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Emission Regulation in India: Environmental Karisma or a Planned Chaos

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The transport and automobile sector plays a vital role in a nation's development by providing access to public space and essential services and creating new employment opportunities. However, vehicular emissions such as cars, trucks, aeroplanes, and ships are major sources of pollution, releasing carbon monoxide, hydrocarbons, and nitrogen oxides. In many cities, vehicles account for more than 60% of total air pollution.¹ This article will explore the benefits of vehicle emission regulatory policies. Although the Indian Government planned a comprehensive set of policies to address India's high emission levels, the country currently faces a serious air quality crisis that remains unchanged and worsens daily. This research examines the operational challenges posed by upcoming, stricter regulatory norms and highlights the potential outcomes of emission regulation. It also includes a comprehensive study on the evolution of norms, the role of technological innovation, compliance burdens on manufacturers, and the balance between economic growth and environmental sustainability in India's regulatory framework.

Keywords: *emission, air pollution, environment, automobile, standards.*

¹ Tamaz Patarkalashvili, 'Road Traffic is The Major Source of Pollution in Big Cities' (2025) 4(1) Medires Publishers <<https://www.mediresonline.org/road-traffic-is-the-major-source-of-pollution-in-big-cities.html>> accessed 01 March 2026

INTRODUCTION

India is a country whose population exceeds the world's, with its enriching diversity and unity, featuring diverse practices and ethnicities. To preserve these characteristics, it is essential to ensure the health and well-being of its people. In line with this goal, there is a need to promote medical stability across the nation by providing clean air to breathe, as the environment plays a vital role. To improve air quality, the government has worked tirelessly. Among these efforts, the transport industry is a key focus. 5% of gross value added (GVA) is contributed by the transport sector in India;² however, it has much broader implications for the country's development by connecting production centres with consumption centres and facilitating labour mobility across the nation. The share of transport in total CO₂ emissions from energy use is 12%³ higher than its sectoral share in GVA. Effective emission control plays a vital role in addressing climate change, enhancing air quality, and safeguarding public health.⁴ The Indian government has introduced several key initiatives, including the National Clean Air Program (NCAP), launched in 2019, which initially covered 122 cities and expanded to 131 cities by mid-2024. Additionally, the Bharat Stage VI emission standards align with European regulations. In India, motor vehicles increased from 0.3 million in 1951 to about 50 million in 2000.⁵ Two-wheelers, mainly powered by two-stroke engines, make up 70% of all vehicles. Together with cars (excluding taxis), which are personal vehicles, they comprise roughly 88% of the total vehicle fleet.⁶ The rapid increase in the number of vehicles has significantly affected atmospheric quality and contributes to various environmental and health problems. Rising concentrations of pollutants such as carbon dioxide (CO₂), carbon monoxide (CO), and nitrogen oxides (NO_x) have become a major concern. Increasing public awareness and improving energy efficiency can play an important role in protecting the environment and promoting sustainable development.

² ROADMAP FOR INDIA'S ENERGY TRANSITION IN THE TRANSPORT SECTOR (TERI 2024)

³ *Transitioning India's Road Transport Sector* (IEA 2023)

⁴ Jason Rudokas et al., 'Regional Air Quality Management Aspects of Climate Change: Impact of Climate Mitigation Options on Regional Air Emissions' (2015) 49(8) *Environmental Science & Technology* <<https://pubs.acs.org/doi/10.1021/es505159z>> accessed 01 March 2026

⁵ *Motor Transport Statistics of India (1999–2000)* (Open Government Data (OGD) Platform India 2015)

⁶ *Environment Status Report 2024–25* (Brihanmumbai Municipal Corporation 2025)

HISTORICAL EVOLUTION OF THE REGULATION OF NORMS

California established the first emission regulations in 1965, and the United States of America (USA) adopted them nationwide in 1968.⁷ European nations established emission limits in 1970, and the United States mandated oxidation catalysts in 1974 to comply with those standards. This led to the introduction of three-way catalytic converters in production cars starting in 1981. As a result, different post-treatment techniques and design changes are developed to lower the harmful emissions. The United States adopted Tier Emission requirements, while European nations adopted EURO emission standards. In order to manage air pollution, the Air (Prevention and Control of Pollution) Act was first passed in 1981.⁸ The Indian government's Environment (Protection) Act 1986 set the stage for regulating motor vehicle emissions in India. The Motor Vehicles Act 1988, which permits the government to enforce the emission limits, followed by this, India started adhering to certain emission criteria.⁹ 1991 and 1992 saw the introduction of pollution regulations for gasoline-powered vehicles and diesel vehicles, respectively.

In 2000, the EURO emission standards were adopted as a benchmark. The 2003 Auto Fuel Policy outlines the schedule for implementing the various phases of emission standards throughout India and the adoption of pollution regulations in a few localities and across the nation. The EURO 1 emission standards serve as the basis for the Indian emission standard India 2000 (BS I), which is derived from EURO II, EURO III, EURO IV, EURO V, and EURO VI. The Indian Supreme Court has mandated that the sale of BS-IV vehicles cease by the end of March 2020, and it plans to start implementing BS-VI emission regulations nationally in April 2020.¹⁰ It can be examined from the emission standard values of several categories using data from the Ministry of Environment, Forestry, and Climate Change's Central Pollution Control Board, Government of India¹¹ and Emission standards, India from Dieselnet. The other exhaust emissions, such as sulfur, ozone, benzene, and soot generation

⁷ Anthony Branch, 'Congress Passes the Motor Vehicle Air Pollution Control Act' (*EBSCO*, 20 October 1965) <<https://www.ebsco.com/research-starters/history/congress-passes-motor-vehicle-air-pollution-control-act>> accessed 01 March 2026

⁸ The Air (Prevention and Control of Pollution) Act 1981

⁹ The Motor Vehicle Act 1988

¹⁰ 'Enforcement of BS-VI Emission Norms' (*PIB*, 25 February 2016)

<<https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=136836®=3&lang=2>> accessed 01 March 2026

¹¹ 'Vehicular Exhaust' (*Central Pollution Control Board*) <<https://cpcb.nic.in/vehicular-exhaust/>> accessed 01 March 2026

in gasoline direct injection (GDI), were not included in this study. Instead, the key emissions, such as CO, HC, NO_x, and PM data, were combined collectively, and graphs were created for understanding. One of the main greenhouse gases that must be eliminated from cars is CO₂, which is produced by perfect combustion. Fuel usage should also be decreased.

KEY VEHICULAR STANDARDS

The Indian government has established air quality regulations for a number of pollutants. For instance, the residential area's ambient NO₂, PM₁₀, and CO levels should be 80µg/m³, 100µg/m³, and 4 mg/m³, respectively.¹² The manufacturers of automobiles must focus on using new technologies to reduce these harmful emissions. They should also install existing technologies, such as the On-Board Diagnosis, 3-way Catalytic Converter, Diesel Particulate Filter, Charcoal Canister, etc., correctly in every vehicle and service them on a regular basis. The usage of alternative fuels, such as compressed natural gas, non-edible oils,¹³ and liquefied petroleum gas,¹⁴ has also emerged as a quick fix for the pollution issue. The majority of Indian cities have already surpassed the WHO's recommended safety air quality guidelines.¹⁵ Maintaining clean air quality in the environment is essential for the benefit of all living things.

ISSUES RELATED TO THE AUTOMOBILE INDUSTRIES

India produces more than 5.8 million cars a year, making it the fourth-largest vehicle producer. With a focus on cost-competitive production, it functions as a significant hub for passenger vehicles, two-wheelers, and the growing EV sector. Beyond just boosting the economy, it also creates jobs and encourages millions of individuals to buy cars for themselves and their families. Related industries, including steel, semiconductors, and textiles, are also supported by this industry. As previously stated, increased participation

¹² National Ambient Air Quality Standards 2009

¹³ V Dhana Raju et al., 'Experimental Studies on Four Stroke Diesel Engine Fuelled with Tamarind Seed Oil as Potential Alternate Fuel for Sustainable Green Environment' (2018) 2(1) European Journal of Sustainable Development Research <<https://www.ejosdr.com/article/experimental-studies-on-four-stroke-diesel-engine-fuelled-with-tamarind-seed-oil-as-potential>> accessed 01 March 2026

¹⁴ Alexandru Cernat et al., 'The Influence of LPG Fuelling on Diesel Engine Cycle Variability' (2016) 22 Procedia Technology <<https://www.sciencedirect.com/science/article/pii/S2212017316000359>> accessed 01 March 2026

¹⁵ Swapnil Shelke et al., 'A Review on Bharat Stage Emission Norms' (2017) 5(1) International Journal for Scientific Research & Development <<https://www.ijserd.com/articles/IJSRDV5I10420.pdf>> accessed 01 March 2026

entails increased accountability. To control the automotive sector, the government has implemented a number of stringent emission regulations, although doing so raises prices for both manufacturers and customers.

The government frequently ignores the pressing need to address fundamental transportation requirements in favour of an ill-defined rivalry with worldwide emission regulations. The transportation sector's proportion of the overall final energy consumption rose significantly from 11 to 16 per cent between 2000 and 2021. In 2019–20, road transportation accounted for 83% of all passenger traffic and 74% of all freight traffic. The transportation sector is responsible for over 80% of the nation's high-speed diesel (HSD) and 99% of its gasoline usage.

Figure 1 illustrates how consumption of HSD and gasoline increased dramatically between 2003–04 and 2023–24, by 2.4 times for HSD and 4.7 times for gasoline.

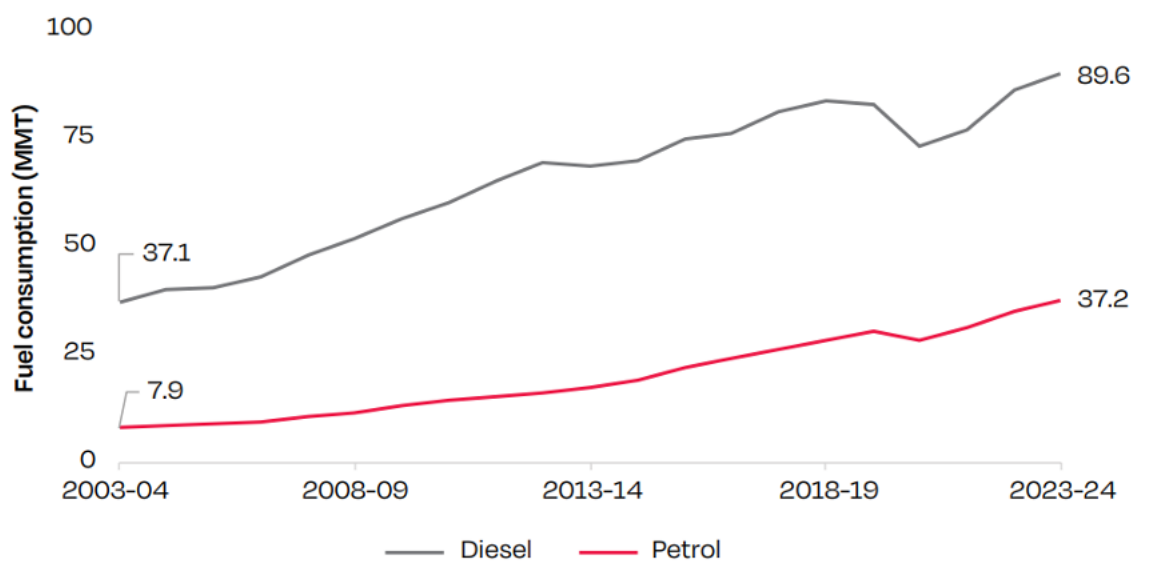


Figure 1: Petrol and Diesel Consumption

CHALLENGES AND IMPACTS

The fact that many of the facilities and technologies are already antiquated and do not meet the current emission requirements is one of the main issues. The high expenses associated with adopting cleaner technology are among the challenges that many sectors, particularly SMEs, confront. Green technology and innovation present opportunities since they can support both the environment and the industrialisation process. Sustainable industrial

development is guided by the government's emphasis on the green economy, subsidies for greener technologies, and investments in renewable energy sources. The harmony between industrial expansion and emission regulations.

It is difficult to strike a balance between industrial growth and pollution limits, but it is necessary. High emission requirements might affect an industry's profitability and growth rates since they increase the cost of compliance. For example, implementing stringent emission reduction measures, such as using high emission control technology, necessitates significant capital expenditure and operational modifications that could impede industrialisation or raise the price of goods and services. Strong emission regulations and sustainable industrial growth, however, are positively correlated in numerous ways.

Therefore, it is clear that effective regulation will probably improve resource use, long-term competitiveness, and innovation. Additionally, industries that invest in greener technologies are more productive and create new markets for green goods, according to a study. However, there are benefits as well, such as improved public health and less environmental deterioration, which will support the development of a stable socioeconomic foundation for sustainable industrialisation.

FUTURE DIRECTIONS

By 2035, BS 7 will reduce overall NO_x emissions from automobiles and vans by 35% compared to BS 6, and from buses and lorries by 56% compared to BS VI. Particles from a car's brakes will be reduced by 27%, while those from cars and vans' tailpipes will be reduced by 13% and those from buses and trucks by 39%.¹⁶ To make sure that cars are as clean as required by the Euro 6 standards, the European Commission has expanded the market surveillance authority of Member States and the Commission and implemented new tests to measure emissions on the road (the RDE method) in response to the Volkswagen emissions scandal in September 2015.

This will undoubtedly lead to more stringent testing procedures in the BS stage for our Indian automakers. The BS-7 standard lowers allowable exhaust emissions and tightens CO₂

¹⁶ Aakash Raj and Nagraj Patil, 'FORECASTING OF FUTURE BHARAT STAGE EMISSIONS STANDARDS' (2025) ResearchGate
<https://www.researchgate.net/publication/389990457_FORECASTING_OF_FUTURE_BHARAT_STAGE_EMISSIONS_STANDARDS> accessed 01 March 2026

limitations. The majority of cars in India still employ combustion engine technology, despite an increase in the number of electric vehicles. Expectations are in place to create future-proof, eco-friendly products that currently meet the emission standards that the government expects to mandate in a few years, probably by the end of 2025, in order to facilitate more sustainable mobility in this region. It is impossible to determine precise BS-7 standards. However, cutting exhaust emissions in half will once again be a struggle for automakers.

Additionally, the car's exhaust system must undertake a high degree of pollution cleaning as soon as the engine is started in accordance with the new BS-7 standard. The analysis predicts that the BS-7 standard will be implemented no later than 2026. This is already having an effect on automakers because of the length of time needed for car development. The CO₂ emission regulations are complementary to the pollutant emission regulations. This proposal takes into consideration the agreed-upon goal of 100% CO₂ reduction for vehicles and vans by 2035.

CONCLUSION

India's efforts to control vehicle emissions show both advancements and enduring difficulties. The nation has gradually accepted and improved emission regulations over the last few decades, progressing from early Bharat Stage requirements to the widespread adoption of BS-VI standards. These actions show a strong understanding of the vital role that pollution from transportation plays in declining public health and air quality. The government's dedication to resolving environmental issues while striking a balance with developmental aspirations is demonstrated by the implementation of initiatives like the National Clean Air Program (NCAP) and compliance with international emission standards.

The situation on the ground is still complicated in spite of these efforts. India's rapidly expanding automobile fleet, which is primarily made up of two-wheelers and private vehicles, continues to significantly contribute to urban air pollution, frequently above acceptable levels advised by international organisations like the World Health Organisation. Adopting greener technology is difficult for many industries, particularly small and medium-sized businesses, because of high prices and antiquated infrastructure. This slows the rate of progress by creating a scenario where operational limitations and regulatory

purposes collide. Strict enforcement is a tough balancing act due to the additional complication of maintaining inexpensive transportation for millions of residents.

Stricter regulations, such as the soon-to-be-implemented BS-VII, as well as a gradual shift to electric cars and other fuels, provide a route forward for significant reductions in harmful emissions and greenhouse gases. However, legislation alone will not be sufficient to achieve these objectives. Public awareness efforts, consistent monitoring, research and development funding, and effective enforcement will all be essential. Environmental regulation and industrial growth don't have to be mutually exclusive; in fact, adopting sustainable practices and cleaner technology may boost competitiveness, encourage innovation, and provide new business prospects. In a world where environmental consciousness is growing, industries that adapt proactively stand to enjoy long-term efficiency advantages and enhanced commercial relevance.

In conclusion, since India is at a pivotal point in its environmental journey, emission regulations should be contested based on the country's economic situation rather than to demonstrate an international standard. Although the current frameworks and policies offer a strong basis, concerted action by the government, business community, and society as a whole will be necessary for their ultimate success. India has the ability to make its transportation sector a sustainable development model by combining technical innovation, regulatory control, and public engagement. If the country continues to prioritise both environmental responsibility and economic growth in a balanced and practical way, then cleaner air, healthier populations, and a resilient automobile sector are not merely aspirational aims but rather attainable results.