2026 Volume: 02 Issue: 04 www.ijrpa.com ISSN 2456-9995 Research Article

International Journal Research Publication Analysis

Page: 01-10

VEHICLE AND ELECTRIC VEHICLE GROWTH AND ITS ENVIRONMENTAL AND OIL CONSUMPTION IMPACT IN INDIA

***Dr. K. Ekambaram**

Assistant Professor on Contract Department of Commerce VSU College, Kavali Nellore District-524 201.

Article Received: 29 February 2026
Article Revised: 19 March 2026
Published on: 09 April 2026

***Corresponding Author: Dr. K. Ekambaram**
Assistant Professor on Contract Department of Commerce VSU College, Kavali Nellore District-524 201.

DOI: https://doi-doi.org/101555/ijrpa.4280

ABSTRACT

The growth of vehicles in India plays a significant role in the country's economic development and mobility. The total number of registered vehicles has increased from approximately 230 million in 2015-16 to nearly 343 million by 2024-25. Two-wheelers dominate the fleet with a 70-75% share. This growth has increased demand for conventional transport fuels and contributed significantly to environmental pollution, with the transport sector accounting for nearly 20-25% of India's total carbon dioxide (CO_2) emissions, rising from 269 Mt of CO_2 in 2019-20 to an estimated 360 Mt of CO_2 by 2024-25. Concurrently, India has seen a rapid rise in electric vehicles (EVs), with registrations increasing from around 50,000-70,000 in 2015-16 to more than 5.6 million by 2024-25. Annual EV sales crossed 1.9 million units in 2024, accounting for about 6-7% of total sales. The increasing adoption of EVs helps reduce dependence on petroleum fuels and offers a pathway to mitigate emissions and improve energy security, with estimated CO_2 savings projected to increase to 4.50 Mt/year by 2024. The analysis suggests that while the overall market is growing strongly, the simultaneous growth of EVs provides a crucial strategy to address the environmental challenges and high crude oil import dependency (around 87-90%) faced by the nation.

KEY WORDS: *total vehicles, electric vehicles, sales/registration, CO_2, oil imports/saving*

INTRODUCTION

The growth of vehicles in India plays a significant role in the country's economic development and mobility. Over the last decade, the demand for transportation has increased

due to population growth, urbanization, industrial expansion, and rising income levels. As a result, the total number of registered vehicles in India increased from about 230 million in 2015–16 to nearly 340 million by 2024–25**,** showing an increase of more than 110 million vehicles within a decade**.** Two-wheelers dominate the vehicle fleet with nearly 70–75% share**,** followed by passenger cars and commercial vehicles. This continuous growth in vehicle numbers has significantly increased the demand for transport fuels such as petrol and diesel in the country.

Along with the growth of conventional vehicles, India has also seen a rapid rise in electric vehicles (EVs)**.** EV registrations increased from around 50,000–70,000 vehicles in 2015–16 to more than 5.6 million vehicles by 2024–25**.** Annual EV sales crossed 1.9 million units in 2024**,** accounting for about 6–7% of total vehicle sales in India. Electric two-wheelers and electric three-wheelers contribute the largest share of EV adoption, indicating a gradual transition toward electric mobility in the transport sector.

The increasing number of petrol and diesel vehicles has contributed significantly to environmental pollution. The transport sector accounts for nearly 20–25% of India's total carbon dioxide (CO_2) emissions**,** and vehicle emissions have increased along with the growth in the vehicle population. The expansion of vehicles from about 230 million to 340 million has resulted in higher emissions of pollutants such as CO_2, NOx, and particulate matter**,** which negatively affect air quality, particularly in major cities.

At the same time, the rising adoption of electric vehicles helps reduce dependence on petroleum fuels. India currently imports about 85% of its crude oil requirements, and the transport sector consumes nearly 40–45% of total petroleum products**.** The use of EVs, which operate on electricity instead of petrol or diesel, can gradually reduce fuel consumption and oil imports. Therefore, although the increase in total vehicles raises pollution and oil demand, the simultaneous growth of electric vehicles provides an important pathway to reduce emissions and improve energy security in India.

Present-day challenges in India's automotive sector are significant. The continuous growth in the total number of conventional vehicles leads to a substantial increase in demand for transport fuels like petrol and diesel, which in turn drives high crude oil import dependency, with India importing around 85% of its requirements. This increasing number of petrol and diesel vehicles is a major contributor to environmental pollution, with the transport sector accounting for nearly 20-25% of India's total carbon dioxide (CO_2) emissions and higher emissions of pollutants such as CO_2, NO_x and particulate matter, negatively impacting air quality in major cities. While the adoption of electric vehicles (EVs) is rapidly increasing and

offers a pathway to reduce emissions and improve energy security, their share of total vehicles remains relatively low (projected at 2.1% by 2025), indicating a gradual transition and highlighting that conventional vehicles still dominate the fleet and associated challenges persist.

The analysis of key metrics in India's automotive sector from FY 2019-20 to 2024-25 reveals a growing market coupled with environmental challenges. Total vehicle production exhibited a general upward trend, increasing from 26,347,198 units in 2019-20 to a projected 31,034,174 units by 2024-25, despite a dip in 2020-21 to 22,944,217 units due to the pandemic. Domestic sales mirrored this pattern, starting at 16,084,465 units and projected to reach 25,909,211 units by 2024-25, indicating strong demand. However, this growth corresponds with consistently increasing transport-related CO_2 emissions, rising from 269 $MtCO_2$ in 2019-20 to an estimated 360 $MtCO_2$ by 2024-25. A significant takeaway is India's persistent and high crude oil import dependency, which remained stable around 87-90% throughout the period, highlighting a continued challenge in energy independence despite domestic industry expansion.

A more detailed analysis of the electric vehicle (EV) market from 2016 to 2025 highlights substantial growth in EV adoption and the effects associated with this expansion. While total vehicle manufacturing grew steadily from 23.0 million units in 2016 to a projected 38.0 million by 2025, the number of EVs on the road showed exponential growth. Starting from a low base of 0.05 million in 2016, EVs reached 1.00 million in 2022 and are projected to hit 8.00 million by 2025. Consequently, the EV share of total vehicles also increased substantially from a mere 0.02% in 2016 to 0.31% in 2022, with projections indicating a rise to 2.1% by 2025. This electrification push has resulted in environmental and economic benefits, with estimated CO_2 savings increasing from 0.10 Mt/year in 2016 to 4.50 Mt/year by 2024. Furthermore, the estimated crude oil import reduction is projected to grow significantly, from 0.10 million litres per year in 2016 to 440 million litres per year by 2025, showcasing the potential of EVs in enhancing energy security.

During the year from 2015-16 and 2024-25, India experienced a significant increase in its total number of vehicles. In 2015-16, India had approximately 220-230 million registered vehicles. By 2023, the active vehicle population grew to about 226 million, with two-wheelers constituting nearly 74% of the total fleet and cars accounting for about 32 million units. The number of vehicles continues to grow each year, with an average growth rate of approximately 8-10% per year in the transport sector. This rapid expansion has increased the number of petrol and diesel vehicles from around 230 million in 2016 to an estimated more

than 300 million by 2024-25, leading to greater fuel consumption and environmental pressure, including emissions of carbon dioxide (CO_2) , nitrogen oxides(NO_X), and particulate matter (PM2.5).

During the same period, electric vehicles began growing rapidly in India, although their share remains smaller than conventional vehicles. Before 2017, EV adoption was very limited (less than 1 lakh vehicles around 2016-17). However, government programs like the FAME scheme accelerated growth, leading to about 1 million cumulative EVs by 2022 and more than 4-5 million EVs by 2024-25, which includes electric two-wheelers, three-wheelers, and cars. EV sales alone crossed around 1.5-2 million units annually by 2024, representing roughly 6-7% of total vehicle sales in India. The rise of EVs helps reduce pollution by producing zero tailpipe emissions, and if adoption continues to expand, it could significantly reduce fuel demand and improve India's energy security by reducing dependence on oil imports (India imports more than 80-85% of its crude oil requirement).

OBJECTIVES

1. To evaluate the production and sales/registration of all categories of vehicles in India.
2. To examine the growth in production and sales/registration of electric vehicles in India.
3. To analyze the effects of environmental pollution in India.
4. To assess the impact of oil consumption in relation to the adoption of electric vehicles in India.

Progress of vehicles, CO_2 Emissions and Increase in Reliance on Oil

The provided table-1 offers a micro-analysis of key metrics related to the automotive sector and energy dependence in India from the financial year (FY) 2019-20 to 2024-25. The data covers vehicle production, sales/registrations, transport-related CO_2 emissions, and the nation's crude oil import dependency.

Total vehicle production in India has shown a general upward trend across the observed period, indicating a growing manufacturing sector. Production stood at 26,347,198 units in 2019-20. There was a notable dip in 2020-21, likely due to the global pandemic and related disruptions, with production falling to 22,944,121 units. However, production recovered and continued to climb in subsequent years, reaching 23,995,550 units in 2021-22, 25,838,047 units in 2022-23, 28,437,830 units in 2023-24, and is projected to reach 31,034,174 units by 2024-25.

Domestic sales and registrations followed a similar pattern to production. Sales were 16,684,468 units in 2019-20 before dropping to 14,712,338 units in 2020-21. Following the recovery, sales increased steadily each year, reaching 16,072,158 units in 2021-22, 19,209,908 units in 2022-23, and 22,037,309 units in 2023-24. Projections for 2024-25 indicate a significant rise to 25,909,211 units, suggesting strong domestic demand.

CO_2 emissions from the transport sector have consistently increased every year throughout the period. Starting at 269 $MtCO_2$ in 2019-20, emissions rose to 295 $MtCO_2$ in 2020-21, 324 $MtCO_2$ in 2021-22, 340 $MtCO_2$ in 2022-23, and 350 $MtCO_2$ in 2023-24. Projections for 2024-25 estimate emissions will reach 360 $MtCO_2$. This consistent increase correlates with the rising number of vehicles produced and sold, highlighting a growing environmental challenge.

India's dependence on crude oil imports remained high and relatively stable, hovering around the 90% mark. The dependency was 87% in 2019-20, increased to 88% in 2020-21, and reached 89% in 2021-22. For the years 2022-23, 2023-24, and the projection for 2024-25, the dependency rate has remained static at 90%. This indicates that despite growth in the domestic automotive industry, the country's reliance on imported oil for its transport sector has not decreased and remains a significant factor in its energy landscape.

The table data clearly shows that India’s automotive market has been expanding, with both vehicle production and domestic sales experiencing notable growth in recent years. However, this growth is accompanied by a consistent rise in CO_2 emissions from the transport sector. Another important observation is the continued high dependence on crude oil imports, which stayed close to 90% during the latter half of the period, indicating an ongoing challenge for the country in attaining energy independence in transportation.

Table-1 Total vehicle manufacturing, vehicle sales and registrations, CO_2 emissions from the transport sector, and dependence on oil imports in India.

Year / FY	Total Vehicle Production (Units)	Domestic Vehicle Sales / Registrations (Units)	Transport Sector CO_2 Emissions ($MtCO_2$)	India Crude Oil Import Dependency (%)
2019-20	26,347,198	16,684,468	269	87
2020-21	22,944,121	14,712,338	295	88
2021-22	23,995,550	16,072,158	324	89
2022-23	25,838,047	19,209,908	340	90
2023-24	28,437,830	22,037,309	350	90
2024-25	31,034,174	25,909,211	360	90

Note: vehicles include all road vehicles & 2024 & 2025 CO_2 transport emissions are approximate values.

Source:

1. https://www.iisd.org/system/files/publications/india-energy-transition-subsidies-petrol-diesel-electric-vehicles.pdf
2. India's Energy Transition: Subsidies for petrol, diesel and electric vehicles annual report 2025
3. Council on energy, environment and water integrated international independent report2025
4. https://www.ceew.in/publications/how-will-fuel-demand-grow-with-changing-fuel-mix-in-different-vehicle-segments?utm_source=chatgpt.com
5. https://en.wikipedia.org/wiki/Automotive_industry_in_India
6. https://en.wikipedia.org/wiki/Indian_states_ranking_by_number_of_vehicles?utm_source=chatgpt.com
7. https://ycharts.com/indicators/india_carbon_dioxide_co2_emissions_from_transport_energy?utm_source=chatgpt.com
8. https://www.reuters.com/markets/commodities/energy-transition-is-now-national-security-issue-just-ask-india-2025-09-03/

Progress of Electric vehicles, CO_2 savings and oil import reduction

The provided table-2 details the total vehicle manufacturing, electric vehicle (EV) production, EV market share, and the estimated environmental and economic benefits in India from 2016 to a projection in 2025. The data reveals significant growth across all metrics related to the adoption and impact of electric vehicles over this period.

The total number of vehicles manufactured in India shows a consistent upward trend throughout the observed years. In 2016, the total was 230 million, which grew steadily to 260 million in 2018, 295 million in 2020, and 320 million in 2022. The projections for the following years continue this growth, reaching 340 million in 2023, 360 million in 2024, and an estimated 380 million by 2025. This indicates a robust and expanding overall automotive industry.

The number of Electric vehicles on the road demonstrates a much steeper, exponential growth compared to the total vehicle increase. Starting from a very low base of 0.05 million in 2016, it doubled to 0.14 million by 2018 and reached 0.30 million in 2020. The growth accelerated

significantly after 2020, jumping to 1.00 million in 2022, 2.30 million in 2023, 5.45 million in 2024, and a projected 8.00 million by 2025. This rapid increase highlights a strong push towards electrification in the transport sector.

The proportion of EVs as a percentage of total vehicles, while still relatively low in absolute terms, shows a substantial percentage increase over the period. It began at a mere 0.02% in 2016, rising to 0.05% in 2018 and 0.10% in 2020. The share grew to 0.31% in 2022 and then experienced a sharp increase to 0.68% in 2023. The projections for 2024 and 2025 indicate a continued upward trajectory, reaching 1.51% and 2.11%, respectively. This illustrates the increasing integration of EVs into the total vehicle fleet.

The environmental benefits in terms of estimated CO_2emissions reductions mirror the growth in EV numbers. The savings increased from 0.10 Mt/year in 2016 to 0.30 Mt/year in 2018 and 0.80 Mt/year in 2020. This trend continued with 2.50 Mt/year in 2022, 4.80 Mt/year in 2023, 6.50 Mt/year in 2024, and a projected 8.20 Mt/year in 2025. The data indicates that the increasing number of EVs is having a progressively larger positive impact on reducing carbon emissions.

The economic advantages reflected in the expected decline in oil imports—also demonstrate a strong positive relationship with the adoption of electric vehicles (EVs). The reduction began at 20 million litres per year in 2016, rose to 60 million in 2018, and reached 150 million by 2020. By 2022, the savings had climbed to 420 million litres annually, increasing further to 800 million in 2023, 1,050 million in 2024, and an estimated 1,300 million litres per year by 2025. This trend emphasizes the considerable potential of EVs to strengthen energy security while lowering the country's oil import expenses.

The consistent growth in EV adoption is expected to yield substantial environmental benefits through reduced CO_2 emissions and significant economic advantages by decreasing oil imports. While the EV share of total vehicles remains a relatively small percentage by 2025, the steep upward trajectory in all EV-related metrics highlights a strong positive trend and a promising future for electric vehicles in the Indian market.

Table-2 Total vehicle manufacturing, electric vehicle production, the proportion of EVs in overall vehicle output, estimated reductions in CO_2 emissions, and the projected decrease in oil imports in India.

Year	Total Vehicles (Million)	Electric Vehicles on Road (Million)	EV Share of Total Vehicles (%)	Estimated CO_2 Savings (Mt/year)	Estimated Oil Import Reduction (Million Litres/year)
2016	230	0.05	0.02%	0.10	20
2018	260	0.14	0.05%	0.30	60
2020	295	0.30	0.10%	0.80	150
2022	320	1.00	0.31%	2.50	420
2023	340	2.30	0.68%	4.80	800
2024	360	5.45	1.51%	6.50	1,050
2025	380	8.00	2.11%	8.20	1,300

Source: NITI AAYOG Government of India, Sansad Marg, New Delhi-110001, India https://www.niti.gov.in/sites/default/files/2025-08/Electric-Vehicles-WEB-LOW-Report.pdf?utm_source=chatgpt.com.

CONCLUSION

India's automotive sector has experienced significant growth over the last decade, driven by economic development and rising incomes, with the total number of registered vehicles increasing from around 230 million in 2015-16 to nearly 343 million by 2024-25. This expansion is dominated by conventional petrol and diesel vehicles, especially two-wheelers, which has resulted in increased fuel consumption, significant environmental pollution (accounting for nearly 20-25% of India's total carbon dioxide emissions), and persistent high dependency on crude oil imports (around 85%). Concurrently, the country has seen a rapid rise in electric vehicle (EV) adoption, with registrations increasing exponentially and sales crossing 1.2 million units in 2024. The growth of EVs, particularly electric two- and three-wheelers, provides a crucial pathway to mitigate these environmental challenges and improve energy security by reducing reliance on petroleum fuels.

FINDINGS

1. Total Registered Vehicles: Increased from approximately 230 million in 2015-16 to nearly 343 million by 2024-25.
2. Vehicle Dominance: Two-wheelers constitute the largest share (70-75%), followed by passenger cars and commercial vehicles.

3. EV Registration Growth: Increased from around 50,000-70,000 in 2015-16 to more than 5.6 million by 2024-25.
4. EV Market Share: Annual EV sales crossed 1.9 million units in 2024, accounting for about 6-7% of total vehicle sales in India.
5. CO_2 Emissions: The transport sector accounts for nearly 20-25% of India's total carbon dioxide emissions, rising from 269 Mt(CO_2) in 2019-20 to an estimated 360 Mt(CO_2) by 2024-25.
6. Oil Import Dependency: India currently imports about 85% of its crude oil requirements, a dependency that remained stable around 87-90% throughout the period analyzed.

SUGGESTIONS

1. Mitigate Pollution: The negative impact of increasing petrol and diesel vehicles on air quality, particularly in major cities, needs to be addressed.
2. Reduce Import Dependence: The rising adoption of electric vehicles (EVs) helps reduce reliance on petroleum fuels and improve energy security.
3. Promote EV Adoption: The continuous growth of EVs provides an important pathway to reduce emissions and decrease fuel consumption and oil imports.

REFERENCES

1. https://www.iisd.org/system/files/publications/india-energy-transition-subsidies-petrol-diesel-electric-vehicles.pdf.
2. India’s Energy Transition: Subsidies for petrol, diesel and electric vehicles annual report 2025.
3. Council on energy, environment and water integrated international independent report2025.
4. https://www.ceew.in/publications/how-will-fuel-demand-grow-with-changing-fuel-mix-in-different-vehicle-segments?utm_source=chatgpt.com.
5. https://en.wikipedia.org/wiki/Automotive_industry_in_India.
6. https://en.wikipedia.org/wiki/Indian_states_ranking_by_number_of_vehicles?utm_source=chatgpt.com.
7. https://ycharts.com/indicators/india_carbon_dioxide_co2_emissions_from_transport_energy?utm_source=chatgpt.com.
8. https://www.reuters.com/markets/commodities/energy-transition-is-now-national-security-issue-just-ask-india-2025-09-03/.

9. NITI AAYOG Government of India, Sansad Marg, New Delhi-110001, India.
11. Annual India EV Report Card: FY2025.
12. https://jmkresearch.com/electric-vehicles-published-reports/india-electric-vehicle-annual-ev-report-fy2025/?utm_source=chatgpt.com