

Bharat Stage Emission Standards (BS Norms)

The Supreme Court of India banned the sale and registration of BS-IV compliant motor vehicles in India from April 2020 signifying the shift from BS-IV emission norms to BS-VI. In this article, you can read all about BS emission standards and its implementation in the country for the [IAS exam](#).

Bharat Stage Emission Standards

Bharat Stage or BS Emission Standards are government-instituted emission standards that all motor vehicles have to comply with if they are to be sold and driven in India.

- Currently, all new vehicles sold and registered in India should be compliant with the BS-VI iteration of emission standards.
- The standards and timelines for their implementation are set by the [Central Pollution Control Board \(CPCB\)](#) under the Minister of Environment, Forests and Climate Change.
- The BS norms are based on the European Emission Standards (Euro norms) and were first set in 2000. Equivalent to the Euro-1, the first iteration was known as 'India 2000', and not BS-I.
- Subsequent emission standards were called BS-II, BS-III, and BS-IV.
- The government decided to jump directly from BS-IV to BS-VI skipping BS-V in view of the long time it took to move from BS-III to IV.
- With the implementation of the new norms, pollution levels are expected to reduce to a large extent as the particulate matter (PM) concentration should decrease. About one-third of the air pollution is caused by motor vehicles and cars.

- At present, BS-IV auto fuels are being supplied in over 30 cities, and the rest of the country has BS-III fuels.
- Earlier, the government planned the implementation of BS V and BS VI emission norms nationwide by 2020 and 2024 respectively. However, the government decided to advance the dates.

Euro V and Euro VI norms

- The first European exhaust emissions standard for passenger cars was introduced in 1970.
- The latest standard, 'Euro 6', applies to new type approvals from September 2014 and all new cars from September 2015 and reduces some pollutants by 96% compared to the 1992 limits.
- Euro 5 tightened the limits on particulate emissions from diesel engines and all diesel cars needed particulate filters to meet the new requirements. There was some tightening of NOx limits too (28% reduction compared to Euro 4) as well as, for the first time, a particulates limit for petrol engines – applicable to direct injection engines only.
- Addressing the effects of very fine particle emissions, Euro 5 introduced a limit on particle numbers for diesel engines in addition to the particle weight limit.

History of Emission Standards in India

- It was in the early nineties that the first emission standards were introduced in the country.
- Other regulatory norms followed in the form of making the catalytic converters mandatory for petrol vehicles and then, by the introduction of unleaded petrol.

- In 1999, the apex court of the country made it mandatory for all vehicles to meet the India 2000 norms by June 2000, in a ruling.
- In 2002, the Mashelkar Committee report was accepted by the Indian Government.
 - The committee had recommended a roadmap for the implementation of the Euro norms based emission standards for India.
 - It also recommended that the roll-out of the norms be implemented in major cities first to be followed by the rest of the country in a phased manner.
 - Based on the committee's recommendations, in 2003, the government released the National Auto Fuel Policy.

Bharat Stage Emission Standards Timeline

The following table gives the timeline of the BS norms being implemented in India starting from the India 2000 till the latest BS-VI norms.

Standard (Reference)	Year/Region
India 2000 (Euro 1)	2000 - Nationwide
BS II (Euro 2)	2001 - Metro cities
	2003 - 10 more major cities
	2005 - Nationwide
BS III (Euro 3)	2005 - Metros and major cities
	2010 - Nationwide
BS IV (Euro 4)	2010 - Metros and major cities
	2017 - Nationwide
BS V (Euro 5)	Skipped
BS VI (Euro 6)	2018 - Delhi
	2019 - NCR
	2020 - Nationwide

The above table gives information for four-wheeler vehicles.

BS-VI Norms (and how it is different from BS-IV)

Emission norms are made further stringent with the introduction of the Bharat Stage VI. BS-VI is the highest vehicle emissions standard specification in the world currently.

- The volume of particulate matter 2.5 is between 20 to 40 micrograms per cubic metre in BS-VI fuel, whereas, in BS-IV, it was up to 120 micrograms per cubic metre.

- The sulphur content in the BS-VI compliant fuel is brought down five times when compared to the BS-IV version. (It is 10 ppm of sulphur as against the previous 50 ppm).
 - Sulphur in the fuel contributes to fine particulate matter emissions. High sulphur content in the fuel also leads to corrosion and wear of the automobile engine.
- Under the BS-VI fuel, for 1 KM, a car will emit 80% less PM and almost 70% less nitrogen oxide (in a diesel engine).
 - In a petrol engine, the emission of nitrogen oxide would be less by 25%.
- BS-VI norms will lead to the reduction of the emission of certain hydrocarbons (that are produced because of the incomplete combustion of fuel).
- BS-VI fuel contains lesser air pollutants compared to BS-IV fuel.
- Car manufacturers will have to fix three new pieces of equipment for their vehicles to comply with BS-VI:
 - Diesel Particulate Filter (DPF)
 - Selective Catalytic Reduction (SCR) system
 - LNT (Lean NOx trap)
- Real Driving Emission (RDE) will be introduced in India for the first time.
 - This will measure a vehicle's emissions under real conditions as against factory conditions.
- Onboard Diagnostics (OD) has been made compulsory for all vehicles.

The Euro 6 standard imposes a further, significant reduction in NOx emissions from diesel engines (a 67% reduction compared to Euro 5) and establishes similar standards for petrol and diesel.

- Exhaust Gas Recirculation (EGR) – replacing some of the intake air (containing 80% nitrogen) with recycled exhaust gas – reduces the amount of nitrogen available to be oxidised to NOx during combustion but further exhaust after treatment may be required in addition to the Diesel Particulate Filters required to meet Euro 5.

Euro 6 diesel cars may also be fitted with:

- A NOx adsorber (Lean NOx Trap) which stores NOx and reduces it to Nitrogen over a catalyst
- Selective Catalytic Reduction (SCR) which uses an additive (Diesel Exhaust Fluid (DEF)/AdBlue) containing urea injected into the exhaust to convert NOx into Nitrogen and water.
- The use of Cerium, a fluid injected into the fuel tank each time the vehicle is refuelled which assists the DPF regeneration by lowering the temperature needed for regeneration.

Impact of shifting from BS-IV to BS-VI

- The cost of production of automobiles will be higher on account of the shift and this would be translated to higher costs for the vehicle buyer.
- In particular, the diesel and the economy segment cars will see a higher increase in the prices.
- Driving a pre-BS IV car using BS-VI fuel can be detrimental to engine life. There may be trouble with injection pumps, oil seals and injectors leading to higher wear and tear, consequently higher emissions.
- The government is yet to announce a scrap policy for old vehicles.
- Automakers say they have a huge stock of BS-IV vehicles and they might have to face huge losses.
- This shift is, however, set to have a positive impact on the quality of air.
- By reducing the emission of toxic substances, BS-VI will definitely reduce the air pollution in cities in India.

- The levels of poisonous, highly reactive gases that form when fuel is burned at high temperatures such as NO_x, or oxides of nitrogen, are also expected to reduce.

BS-III and BS- IV

- The auto emission norms are emission standards which are adopted by the government of a nation to check the air pollutants released from any internal combustion engine equipment, including motor vehicles.
- These norms were introduced in India in 2000, when the Bharat Stage norms were adopted by the then government, based on the European emission norms.
- Each stage specifies a certain limit on the pollutants released, which is controlled by the type of fuel made by the oil companies and the upgradations and modifications made by the auto firms to their vehicles to control the pollutants released from the vehicle.
- India had enforced Bharat stage III norms across the country since October 2010. In 13 major cities, Bharat stage IV emission norms were put in place since April 2010.
- BS-IV fuels contain 50 parts per million (ppm) sulphur, while BS-V and BS-VI grade fuel will have 10 ppm sulphur.
- Currently, BS-IV auto fuels are being supplied in whole of northern India covering J&K, Punjab, Haryana, Himachal Pradesh, Uttarakhand, Delhi, parts of Rajasthan and western Uttar Pradesh. The rest of the country has BS-III grade fuel.

Frequently asked Questions about the Bharat Stage Emission Standards

Which Bharat Stage emission standards are followed now in India?

Since 2000, Euro norms are followed in India under the name Bharat Stage Emission Standards for four wheeled vehicles. Bharat stage III norms have been enforced across India since October 2010. In a few cities, Bharat stage IV norms are in place since April 2010.

What is the difference between Bharat Stage 4 and 6?

The extent of sulphur is the major difference between Bharat Stage IV and Bharat Stage VI norms. BS-IV fuels contain 50 parts per million (ppm) sulphur, the BS-VI grade fuel only has 10 ppm sulphur. The new norms will bring down nitrogen oxides from diesel cars by 70 per cent and in petrol cars by 25 per cent.