

A Review On Air Pollution Problem In India and BS Norms

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ABSTRACT- As world air get worse, India's struggling to breath some of the fabled cities of India are now among the most polluted in the world and to control air pollution is a major problem with India. Bharat stage emission norms (BS-VI) will help India to reduce air pollution by vehicle emission it looks like silver lining to dark cloud. This paper try to cover aspect of struggling air pollution problem of India and regulation related to vehicle exhaust air pollution.

Keywords- Air pollution, Bharat stage emission standards, BS-VI, IQAR report, PM.

I. INTRODUCTION-

Air pollution is a very serious health issue across the world and India. According to the WHO report 9 out of 10 people breathing polluted air, which seriously causes human health^[1]. One third of death from lungs, cancer and stroke diseases are due to air pollution. India is ranked 5th among the most pollutant country according to the IQAR report and out of 30, 21 cities ranked among the top of the polluted cities in the world. Indian capital Delhi is Ranked first in most polluted cities^[2].

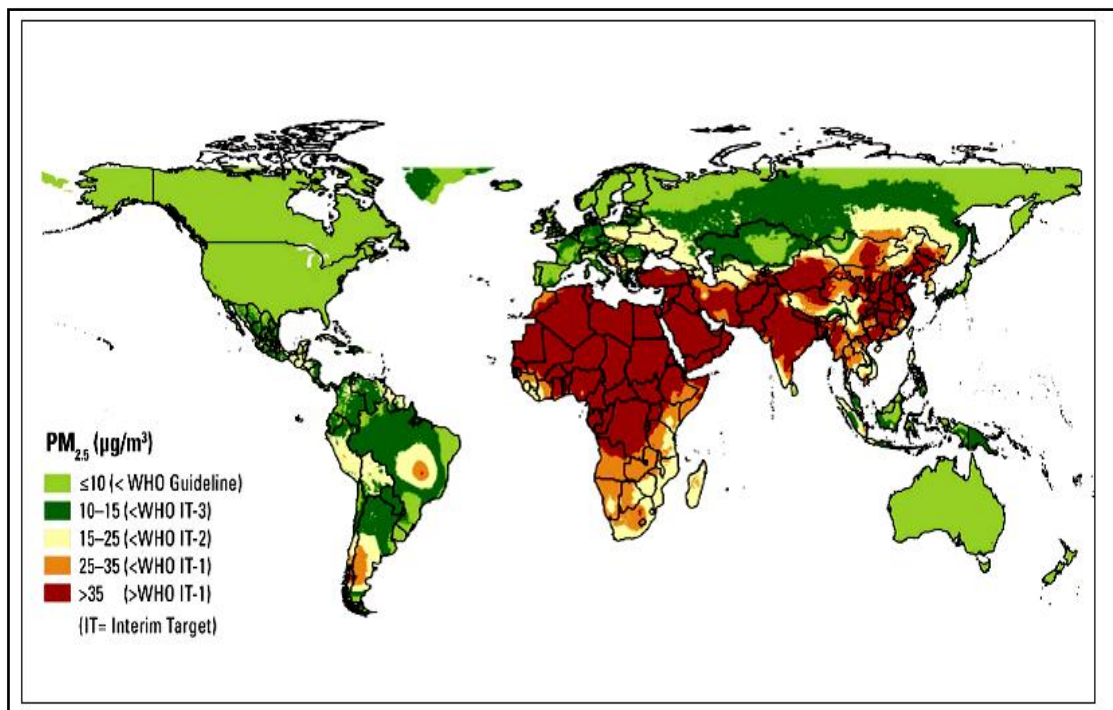


Figure .1 Annual average PM 2.5 conc. In 2017 relative to WHO guideline (Source –state of global air /2019)^[3]

According to the United States, air quality index (US AQAI) Pm 2.5 $\mu\text{g}/\text{m}^2$ range 0-12 is satisfactory for human health but in India, it is 58.1 $\mu\text{g}/\text{m}^2$ which is very high concentration, unhealthy for human health^[2].







| US AQI Level | | | PM2.5 ($\mu\text{g}/\text{m}^3$) | Health Recommendation (for 24hr exposure) |
|--|--------------------------------|---------|------------------------------------|---|
|  | Good | 0-50 | 0-12.0 | Air quality is satisfactory and poses little or no risk. |
|  | Moderate | 51-100 | 12.1-35.4 | Sensitive individuals should avoid outdoor activity as they may experience respiratory symptoms. |
|  | Unhealthy for Sensitive Groups | 101-150 | 35.5-55.4 | General public and sensitive individuals in particular are at risk to experience irritation and respiratory problems. |
|  | Unhealthy | 151-200 | 55.5-150.4 | Increased likelihood of adverse effects and aggravation to the heart and lungs among general public. |
|  | Very Unhealthy | 201-300 | 150.5-250.4 | General public will be noticeably affected. Sensitive groups should restrict outdoor activities. |
|  | Hazardous | 301+ | 250.5+ | General public is at high risk to experience strong irritations and adverse health effects. Everyone should avoid outdoor activities. |

Figure no.2 -The United States air quality index (source 2019 world air quality report by IQAir)

The major source of air pollution is fine airborne particles as well as different harmful gases, which comes from vehicle emission, near about 27% of total air pollution comes from vehicles, which emits gases like CO, NO, Hydrocarbons as well as airborne particulate matter PM 2.5 which affects the human health by causing diseases like asthma, lung cancer and putting health cost burden on the country.^[4]

As India is developing country and spend only 1.15% of total GDP % on healthcare sector which is ranked 184 out of 191 countries and lot of burden on healthcare sector need additional funds new reforms and introduction of more targeted initiatives have the potential to make wave for unprecedent development in the sector to control the air pollution.

II. GOVERNMENT OF INDIA INITIATIVE AND BHARAT STAGE EMISSION STANDARDS

To tackle the air pollution problem the Government of India pass the air prevention and control act in 1981 to regulate air pollution but the act has failed. To reduced pollution together with IIT Kanpur Government of India started National air quality index in 2015 and launching The National clean air program in 2019 having target

reduction of air pollution 20-30% by 2024 on the base year 2017.

Mainly to tackle the vehicle emission problem Government of India start the Bharat stage emission standards (BSES) in 2000 base on European regulation. Bharat stage emission standards are emission standards instituted by the government of India to regulate the output of air pollutants from compression ignition engines and park-ignition engines. The standard and timeline are set by the central pollution control board and ministry of environment, forest, and climate changes. All new vehicles manufacture compliant with regulation^[5].

a) History of Bharat stage emission standards

In 1999, the supreme court of India ruled that all vehicles in India have to meet Euro I or India 2000 norms June 1999^[6] at that time Indian vehicle manufactures are not ready for this transformation so the Mashelkar committee^[7] was setup to roadmap of a euro-based norm in India. Mashelkar committee recommends the national auto fuel policy and roadmap to the implementation of Bharat norms^[8].

On January 6, 2016, the Indian Ministry of Road Transport and Highways (MoRTH) announced its decision to leapfrog from BS-IV to BS-VI emission standards in an accelerated

fashion, with full implementation of BS-VI level emission standards beginning in April 2020. This announcement was supported by corresponding actions taken by the Ministry of Petroleum and Natural Gas (MoPNG) to ensure nationwide supply of BS-VI fuel along with the proposed BS-VI emission standard implementation date of April 1, 2020. The announcement by the MoRTH effectively^[9]

BS-VI regulation will be the first global instance of leapfrogging from Euro 4/IV level directly to Euro 6/VI level motor vehicle emission standards. The notification comes at a time when many Indian cities are struggling with severe air-quality problems and is an important step in addressing these issues.

Table no.1 List of Indian emission standard

| standard | Reference | Year | Region |
|------------------|-----------|--------------|----------------------------------|
| India 2000 | Euro 1 | 2000 | Nationwide |
| Bharat stage II | Euro 2 | 2001 | NCR, Mumbai, Kolkata and Chennai |
| | | 2003 | NCR and 13 major cities |
| | | 2005 | Nationwide |
| Bharat stage III | Euro 3 | 2005-04 | NCR and 13 major cities |
| | | 2010 | Nationwide |
| Bharat stage IV | Euro 4 | 2010 | NCR and 13 major cities |
| | | 2017 | Nationwide |
| Bharat stage V | Euro 5 | SKIPPED | |
| Bharat stage VI | Euro 6 | 2018 | Delhi |
| | | 2019 | NCR |
| | | 1 April 2020 | Nationwide |

The abbreviation of ‘BS’ is the Bharat stage and is suffixed with the iteration of the actual emission norm.

b) Comparison between Bharat stage IV and Bharat Stage VI

i) Petrol vehicles

In BS-VI emission of carbon monoxide is to be reduced by 30% and NO_x by 80% it also setup limits for hydrocarbon and particulate emission, which were not specified in earlier

norms. to meet the emission of BS-VI norm, the carburetors in petrol engines need to replace by the programmed fuel injector. To further reduced tailpipe emission, the exhaust system must be fitted with a three-way catalyst converter .also norms also mandate the On-Board Diagnostic system (OBD) for all BS-VI compliant vehicles^[11].

Table no.2 Petrol engines emission norm for

| Emission norms PETROL(g/km) | CO | HC | NO _x | PM | PN |
|-----------------------------|----|-----|-----------------|-------|------------------------|
| BS-IV | 1 | 0.1 | 0.08 | - | - |
| BS-VI | 1 | 0.1 | 0.06 | 0.005 | 6 x10 ¹¹ km |

ii) Diesel vehicles

In BS-VI norms NO_x emission from diesel engines is to be reduced by 70% and particulate by 80%. To achieve this fitting Diesel pre-filter in the

exhaust system as well need to use selective catalytic reduction (SCR) or exhaust gas recirculating techniques to reduced NO_x^[11].

Table no.3 Diesel engine emission norm for

| Emission norms Diesel (g/km) | CO | HC | NO _x | PM | PN |
|------------------------------|-----|------|-----------------|-------|------------------------|
| BS-IV | 0.5 | 0.25 | 0.08 | 0.025 | - |
| BS-VI | 0.5 | 0.06 | 0.25 | 0.005 | 6 x10 ¹¹ km |

Addition to that due to BS-VI Fuel sulfur percentage reduced by 70 % and limited to 10 ppm in BS-VI norms.

III. LIMITS OF BHARAT STAGE EMISSION STANDARDS TOWARD ACHIEVING THE GOAL.

Government of India trying to best to controlling air pollution by vehicles and Bharat stage emission standards are one of them but it looks good on paper but it has certain limits and maybe not getting its best.

a) Comparison between Bharat stage and Euro norm

Although Bharat stage norms referring from Euro norms it is specified by Indian conditions but some times did not look appropriate.

For instance,

i) Euro norm tested at a sub-zero temperature in European countries but in India, the average annual temperature is 30^o c but keeping the emission limit the same in both cases.

ii) Another difference is the maximum speed at which a vehicle is tested. A speed of 90 km/h for Bharat stage norms, whereas 120 km/h for Euro norms, keeping the emission limit the same in both cases.

iii) There is no provision of CO₂ emission standard in Bharat stage norm (including BS-VI) as this provision in Euro norms. The here important fact that the Indian auto industry responsible for 18% of CO₂ emission in India.

b) Leniencies in P.U.C

Currently, all vehicles undergo periodic emission check at PUC Centre sometime this is centres are at the fuel station or private garages and this centers are not following proper procedure and they do not have proper train persons as well-calibrated equipment. No such proper system in India for periodic emission check.

c) Fuel Adulteration

In India, some taxi, auto, and truck run on adulterated fuel blend. Government imposing higher tax on fuel. So people move towards adulterated fuel blends. adulteration like mix petrol with kerosene or naphtha is common in rural India This adulated fuel emits harmful gases in the air

Kerosene is more difficult to burn than petrol, its addition results in a higher level of HC, CO, and PM emission even from the catalyst-equipped car.

d) Traffic congestion

Traffic congestion is a major problem in cities. Traffic congestion is due to a lot of reasons like improper traffic signal system. Lack of express highway and proper road, resulting number of vehicles increase in per km area. Also traffic

congestion at toll plaza final results in more fuel burning and increasing air pollution.

IV. SOLUTION TO REDUCE AIR POLLUTION BY VEHICLE EXHAUST

- Old Vehicle Scrap policy- Government needs to introduced vehicles scrap policy to avoid air pollution by old vehicles. In European countries this policy already exists but not yet in India. If the government introduced these old vehicles is replace by the new one and with new BS norms this vehicles definitely help controlling air pollution.
- Policy for PUC centers- for Individual PUC Centre must have some guidelines and regulating authority. For PUC centers must have trained qualified persons is a minimum requirement just like medical stores.
- There must be tag of PUC on every car that should be compulsory like a Fast tag.
- Promotion of fast tag- To Avoid traffic congestion Government needs to promote fast tags and expand policy, if government gives some cashback offers on fast tag that will definitely help for promotion.
- Promotion of Electric vehicles- Government already has taken initiative in promoting electric vehicles by reducing tax on battery and parts on electric vehicles but electric vehicles are still very costly so need to reduce the price by mass production, so middle class people can offered electrical vehicles.
- Clean Fuel- Government need to expand CNG station all over India and maintain adequate supply. also need to promote CNG and Bio-diesel based vehicles in public transport like city buses.
- Our Initiative- People need to used car-sharing, public transport and eco-friendly transportation to avoid traffic and air pollution.

V. CONCLUSION

Bs-VI norms step marks a new path forward for all developing country markets to follow to accelerate the adoption of clean vehicle technologies and fuels. Government trying best from his side.

But After COVID 19 impact growth rate of developing countries is highly affected just like India having growth rate in 2020 is only 4% so definitely burden on the economy and health budget, so more restrictions on government for expansion policies, therefore we also need to take initiative along with the to control air pollution.

The odd-even formula, car-sharing and plantation are the simple and basic tips that we can use as helping hand to government for controlling air pollution as we are struggling for several air quality problems.

Conflict of interest

The authors declare there is no conflict of interest.

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