



Legal framework preventing hazardous emission from vehicular exhaust in India: Issues and challenges

Abhijit A More

Research Scholar, National Law University, Nagpur, Maharashtra, India

Abstract

The WHO estimated that nearly 7,00,000 people die each year in south Asia and nearly 40,000 premature deaths caused each year in Indian cities due to air pollution. The emission through the vehicle is contributing nearly 70% to air pollution in Indian cities. To avoid these health hazards, the Central Government has framed various policies, laws and regulations for preventing the emission of Air pollutant through the vehicular exhaust. Strict compliance to emission norms can cause huge economic losses to Automobile Industry if no relaxation is given to sell outdated inventory. The Indian Automobile industry is employing millions of people and contributing nearly 7% to the Indian GDP. The Central Government while framing laws must consider the health of people as well as the financial health of the Automobile industry. The strong financial condition of the Automobile industry will make sure smooth compliance with emission norms. This will prevent Air pollution through the vehicle and will create millions of job opportunities in the Automobile industry in future. The researcher in this paper will critically analyse the legal framework dealing with the prevention of Air pollution through the vehicular exhaust. The researcher will find out the issues and challenges before the government and Automobile industry for the introduction of eco-friendly auto technologies in India.

Keywords: WTO, air pollution, central government, automobile industry, emission norm, GDP, eco-friendly, auto-technologies

Introduction

Transportation is the movement of goods and persons from place to place and the various means by which such movement is accomplished. The growth of the ability—and the need—to transport large quantities of goods or numbers of people over long distances at high speeds in comfort and safety has been an index of civilization and in particular of technological progress^[1]. The importance of transport for economic development results from its multilateral links with different forms of human activity. The interdependencies between the demand for transport and socio-economic development have been the subject of many research studies which indicate a strong correlation. Strong transportation and transport-related infrastructure contributed heavily to the economic, social and cultural development of any Country. The Automobile Industry is now providing a faster and smarter mean of transportation with the development of motor vehicles. These motor vehicles are helping people to move faster from one point to other.

With time, technologies relating to the Automobile sector updated and developed to provide cost-effective vehicles. Initially only rich people could afford vehicles due to their high prices however with the development of good road infrastructure, increase in per capita income, growth of automobile industry, development of cost-effective auto technologies, urbanization, Cheap finance for the purchase of the vehicle, government support to the Automobile industry and increase in need of consumers increases the number of vehicles on road. These vehicles are running on traditional fuels like diesel and Petrol which emits hazardous pollutants in the air. The gases emitted from the combustion of fuels are carbon monoxide, Carbon dioxide,

Nitrogen Oxides, Sulphur Oxide, hydrocarbon and particular matter cause a significant adverse impact on the health of people. These gases are the reason behind the deteriorating health conditions of people. These gases are also the major contributor to global warming causing an increase in temperature each year. Air pollution is causing many health hazards and emission from the vehicular exhaust is the reason behind 70% of the air pollution in cities. Exposure to air pollution is causing 10 Lakhs deaths annually worldwide. The Transportation sector in India emits nearly 260 tonnes of Carbon dioxide. This hazardous emission is the reason Indian people are facing difficulty in breathing.

According to International Council on Clean Transportation survey, nearly 40,000 premature deaths caused each year in Indian cities due to emission of PM from the vehicle and nearly 7 lakh people dies in South of Asia due to air pollution in 2016^[2, 3]. According to Greenpeace Southeast Analysis of IQAir data^[4], 1 lakh 20 thousand people die in India due to pollution in 2020. An estimated 25,000 avoidable deaths in Mumbai in 2020 have been attributed to air pollution. Bengaluru, Chennai, Hyderabad and Delhi estimated an approximate 12,000, 11,000, 11,000, and 54,000 avoidable deaths respectively due to polluted air.

History of Emission Norms in India

Initially, vehicles used to emit a huge amount of particular matters and gases in the air but at that time number of vehicles on road was less. However, with the increase in the number of vehicle need was felt to have emission norms to compel automobile manufacturer to update automobile technology causing less emission. The Central government of India under the order from the Supreme Court introduced

EURO Norm in 1999. EURO Norm permits emission up to 14.3-27.1 g/km of Carbon dioxide and 2.0 g/km of Hydrocarbon ^[5].

Euro norms were followed in Europe however, because of different driving style, average speed and driving rules of India and Europe, India started its emission norm i.e., Bharat Stage Norm. The difference between Europe's and India's norm is very marginal. India doesn't follow the norm uniformly all over India. Big metropolitan cities like Mumbai, Delhi, Calcutta and Chennai follow emission norm first then the rest of the country follow that norm after a considerable amount of time.

In the Year 2000, Commercial Vehicle follows India 2000 norm which was equivalent to Euro I Norm. It used to emit 8.68-12.40 g/km of carbon dioxide and 3.00-4.36 g/km of carbon dioxide and Nitrogen dioxide ^[6]. When the rest of the country was following the BS-II norm in 2005, cities like Delhi, Mumbai, Calcutta and Chennai followed the BS-II norm in 2001. BS-II norm permits 2.2 g/km CO and 0.5 g/km of HC+NOx. Bharat Stage norm III reduced emission of CO + NOx to 0.5 g/km. BS III norm implemented in the country in a staggered manner in October 2010 while big cities followed the same norm in 2005 itself ^[7].

Bharat Stage IV reduced the emission of CO to 1.0 g/km and 0.18 g/km of HC+NOx. The BS-IV norms were implemented in major cities by April 2010 and the country follows that norm in 2014. India lags behind European and American countries in emission standards so with the direction of the Supreme Court India Leapfrog BSV Norm and followed BSVI norm implemented on April 1, 2020. The implementation of the BSVI norm put India in the elite club of countries with the best emission norm.

Role of the Supreme Court behind Leapfrogging of BSV Norm.

The Supreme Court of India directed that BSVI vehicles would be sold after April 1, 2020, after leapfrogging BSV norm vehicle from BSIV norm. India already switched to the world's cleanest petrol and diesel from April 1, 2020, as it leapfrogs straight to Euro-VI emission compliant fuels from Euro-IV emission compliant fuel ^[8]. Due to Corona Virus, a lockdown short window was granted to automobile manufacturer to sell their outdated stock. Solicitor General Mr Nadkarni and the Federation of Automobile Dealer Association requested the government to allow automobile manufacturer to sell their unsold inventory worth ₹7,000 crores. On this request, Justice Arun Mishra told the dealer that "you have already sold more than what was allowed and no further extension will be granted". The Supreme Court also directed Central Government not to register any vehicle sold after 31 March 2020 ^[9]. He made a further inquiry about the discount given by automobile manufacturer to sell their outdated stocks after March 31, 2020 ^[10].

Article 21 of the constitution of India provides the fundamental right of Pollution free environment to all its citizen, which could be recourse by any individual on violation of that right under Article 32 and Article 226 of the Constitution of India from SC and HC respectively ^[11]. This right is protected by Judiciary by the compelling automobile industry to strictly comply with emission norm even at the cost of huge economic losses to them. The Judiciary while thinking about the fundamental right of people could damage the economic condition of the

Automobile industry employing millions of people and contributing nearly 7% to the Indian GDP. When the Automobile industry was facing challenges, the SC doesn't grant additional time to automobile manufacturer to sell inventories worth hundreds of Crores remain unsold due to the sudden lockdown in March due to the Corona Virus pandemic. This may impact the long term growth of the Automobile industry hampering India's goal of emission-free transportation in future. The weak financial condition of the automobile industry will impact R&D, which requires lots of money for improving auto-tech to be more eco-friendly and safer ^[12].

Initiatives Taken and Policies Framed by Central Government for Promoting Emission Free Transportation in India

Ministry of Road Transport and Highways Construction is the ministry which also regulates and frame rules and regulation for the Automobile industry. This ministry talks to various stakeholders and automobile manufacturers to provide effective, safe and environmentally-friendly vehicles. It also tries to resolve issues surrounding the automobile industry. Motor Vehicle Act 1988 and Central Motor vehicle rules 1989 are framed for regulating the safety and emission through vehicles in India. Ministry has created several committees for research in legal framework dealing with transportation i.e., Motor Vehicle Act 1988 and Central Motor Vehicle Rule 1989. The Committees Constituted are:

1. Standing Committee of Implementation of Emission Legislation
2. Central Motor Vehicle Rule – Technical Standing Committee
3. Automobile Industry Standing Committee

The Standing Committee of Implementation of Emission Legislation suggests a recommendation to MoRT&H on future emission and noise norms. The Standing Committee of Emission Legislation committee compromise members from the Ministry of Petroleum and Natural Gas, Ministry of Environment and Forest, SIAM and Ministry of Heavy industry and Public Enterprises. The objectives behind the formation of these committees are to provide technical clarification and actual interpretation of various legal framework dealing with motor vehicle transportation. It also suggests necessary changes required in Motor Vehicle Act and Central Motor Vehicle Rules ^[13]. The Motor Vehicle Act, 1988 direct automobile manufacturer to maintain the standard of construction, maintenance and equipment's to be inbuilt in the vehicle for ensuring safer and liability-free transportation. The Central Motor Vehicle rules compel vehicle owner to have PUC ^[14] for the vehicle to check whether the vehicle is emitting air pollutant beyond the permissible limit ^[15]. CMVR 1989, empowers Central Government to create various testing and validating bodies to make the vehicle in India safer and emission-free. This testing agency will not allow the selling of vehicle in India not complying with safety and emission standards.

The Central Pollution Control Board was instituted by the Ministry of Environment, Forest and Safety. The Central Pollution Control Board specifies the number of Particular matters that should be permitted to emit due to internal engine combustion. The decision is taken by CPCB based on the quality of air in the Country and the technological

advancement of the automobile industry.

National Automotive Testing and R&D Infrastructure Projects is an initiative undertaken by Central Government under the Central Motor Vehicle Rules 1989 to create testing and validation agencies. These projects ensure smooth communication between Central Government, State Government and the Automobile industry. By Setting up testing, validation and R&D agencies across the country government are promoting more safer and emission-free vehicles. These agencies will work to improve the quality of Indian vehicles and protect the interest of consumers as well as the Automobile industry. While grating validation to automobile manufacturer to sell its motor vehicle in Indian market it will look after the compliance made by them with Indian laws regulating safety and emission. The NATRIP established test centres at various places like GARC^[16], (Chennai), NCVRS^[17] (Raibarelli), ARAI^[18] (Pune), iCAT (Manesar), NIAIMT^[19] (Silchar), NATRAX^[20] (Indor), VRDE^[21] (Ahmednagar).

- The two existing facilities 'Automotive Research Association of India (ARAI-Pune) and Vehicle Research & Development Establishment (VRDE - Ahmednagar)' have been upgraded with new technologies to find out the solution to avoid accidents and emission through the vehicular exhaust^[22].
- Global Automotive Research Centre (GARC) has been authorized as a testing agency under CMVR 126 by the Ministry of Road Transport & Highways and Govt. of India. GARC has the full-fledged R&D and Homologation Test Facilities including the test tracks to certify all category of vehicles, systems and components as per national and international standards.
- The National Automotive Test Tracks (NATRAX-Indore) will be a world-class automotive proving ground for comprehensive testing and evaluation of all type of vehicles. The core of the facility is the oval 4-lane high-speed track of 13.6 KM designed for a neutral speed of 250 km/ph on curves. A large part of the test load on this facility is related to the evaluation of automotive performance such as max speed, acceleration, brake, efficiency, noise, vibration, handling, stability etc^[23].

India will be in a position to sell its locally manufactured vehicle in the world if we followed safety norms followed by western countries. Presently many Indian cars are not as per the global safety and emission standards. These projects aim to ensure cost-effective vehicles for Indian consumers and compliance with global safety standard so that India will sell its vehicle in other countries as well. Presently locally manufactured cars in India are not allowed by any government of the foreign country to be sold in their market due to non-compliance with global standard.

The Auto Fuel Vision and Policy 2025 was drafted by the Ministry of Petroleum and Natural Gas in January 2013. This policy aims to set standards of fuel quality till 2025 and opt for the cleanest fuel possible till 2025. The supply of BSVI fuel notified in the entire country in 2017 while the supply of same extended on April 1, 2005, to the most polluted city in the world i.e., Delhi. The expert committee was constituted for the formulation of the roadmap in December 2013. The proposed roadmap directs the implementation of the BS V norm by 2020 and the BS-VI norm by 2024^[24]. However, to achieve emission norms of

European and Western countries India leapfrogs BSV norm and implemented the BSVI norm on April 1, 2020^[25].

In January 2013, the Prime Minister of India launched National Electric Mobility Mission Plan to increase the use of electric, hybrid or any other environment-friendly means and modes of transportation. It aims to have at least nearly 6-7 million electric or hybrid vehicles on Indian roads by 2020. Under NEMMP 2020, the Ministry of Heavy industry empowered to administer FAME India Scheme. FAME stands for faster adoption and manufacturing of Hybrid and Electric vehicle. The aim of the FAME India Scheme under NEMMP 2020 was to provide monetary and fiscal incentives to manufacturers and consumers on an electric and hybrid vehicle. It aimed to create an electric charging infrastructure for promoting and creating confidence in electric vehicles. National Automotive Boards was the agency to decide the distribution of fund allocated by CG to various bodies. The period of the FAME India scheme was for 2 years only i.e., April 1, 2015, to March 31, 2017. The total allocation by CG for this Scheme was 795 Crore. The period of this scheme was extended to fulfil its objectives from March 31, 2017, to September 30, 2017, which further extended till March 31, 2018^[26].

FAME India II Scheme was introduced with a total outlay of 10000 Crore with the same objectives as that of FAME India I. FAME India II is an extended version of the FAME India I Scheme. FAME India II Scheme was approved by the cabinet which comes into force on April 1, 2019. In furtherance to FAME India I objectives, FAME India Scheme II offers support to State Government and Consumers in the purchase of 55 thousand Electric buses, 50,000 four-wheelers, 10 lakhs two-wheelers and five lakhs electric 3 wheelers. This scheme proposed to have electric charging infrastructure in all major cities of India in the grid of 3*3 km and on all the major highways at the distance of 25 km between two charging stations^[27]. Under this scheme, the government also looks to deploy 2,700 charging stations across the country^[28].

In May 2016, the proposal was made by the Hon'ble Minister of Road Transport and Highways Nitin Gadkari of the Voluntary Vehicle Fleet Modernization Programme (V-VMP). Under this draft proposal was made to scrap a 15-year-old vehicle or vehicle below BS III standards. The main aim of this draft was to reduced the pollution emitted from old junk outdated vehicles.

As this draft proposed to give incentives on the purchase of a new vehicle on scrapping of old one. This proposed draft was sent to the Ministry of Finance for supporting this incentive with the allocation of funds. Ministry of Finance raised several objections to the proposed Voluntary Vehicle Fleet Modernization Programme draft. Ministry of Finance opposed this programme as it was difficult for the ministry to provide incentives or rebate to nearly 28 million vehicle owners. The policy was rejected citing the reason for lack of fund and burden on the pocket of the government^[29].

On February 1, 2020, the Finance Minister Mrs Nirmala Sithara man announced Voluntary Vehicle Scrap page Policy in her budget speech to phase out the 20-year-old personal vehicle and 15-year-old commercial vehicles^[30]. If the vehicle fails the fitness test conducted by the authority, the owner will be allowed to scrap the vehicle and an incentive or rebate will be given to the owner on the purchase of a new vehicle. The policy aims to encourage fuel-efficient and environmentally friendly vehicle on

Indian road reducing air pollution. According to the Automobile sector's executives and experts, it can help to create an industry of its own with business opportunities of \$6 billion (Rs 43,000 Crore) a year under a well-defined vehicle scrap policy^[31].

National Institute for Transforming India (NITI AYO) asked Central Government to reduce the import of Petroleum products causing air pollution in India. The NITI AYO in its report suggested the government produce Methane from Municipal solid waste and coal reserve. Mixing Methanol in Petroleum products could reduce the emission of hazardous gases like SO_x and NO_x by 25%. Using Methanol could improve air quality in India^[32].

High taxes are the reason behind the destruction of many industries. Even when India was having the ambition to become an electric vehicle manufacturing leader the taxes on lithium-ion batteries and the electric vehicle was high enough to discourage people to even think about purchasing electric vehicles. Some relaxation in GST^[33] the rate was given by Central Government on lithium-ion batteries from 28% to 18%. This reduction in GST rate could promote local manufacturing of lithium-ion batteries creating a Multi-million-dollar industry in India. The GST rate on the introduction of the Goods and Service Tax Act 2017 was 28%. To accelerate the production of electric vehicles in India the finance minister Mrs Nirmala Sitharaman in her budget speech of FY 2019-20 announced tax relief of 12% from 28% on the purchase of an electric vehicle. On August 1, 2019, GST Counsel Committee further extended relief from 12% to 5% on electric vehicle and from 18% to 5% on the charger of an electric vehicle^[34]. The absence of electric charging infrastructure discourages people to think beyond traditional vehicles running on diesel and petrol^[35].

Issues and Challenges in Preventing Air Pollution Through Vehicular Exhaust

To eliminate emission from the vehicle we need to shift to electric or hybrid vehicles empowered by a renewable source of energy. Various initiatives are taken by Central Government to promote the use of electric and eco-friendly auto-technology which are already discussed in this research paper. Even after so many incentives and efforts from the government and automobile industry electric & hybrid vehicles are still out of Indian Roads. India presently facing several issues and challenges in preventing air pollution caused due to emission from vehicles. The researcher has discussed several issues and Challenges as follows:

1. High Cost of BSVI Vehicles

As per the directions from the Supreme Court, India Leapfrog BS V Norm and shift to BSVI norm directly. However, many Indian automobile manufacturers like TATA and Mahindra etc. Were not having BSVI technology at that time. They invested a huge amount of money in R&D for the introduction of the BSVI norm vehicle. The money invested in R&D is being incurred from the customers by increasing the price of vehicle burdening the pockets of the customer^[36]. The mandatory 5-years third party insurance policy for vehicles increases the cost of the vehicle. The increase in the price of the vehicle creates a suitable environment for the Second-hand vehicle market causing more pollution.

Using BSVI Standard Fuel in BS-IV Vehicle will not Reduce Pollution Significantly

The Capital City of India, Delhi already declared as the most polluted cities in the world several times hence in April 2019, the Ministry of Petroleum provided fuel for the BSVI norm in the National Capital Region of Delhi. However, automobile manufacturer didn't provide BSVI norm vehicle in Delhi before April 1, 2020. The people of Delhi used BSVI Norm Fuel in their BSIV Vehicle, which does not help in reducing the pollution significantly^[37].

Inadequate Infrastructure for Charging E-Vehicles

The aim of the Indian Government to make India a Global Electric Automobile Hub will remain a dream until government create infrastructure sufficient enough to make people confident about electric vehicle efficiency. Inadequate infrastructure for charging vehicle will not encourage people to opt for electric vehicle in future. The Indian Government must create charging stations in all major cities of India at the grid of 3*3 KM and the distance of 20 KM on all highways in India. In 2018, India had 370 slow charging station and nearly 40 fast-charging stations accessible to people. Urban planning is very poor in India, which is another hindrance for setting charging infrastructure at residential buildings^[38].

Nascent and Underdeveloped Technology of Electric and Hybrid Vehicle.

The technology of electric vehicle is very nascent and constantly changing with each passing day. The Automobile manufacturer is investing heavily in R&D to create the most cost-effective and efficient electric vehicle to achieve monopoly. Presently the technology of electric vehicle is rapidly changing which create doubt in the mind of automobile manufacturers relating to future risk. The automobile manufacturer will face huge economic losses if another manufacturer comes with better and cost-effective technology in future. People will only choose the best for them. This uncertainty relating to future of electric vehicle discourage them to invest in this technology. Most electric vehicles like E-Verito takes 8-9 hours of charging for covering 30 km. Electric batteries are also in the advancement stage to make them cost-effective and efficient^[39]. In India, the Charging Infrastructure Guidelines allow a Public Charging Station to install one or more chargers of the fast or slow/moderate charger types. Most of the chargers are AC charger requiring more than 80 minutes however these chargers are called a fast charger^[40].

Lack of Awareness about Electric Vehicle

According to Mr Naveen Munjal, managing director of Hero Electric Vehicles, among the many problems causing lower-than-expected adoption of EVs in India is lack of awareness. For a customer to let go of vehicles driven by traditional forms of easily accessible power, vehicle manufacturers must address questions and concerns^[41]. Most of the dealers and consumers are having very little awareness about EV's and EV's deals of their respective auto manufacturer. The Government fails to advertise EVs due to which people are making less inquiry and purchase of EV's. Only 5% of the total inquiry that is made relating to EV's out of that total inquiry only 20% end up in a sale^[42].

Inadequate Financing for Electric Vehicle to Consumer and Manufacturing

Electric vehicle price range anywhere between Rs 13 lakh and Rs 22 lakh. Financiers believe that the consumer would default because of the high prices, making it difficult for them to sell the attached vehicle. The FAME-II benefits are currently extended only to vehicles used for commercial purposes and not to a personal vehicle. Large electric fleet operators can get finance. It's the small fleet operator or the personal buyer who is finding it difficult to buy such cars [43].

Over Dependence on Oil Gas Energy and Thermal Energy for Empowering Electric Vehicle.

David Sanda low, the member at Center on Global Energy Policy at Columbia University, said at a conference in New Delhi in September said that "In a world in which renewable energy has a very high penetration, India has the opportunity to be independent and provide cheap power to its people in ways that are quite different than say in an economy that is built upon oil and gas,". However, right now coal-powered thermal reactors fulfil India's energy demand. Out of the total energy demand of India thermal energy contributes 55% to it [44]. The thermal power plan makes more pollution than a prescribed norm so a completely electric vehicle policy empowered by coal would make no sense [45]. The promotion of Renewable energy for empowering EV's will make future pollution-free.

High GST rate Slab on Hybrid Cars

The Central Government reduced the GST rate on the electric vehicle after constant pressure from people, the automobile industry and stakeholders. The GST Council reduced the GST rate on lithium-ion batteries for electric vehicles to 18% from 28%. Similarly, the GST rate on Electric Vehicle reduced to 12% from 18%, which further reduced to 5% from 12%. There is a difference in GST rate 13% on lithium-ion batteries and electric vehicles. This makes electric vehicle batteries costly and increases the price of the vehicle. The hybrid vehicles were taxed 28% on the introduction of GST and an additional 15% cess imposed by the government making it 43%. Previously hybrid vehicles were tax 30% only [46].

India is not the first choice for Electric Automobile Manufacturers

Tesla Motors Inc. is a leading American Electric Motor Vehicle Manufacturing Company based in Palo Alto California. Elon Musk CEO of Tesla was approached by Hon'ble Minister of Road Transport and Highway Construction Mr Nitin Gadkari to enter the Indian Market and also offers various incentives and free land to him. Elon Musk refuses the offer saying that the American and Chinese market is not exciting for him. The government in the USA and China giving incentives for the manufacturing of electric vehicle in their country. Due to this, Multinational Electric vehicle manufacturers focus on these big economies only. The slow response from the Indian Government and lack of awareness will not encourage manufacturers to invest in India [47].

Even though Tesla entered the Indian market with the establishment of an R&D office in Bengaluru. India will get most of its Tesla variant cars manufactured and assembled

in China. The abundant amount of lithium reserve in china (1,000,000 metric tons) will help china to become a global leader in the manufacturing of EV batteries. As lithium is the main component in a lithium-ion battery. The excitement of people from the USA and China and the incentives government of these countries are offering to their people on the purchase of EV are creating a suitable environment for investment [48].

Conclusion

Indian automobile industry faces various challenges for bringing environment-friendly auto-technologies in India. The Central Government with its legislative framework and strict directions from the judiciary to achieve emission standards followed by Western and European country caused losses due to unsold inventories. No further relaxation for selling unsold inventories is given by the judiciary, which remains unsold due to the sudden imposition of Coronavirus lockdown. This strict compliance with emission norm could hamper the growth of the automobile industry. The weak automobile industry will not be in a position to develop new environmentally friendly auto technologies. As they need a huge amount of money for the R&D of these technologies. The compulsion to follow new emission norm within a short period of 2-3 years leads to an increase in the price of the vehicle. As automobile manufacturer tries to recover the cost incurred for R&D of that emission norm standard. An increase in the price of the vehicle creates favourable conditions for the Second-hand market, which cause more pollution.

The Union Government makes it mandatory for all new vehicles to have 5 years of mandatory third-party insurance, which further increase the price of the vehicle. This new policy also contributed to the flourishing Second-hand vehicle market. It is the responsibility of the Centre Government, State Governments and Judiciary to make sure the sustainable development of the automobile industry. The automobile industry employs millions of people and contributes nearly 7% to India GDP. The Central Government must think about the health of people as well as the financial health of the Automobile industry while framing any policy.

Less advertisement and inadequate electric vehicle charging infrastructure are hindrances before India's goal of achieving emission-free transportation. The poor urban planning in India doesn't allow us to fix charging infrastructure within residential areas. The government must compel all new residential and commercial complex building to have space for charging infrastructure to promote electric vehicle use. The price of EV's battery cost nearly 1/3rd the price of the vehicle so if we provide incentives and rebate on tax for local manufacturing of EV's battery that could help us to reduce the price of an electric vehicle.

India fulfils the majority of its energy demand from coal (Thermal Energy). Charging electric vehicle from electricity produced by thermal power will not help in reducing air pollution. In such a situation having more electric vehicle on road will not reduce pollution significantly. It is the responsibility of the Government to satisfy India's energy demand from renewable energy sources like Solar, Wind, hydro or tidal etc. This move will fulfil the aim of improving the air quality otherwise EV policies empowered by Thermal energy will make no sense and more EV's on-road will cause more pollution indirectly.

References

1. Definition of Transportation according to Britannica, <https://www.britannica.com/technology/transportation-technology>, (Visited on February 26, 2021).
2. Over 120K died due to air pollution in India in 2020: Greenpeace, Hindustan Times, <https://www.hindustantimes.com/india-news/over-120k-died-due-to-air-pollution-in-india-in-2020-greenpeace-101613628725846.html>, (Visited on February 27, 2020).
3. Report of ICCT, <https://www.theicct.org/news/clearing-air-india>, (Visited on March 14, 2019).
4. Global Climate Advisory Group
5. Data were taken from the official website of the Central Pollution Control Board, <http://cpcb.nic.in/auto-fuel-quality/>, (Visited on February 12, 2021)
6. *Ibid.*
7. SC issues final deadline for Bharat Stage IV cars, the clock begins ticking for India's carmakers, economics times, October 24, 2018, <https://economictimes.indiatimes.com/news/politics-and-nation/supreme-court-says-only-euro-vi-compliant-vehicles-to-be-sold-from-april-2020/articleshow/66343274.cms>, (Visited on October 30, 2018).
8. India to switch to world's cleanest petrol, diesel from Apr 1, <https://economictimes.indiatimes.com/industry/energy/oil-gas/india-to-switch-to-worlds-cleanest-petrol-diesel-from-apr1/articleshow/74206834.cms?from=mdr>, (Visited on February 5, 2021).
9. BS-IV vehicle sold after March 31 won't be registered: SC, The Economic Times, <https://economictimes.indiatimes.com/industry/auto/auto-news/sc-recalls-its-order-allowing-sale-of-bs-iv-vehicles-for-10-days-after-lifting-of-lockdown/articleshow/76853618.cms?from=mdr>, (Visited on February 5, 2021).
10. India to switch to world's cleanest petrol, diesel from Apr 1, <https://economictimes.indiatimes.com/industry/energy/oil-gas/india-to-switch-to-worlds-cleanest-petrol-diesel-from-apr1/articleshow/74206834.cms?from=mdr>, (Visited on February 5, 2021).
11. Article 32 and Article 226 of the Constitution of India. (Also refereed Article 21)
12. SC issues final deadline for Bharat Stage IV cars, the clock begins ticking for India's carmakers, economics Times, October 24, 2018, <https://economictimes.indiatimes.com/news/politics-and-nation/supreme-court-says-only-euro-vi-compliant-vehicles-to-be-sold-from-april-2020/articleshow/66343274.cms>, (Visited on 30th October 2018).
13. Society of Indian Automobile Manufacturer, In India, the rules and regulations related to driver's license, registration of motor vehicles, control of traffic, construction & maintenance of motor vehicles, etc. are governed by the Motor Vehicles Act (MVA), 1988 and the Central Motor Vehicles Rules (CMVR), 1989, <http://www.siamindia.com/technical-regulation.aspx?mpgid=31&pgidtrail=32>, (visited on February 20, 2021).
14. Pollution Under Control Certificate.
15. Section 115, 115 A, 115 B, 115 C and 115 D and 115 (7) of Central Motor Vehicle Rules, 1989.
16. The Global Automotive Research Center.
17. The National Center for Vehicle Research & Safety
18. Automotive Research Association of India.
19. National Institute for Automotive Inspection Maintenance & Training
20. The National Automotive Test Tracks
21. Vehicle Research & Development Establishment.
22. NATRiP Official Website, <https://www.natrip.in/>, (Visited on February 24, 2019).
23. *Ibid.*
24. SIAM, "Emission Norms", <http://www.siamindia.com/technical-regulation.aspx?mpgid=31&pgidtrail=33>, (Visited on February 12, 2019).
25. Report of The Expert Committee, Auto Fuel Vision and Policy 2025, Govt. Of India, May 2014, <http://petroleum.nic.in/sites/default/files/autopol.pdf>, (Visited on February 27, 2021).
26. Department Of Heavy Industry, Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicle India, <https://dhi.nic.in/UserView/index?mid=2418>, Visited on March 13, 2019).
27. FAME India Phase II Scheme Approved by Cabinet - Implications, Impact and Industry Reactions, March 2, 2019, NEWS 18, <https://www.news18.com/news/auto/fame-india-phase-ii-scheme-approved-by-cabinet-implications-impact-and-industry-reactions-2052425.html>, (Visited on March 12, 2019).
28. Electric vehicle charging infrastructure, RMI India, Niti Ayog Report, PP. 17-18, https://rmi.org/wp-content/uploads/2020/07/EV-Readiness-Guide_Haryana_Lighthouse_Discom_Programme.pdf, (Visited on February 12, 2021).
29. Voluntary Vehicle Fleet Modernization Programme, The Economic times, <https://economictimes.indiatimes.com/topic/Voluntary-Vehicle-Fleet-Modernisation-Programme>, (Visited on March 16, 2019).
30. Budget 2021: FM Sitharaman Announces New Vehicle Scrapage Policy, The Quint, <https://www.thequint.com/tech-and-auto/fm-sitharaman-announces-new-vehicle-scrapage-policy#read-more>, (Visited on February 4, 2021).
31. The Rs 43,000 crore opportunity buried under vehicle scrappage policy, The Economic Times, <https://auto.economictimes.indiatimes.com/news/policy/the-rs-43000-crore-opportunity-buried-under-vehicle-scrapage-policy/74251208>, (Visited on February 4, 2021).
32. Niti Ayog, Methanol Economy, <http://www.niti.gov.in/content/methanol-economy>, (Visited on April 3, 2020).
33. Goods and Service Tax
34. GST Council slashes tax rates on electric vehicles, chargers, July 27, 2019, livemint, <https://www.livemint.com/>, (Visited on February 7, 2021).
35. *Ibid.*
36. Chandan Bhavani *et al.*, Electric Mobility Paradigm Shift: Capturing the Opportunities, February 28, 2019, https://www.yesbank.in/pdf/electric_mobility_paradigm_shift, (Visited February 4, 2021).
37. Tweet Mishra and Ronendra Singh, Oil Companies gear up to Supply BS-VI fuel to Delhi from April 1, March 26, 2018, Bussiness Line, <https://www.thehindubusinessline.com/economy/oil-companies-gear-up-to-supply-bs-vi-fuel-to-delhi-from->

- april-1/article23357383.ece, (Visited on February 14, 2021).
38. Supra no. 33.
 39. India EV story Emerging Opportunities, Innovation Norway, <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>, (Visited on February 5, 2021).
 40. India EV story Emerging Opportunities, innovation Norway, <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>, (Visited on May 5, 2019).
 41. Srinivas Cherla, Amit Garg, Study of Electric Mobility in India, UNEP DTU.
 42. *Ibid.*
 43. Like Philip, Financing may not come easy for the purchase of high-priced EVs, January 22, 2020, <https://economictimes.indiatimes.com/industry/auto/auto-news/financing-may-not-come-easy-for-purchase-of-high-priced-evs/articleshow/73514294.cms?from=mdr>, (Visited on April 22, 2020).
 44. Utpal Bhaskar, India's electric vehicle drive: Challenges and opportunities, November 16, 2017, <https://www.livemint.com/Industry/ji96zXi5dZz3L1XUSkiZxM/Indias-electric-vehicle-drive-Challenges-and-opportunities.html>, (Visited on April 14, 2020).
 45. *Ibid.*
 46. Sharmishtha Mukherjee, "Hybrid vehicles to attract steep GST levies of 43%; to impact plans of Maruti Suzuki, Tata Motors, others" May 20, 2018, The Economic Times, <https://economictimes.indiatimes.com/industry/hybrid-vehicles-to-attract-steep-gst-levies-of-43-to-impact-plans-of-maruti-suzuki-tata-motors-others/articleshow/58756656.cms>, (Visited on March 14, 2019).
 47. Jitendra Singh, 'Tesla busy in China and US': Nitin Gadkari wants desi Tesla in India, September 28, 2017, <https://entrackr.com/2017/09/nitin-gadkari-wants-desi-tesla-in-india/>, (Visited on October 19, 2020).
 48. *Ibid.*