric vehicles through various incentives and subsidies.[31]

[31] Sakshar Law Associates – Sakshi Shairwal and Vaishnavi Chandrakar, 'E-vehicles and their alignment with environmental law in India' (Lexology, 30 May 2022) <https://www.lexology.com/library/detail.aspx?g=448800bd-ff88-4820-9708-7a0c427db0fc> accessed 10 November 2024.

THE ADEQUACY OF EV VEHICLES (EV'S) SAFETY STANDARDS AND NORMS

Electric Vehicles (EVs) offer numerous environmental benefits, but side by side, concerns about their safety have emerged. Some experts argue that EVs are as safe, if not safer, than traditional gasoline-powered vehicles, citing advancements in safety features like automatic emergency braking and lane-keeping assist. However, others raise concerns about the potential for battery fires.[32] The Indian government is encouraging citizens to adopt Electric Vehicles (EVs) as a more sustainable alternative to traditional fuel-powered vehicles. However, concerns about potential battery fires have hindered widespread adoption.[33]

Recent years have witnessed a surge in electric vehicle (EV) fires in India, raising concerns about their safety and reliability.[34] In 2022, a Tata Nexon EV caught fire, raising concerns about the safety of Electric Vehicles (EVs) in India. While the automaker launched an investigation into the incident, it sparked broader discussions about EV safety and fire prevention measures.[35] In 2023, an electric car caught fire near Dalmia Circle in JP Nagar, Bengaluru, causing significant concern. While no casualties were reported, the incident sparked discussions about the safety of Electric Vehicles (EVs). The exact cause of the fire remained unknown.[36]

To address growing concerns about EV safety, the Bureau of Indian Standards (BIS) has introduced two new standards: IS 18590:2024 and IS 18606:2024. These standards focus on the powertrain, a critical component of electric vehicles, aiming to enhance safety and quality for L, M, and N category vehicles (two-wheelers, four-wheelers, and goods trucks, respectively). By setting stringent safety requirements, the BIS aims to mitigate the risk of incidents like battery fires and other safety hazards, fostering greater confidence in the adoption

[32] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.
[33] Dr. Emily Greenfield, 'Are Electric Vehicles Safe in India' (SIGMA EARTH, 10 May 2022) <https://sigmaearth.com/are-electric-vehicles-safe-in-india/> accessed 10 November 2024.
[34] Sudeep Singh Rawat, 'BIS introduces new safety standards for electric vehicles to enhance safety' (Business Standard, 24 June 2024) <https://www.business-standard.com/industry/auto/bis-introduces-new-safety-standards-for-electric-vehicles-to-enhance-safety-124062400715_1.html> accessed 10 November 2024.
[35] Saurav Mukherjee, 'Nexon EV fire row: All about the incident, reasons and protection from such incidents' (Mint, 23 June 2022) <https://www.livemint.com/news/nexon-ev-fire-row-all-about-incident-reasons-protections-from-such-incidents-11656004201417.html> accessed 10 November 2024.
[36] ET Online, 'Electric car catches fire in Bengaluru' (The Economic Times, 1 October 2023) <https://economictimes.indiatimes.com/industry/renewables/electric-car-catches-fire-in-bengaluru-heres-what-causes-ev-fires-and-why-electric-two-wheelers-are-at-higher-risk/articleshow/104081291.cms> accessed 10 November 2024.

of electric vehicles in India.[37] While Electric Vehicles (EVs) have made significant strides in terms of safety, continuous improvement is necessary. Despite rigorous safety standards, incidents like battery fires have highlighted potential vulnerabilities. Manufacturers and regulatory bodies have to actively work together hand in hand to enhance battery technology, improve thermal management systems, and implement robust safety protocols to further bolster the safety of EVs.

To ensure the safety of Electric Vehicles (EVs), governments and regulatory bodies need to establish robust safety standards and guidelines. This includes measures to prevent electric shock, insulation of live parts, protection against uncontrolled operation, and the implementation of emergency stop systems. Additionally, stringent battery safety standards and mandatory acoustic vehicle alerting systems are crucial to enhance the overall safety of EVs. India can draw inspiration from the safety regulations adopted by the European Union, which has implemented the Global Technical Regulation No. 20 and other relevant standards. By implementing similar measures, India can promote the safe and responsible development of the EV industry.[38]

As no specific legislation is present in regard to the Safety of Electric Vehicles (EVs), given the numerous fire incidents that have occurred in the Country, it is a direct violation of the Fundamental Right to Life under Article 21 of the Constitution of India.

BARRIERS TO ELECTRIC VEHICLE (EV) PROSPERITY AND THE PATH AHEAD

The growth and prosperity of Electric Vehicles (EVs) in India are hindered by several factors:

Insufficient Charging Infrastructure: India's current charging infrastructure is inadequate compared to countries like China. The limited availability of charging stations, particularly on long-distance routes, remains a significant concern for potential EV buyers.

[37] Sudeep Singh Rawat, 'BIS introduces new safety standards for electric vehicles to enhance safety' (Business Standard, 24 June 2024) <https://www.business-standard.com/industry/auto/bis-introduces-new-safety-standards-for-electric-vehicles-to-enhance-safety-124062400715_1.html> accessed 10 November 2024.
[38] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.

Lack of Centralised Monitoring: Despite significant investments in EV promotion, there's a lack of centralised monitoring to track the progress of EV infrastructure development and policy implementation. This can lead to inefficiencies and delays.

Investment Challenges for Automakers: The simultaneous push for BS VI emission standards for conventional vehicles presents a challenge for automakers. With substantial investments already made in traditional technologies, automakers may be hesitant to allocate significant resources to EV development.

Restrictive Subsidy Eligibility Criteria: While subsidies under FAME and state-level policies are intended to bridge the price gap between EVs and conventional vehicles, stringent eligibility criteria can limit their effectiveness. For instance, caps on subsidies based on EV category and battery capacity can undermine the cost advantage of EVs.

Inadequate Financial Support for Electric Buses: The availability of financial support for electric buses is limited. Concessional loans, government-backed guarantees, and green bonds can play a crucial role in promoting the adoption of electric buses, but these instruments are not widely accessible.

The following initiatives would help guide the path ahead related to the adoption of EVs in India:

Long-term Policy: To achieve a complete transition from traditional fuel-powered vehicles to Electric Vehicles (EVs) by 2030, the Indian government and state governments must establish long-term, stable policies. This will instil confidence in the automotive industry and encourage significant investments in EV technology and infrastructure.

Institutional Development: To effectively implement EV policies and ensure the development of charging infrastructure at the state level, dedicated state-level institutions should be established to monitor progress and evaluate policy effectiveness. Additionally, a central coordinating body could be established to provide guidance, oversee national-level initiatives, and ensure consistency across states.

Development of Charging Infrastructure: To accelerate the deployment of EV charging infrastructure, the government should collaborate with distribution companies (discoms) to establish charging stations across the country. Globally, discoms have played a significant role

in developing charging infrastructure, as exemplified by state-owned grid utilities in China. Additionally, leveraging the existing network of petrol pumps can expedite the installation of charging stations. Partnerships between EV companies and oil marketing companies, such as the agreement between Tata Power and HPCL, can significantly contribute to expanding the charging infrastructure and addressing range anxiety among EV users.

Uniform Policies: Implementing a unified EV policy across India can streamline the adoption process by eliminating bureaucratic hurdles such as permits, parking fees, registration charges, and road tax for public transport EVs. This will facilitate the widespread adoption of electric public transportation.

Financial Support: To incentivise investment in the EV sector, the government should consider providing financial support through concessional loans or government-backed guarantees. Additionally, relaxing or removing minimum capacity requirements for EVs and batteries can promote innovation and accelerate the scaling up of the EV industry in India.[39]

CONCLUSION

Electric Vehicles (EVs) represent a significant advancement in sustainable transportation. When powered by clean energy sources, EVs can significantly contribute to a more sustainable future. However, a comprehensive evaluation of the environmental impact of EVs is essential. Factors such as the energy source used for charging, the mining and processing of battery materials, and the recycling of end-of-life batteries must be carefully considered. By adopting sustainable practices throughout the EV lifecycle, the environmental benefits of this technology can be maximised.[40] Developing indigenous EV cell technologies is indeed crucial for India's Electric Vehicle (EV) future. It will not only reduce reliance on imports but also ensure safety standards tailored to local conditions. Like China, India must prioritise robust R&D investment

[39] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.

[40] Sakshar Law Associates – Sakshi Shairwal and Vaishnavi Chandrakar, 'E-vehicles and their alignment with environmental law in India' (Lexology, 30 May 2022) <https://www.lexology.com/library/detail.aspx?g=448800bd-ff88-4820-9708-7a0c427db0fc> accessed 10 November 2024.

and attract foreign direct investment to accelerate technological advancements and establish a strong domestic EV ecosystem.[41]

To facilitate a seamless transition to Electric Vehicles (EVs), India must prioritise the development of a comprehensive infrastructure ecosystem. Government policies and investments will be instrumental in driving this infrastructure development. The Indian EV market is poised for significant growth, with an estimated investment of 94,000 crores over the next five years. Major industry players, such as Indian Oil Corporation, Skoda, Hyundai, Yamaha, Mahindra, and numerous startups, are actively investing in EV manufacturing and infrastructure. With strong government support and substantial private investment, the Indian EV market is well-positioned for future growth and development.[42]

India's Electric Vehicle (EV) industry, while promising, faces challenges due to inconsistencies in existing policies. A unified and comprehensive EV policy framework is crucial to fully realise its potential. Such a framework would streamline EV adoption, reduce greenhouse gas emissions, improve air quality, and stimulate economic growth across various sectors, including manufacturing, research and development, and trade.[43]

While there is growing public interest in EVs as an affordable and eco-friendly alternative to traditional gasoline-powered vehicles, several challenges remain. The widespread adoption of EVs requires the expansion of charging infrastructure and the development of vehicles with longer driving ranges.[44] Ultimately, a balanced approach that fosters both domestic EV technology development and strategic international collaborations is essential. This will not only catalyse the growth of India's EV ecosystem but also position the country as a global leader in sustainable mobility.[45]

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[41] Arpita Garg, Abhishek Tiwari, Deborshi Barat and Ameesha Tripathi, 'E-Vroom! An Overview of the Electric Vehicle (EV) Sector in India' (S&R Associates, 9 February 2023) <https://www.snrlaw.in/e-vroom-an-overview-of-the-electric-vehicle-ev-sector-in-india/> accessed 10 November 2024.

[42] Anandini Sood and Kopal Kesarwani, 'Electric Vehicles in the Indian Legal Domain' (IJPIEL, 11 May 2022) <https://ijpiel.com/index.php/2022/05/11/electric-vehicles-in-the-indian-legal-domain/> accessed 10 November 2024.

[43] Arjun Goswami, Varun Mehta and Avinash Das, 'Charging Up the EV Sector through Policy Reform' (Cyril Amarchand Mangaldas, 23 August 2021) <https://corporate.cyrilamarchandblogs.com/2021/08/charging-up-the-ev-sector-through-policy-reform/> accessed 10 November 2024.

[44] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.

[45] King Stubb & Kasiva, 'Electric Vehicle Industry in India: Regulations and road ahead' (King Stubb & Kasiva, 25 October 2022) <https://ksandk.com/automobile/electric-vehicle-industry-in-india-rules/> accessed 10 November 2024.