

Auto Fuel Policy interventions in India to Improve Air Quality

By

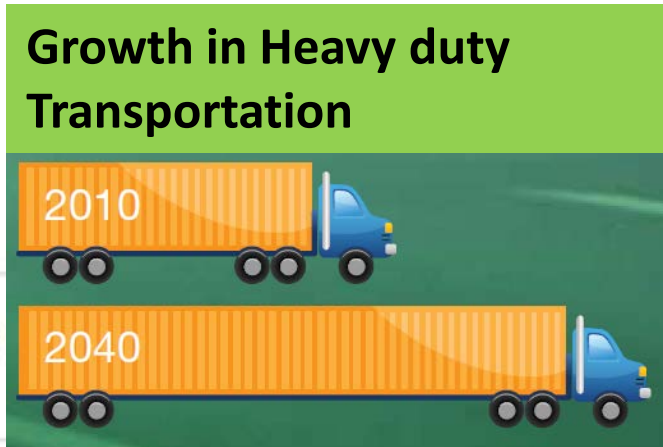
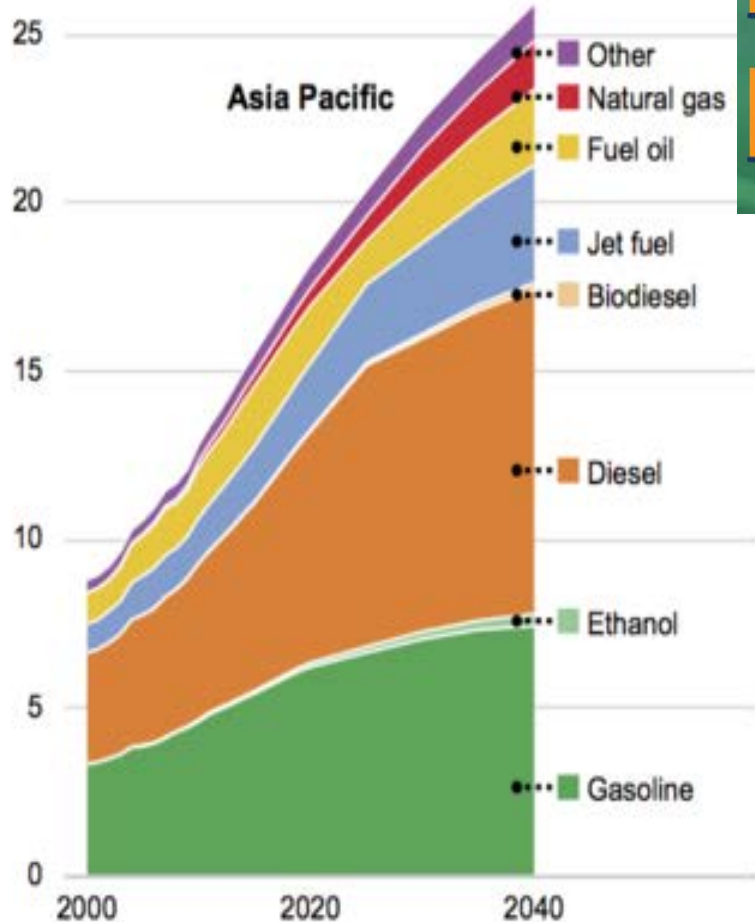
Dr.R.K.Malhotra

Globally Changing Product Slate

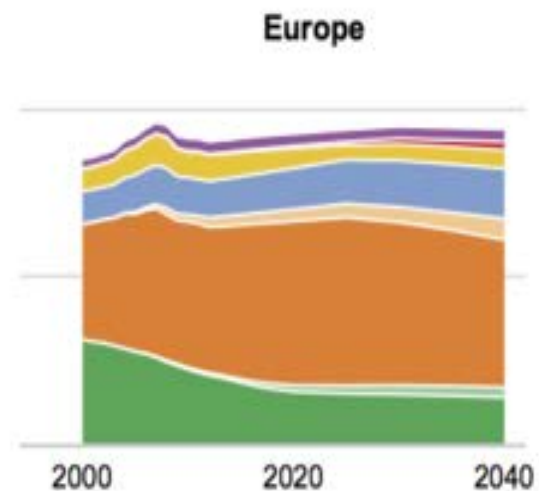
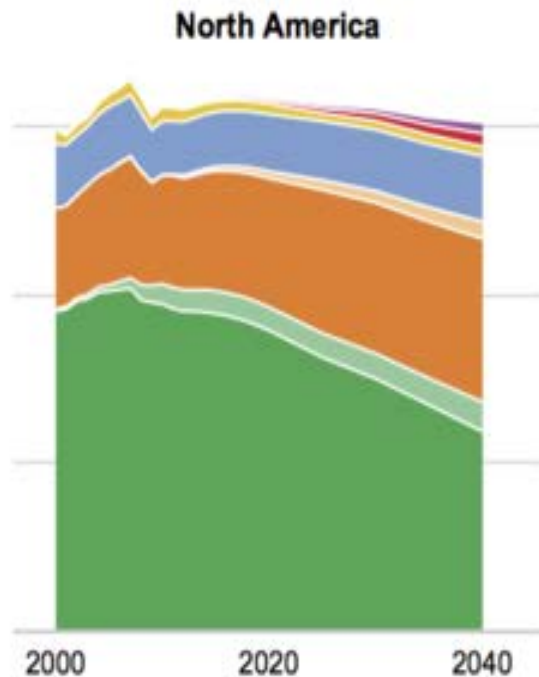
Source: Exxon Mobil

Transportation fuel mix
Millions of oil-equivalent barrels per day

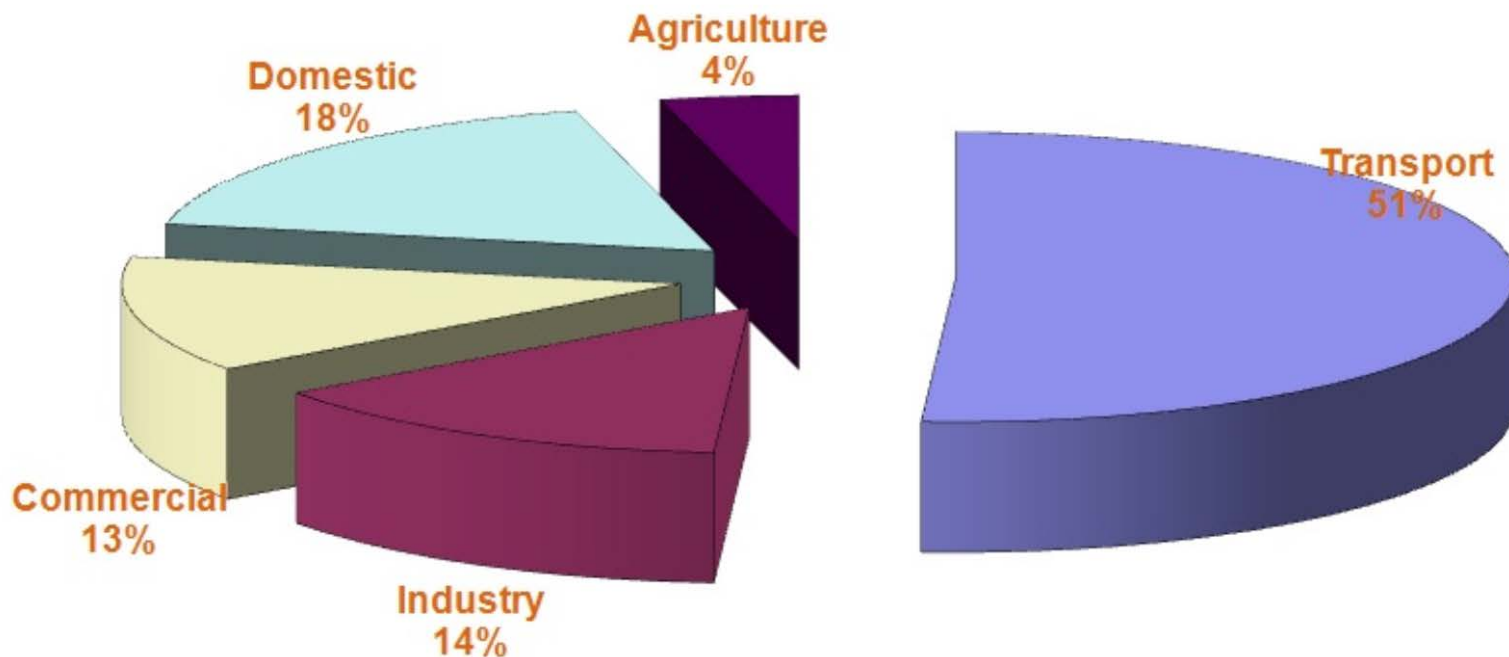
Demand of Diesel ↑



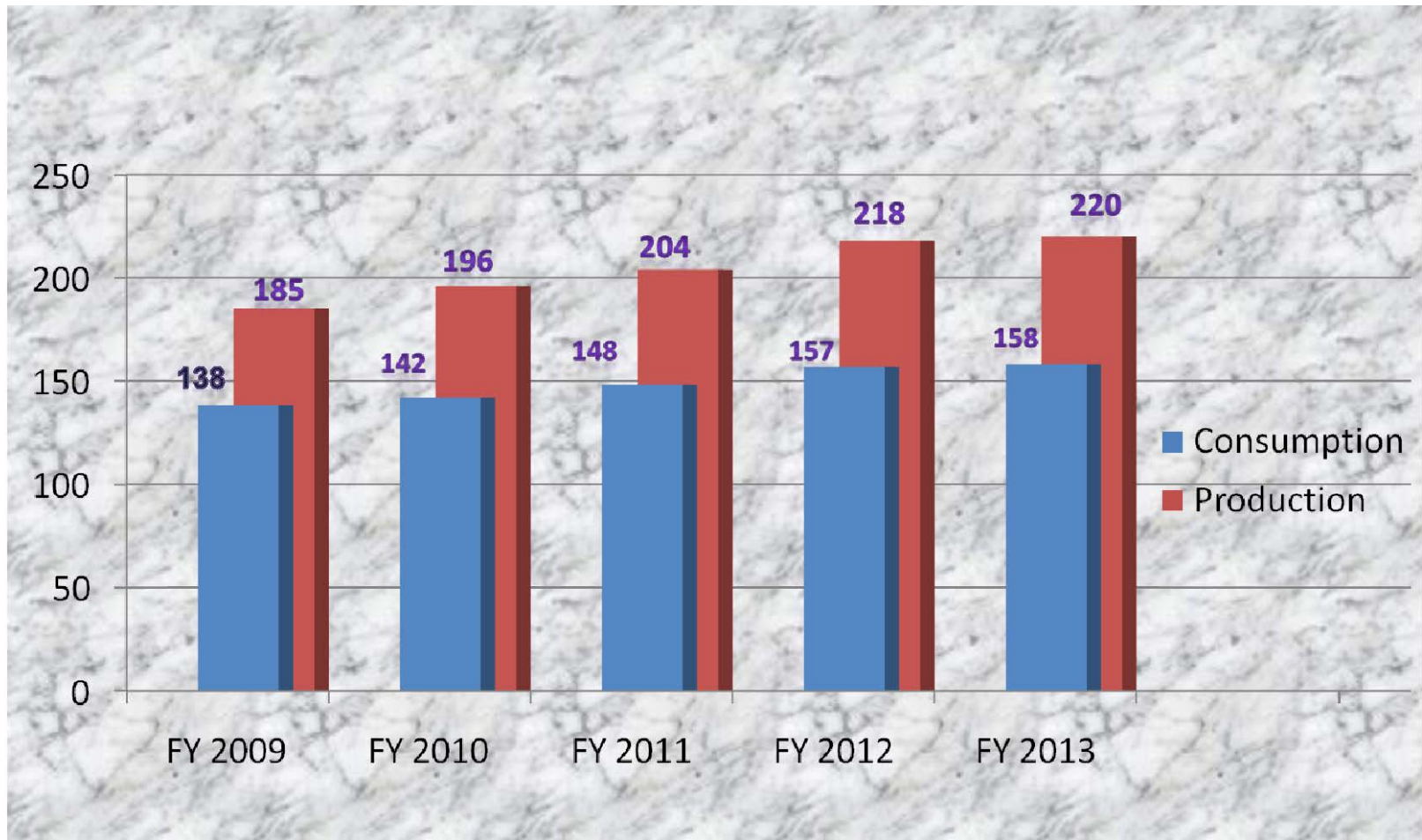
Diesel accounts for 70 percent of the growth in transportation fuels over the *Outlook* period.



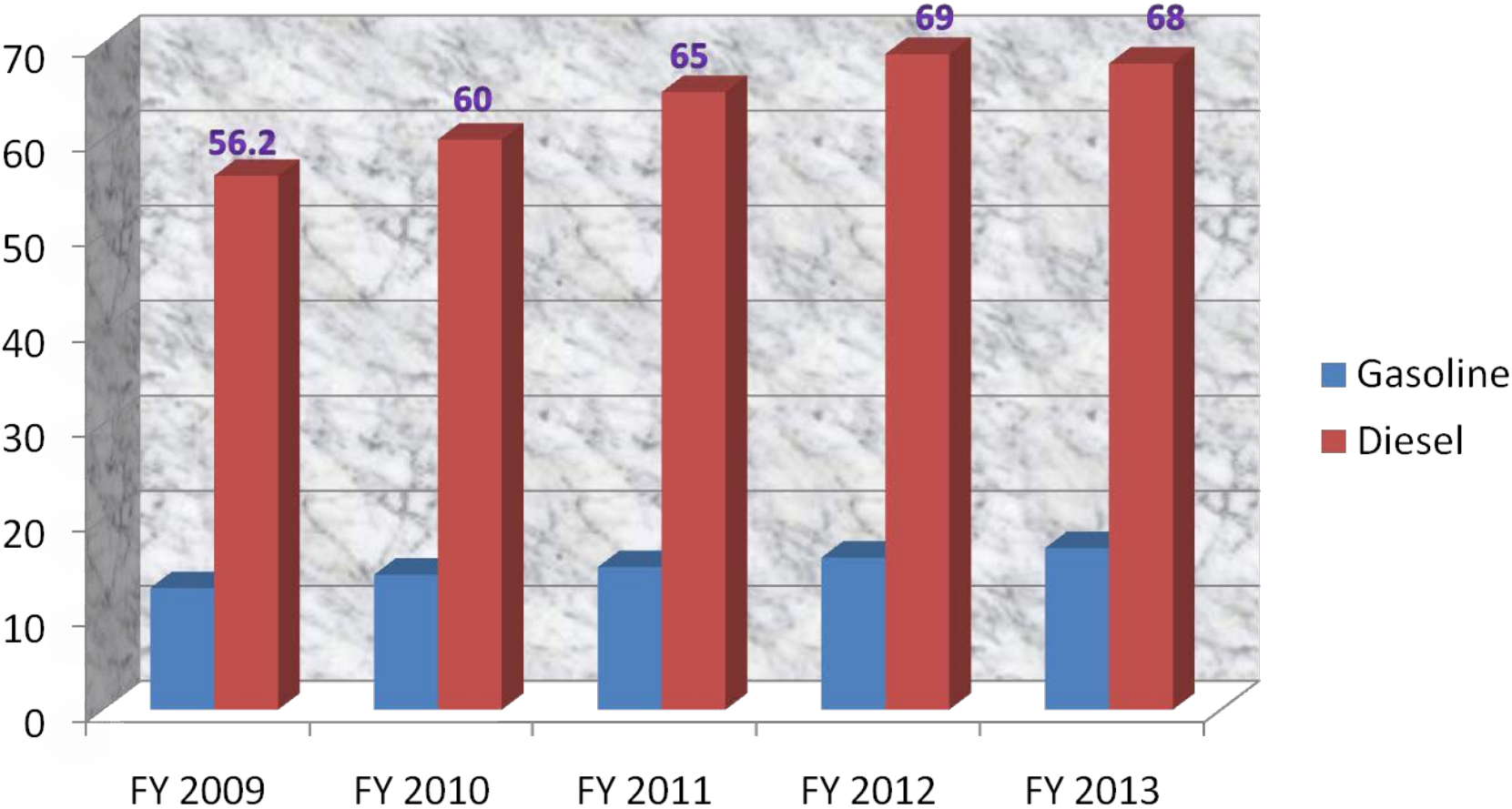
Petroleum Fuels Share In India



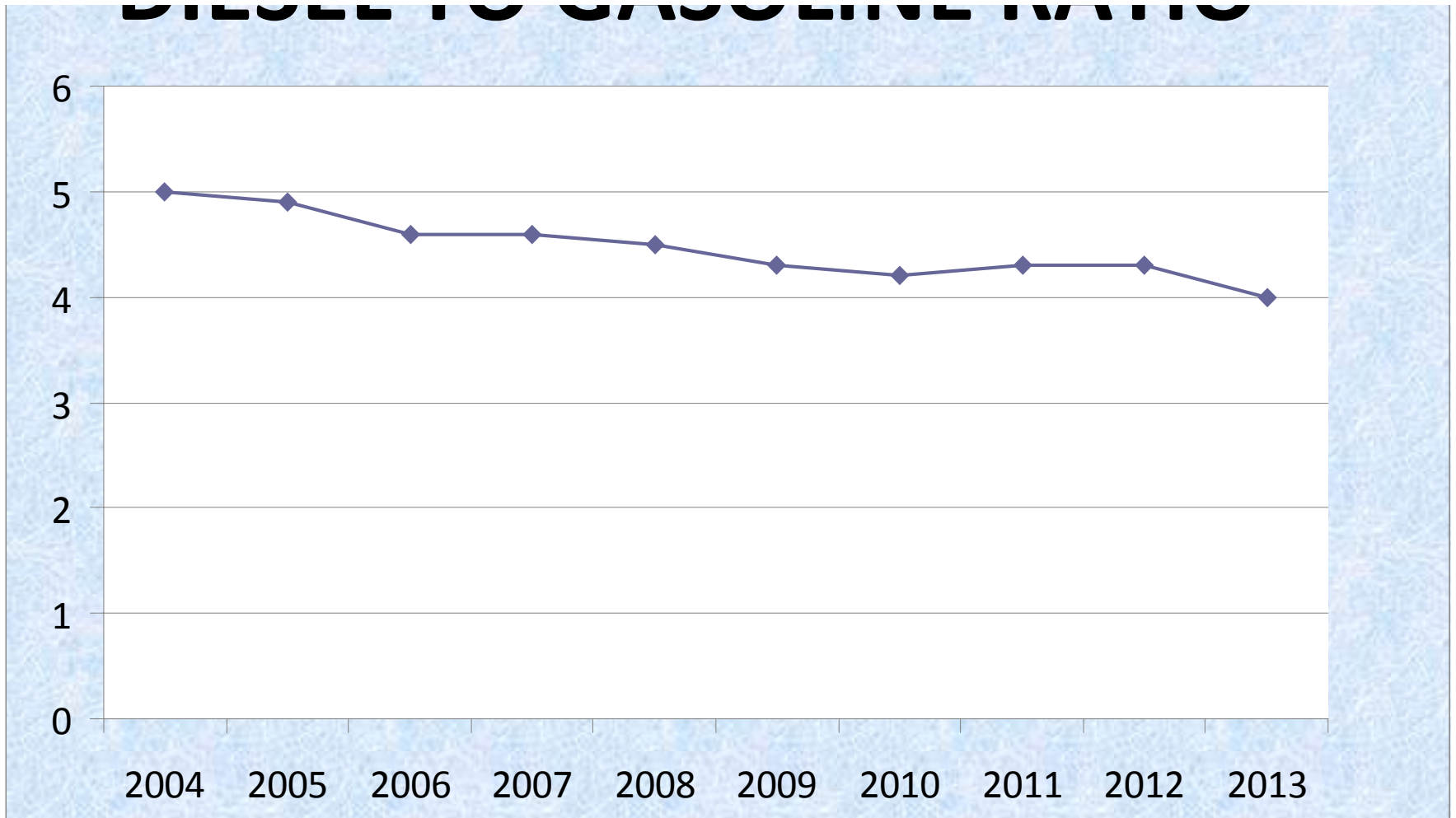
Growth of Petroleum Fuels in India



Diesel to Gasoline Ratio In India



Diesel Gasoline Ratio in India



Fuel Quality Improvements in India

- **Fuel Quality changes were driven by concerns of Environmental Pollution and Initial Changes were mandated by Courts**
- **Major Government initiative came with appointment of Mashelkar Committee in 2001 with following objectives:**
 - To propose an Auto Fuel Policy for the country including major cities; to devise a road map for its implementation;**
 - **To recommend suitable auto fuels and their specifications considering the availability and logistics of fuel supplies, the processing economics of automotive fuels, and the possibilities of multi-fuel use in different categories of vehicles;**
 - To recommend attributes of automobile technologies, fiscal measures for ensuring minimization of social cost of meeting a given level of environmental quality and institutional mechanisms for certification of vehicles and fuels, as also the monitoring and enforcement measures.**

Road map for fuel specifications and emission norms as per Auto Fuel Policy 2003

- The road map for new vehicles (except 2 and 3 wheelers) required compliance of Bharat Stage II emission norms in the entire country from 1.4.2005 and Euro III equivalent norms by 1.4.2010.
- In addition to 4 metros where Bharat Stage II norms were already in place, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur and Agra were also made to meet BS II norm from 1.4.2003.
- The four metros and the other seven cities were required to comply Euro III and Euro IV equivalent emission norms from 1.4.2005 and 1.4.2010 respectively.
- The 2 and 3 wheelers were required to conform to Bharat Stage II norms from 1.4.2005 all over the country and Bharat Stage III norms preferably from 1.4.2008 but not later than 2010.

Auto Fuel Vision and Policy 2025

- Ministry of Petroleum & Natural Gas vide Office Memorandum dated 19 December 2012 constituted an Expert Committee under the Chairmanship of Shri Saumitra Chaudhuri, Member, Planning Commission, Government of India to prepare a “Draft Auto Fuel Vision & Policy 2025”.

Auto Fuel Vision & Policy 2025

-Terms of Reference

-To recommend a road-map for auto fuel quality till 2025 for the country, taking into account the achievement under the last Auto Fuel Policy, emission reduction of in-use vehicles, growth of vehicles and the supply and availability of fuels.

-To recommend suitable mix of automotive fuels including natural gas and its specifications, considering the following:

a) Availability of infrastructure and logistics of fuel supplies,

b) The processing economics of auto fuels, and

c) Improvement in the quality of fuel *vis-à-vis* improvement in vehicle engine technology.

- To recommend vehicular emission norms for various categories of vehicles and roadmap for their implementation.

-To recommend use of alternate fuels to minimize impact on environment.

-To recommend fiscal measures for funding requisite up-gradation of Oil Refineries, logistics and removal of inter-fuel pricing distortions.

BSIV Fuel Extension Roadmap

- **1st April 2015:** Whole of North India covering J&K (except Leh/Kargil), Punjab, Haryana, Himachal Pradesh, Uttrakhand, Delhi & Bordering Districts, Parts of Rajasthan (Bharatpur, Alwar, Hanumangarh, Sriganganagar), Western UP (Saharanpur, Muzaffarnagar, Baghpat, Meerut, Bijnor, Ghaziabad, Gautam Buddh Nagar, Bulandshar, Jyotiba Phule Nagar, Rampur, Moradabad, Aligarh, Badaun, Bareilly, Mathura, Mahamaya Nagar, Etah, Agra, Ferozabad, Etawah and Mainpuri).
- **1st April 2016:** Goa, Kerala, Karnataka, Telangana, Odisha and Union Territory of Daman & Diu, Dadar-Nagar-Haveli, Andman & Nicobar, Parts of Maharashtra (Mumbai, Thane, Pune), Parts of Gujarat (Surat, Valsad, Dangs & Tapi), Corridors spanning the highway link through Gujarat and Rajasthan linking Northern India to the ports on the West Coast will also be covered.
- **1st April 2017:** Rest of Country

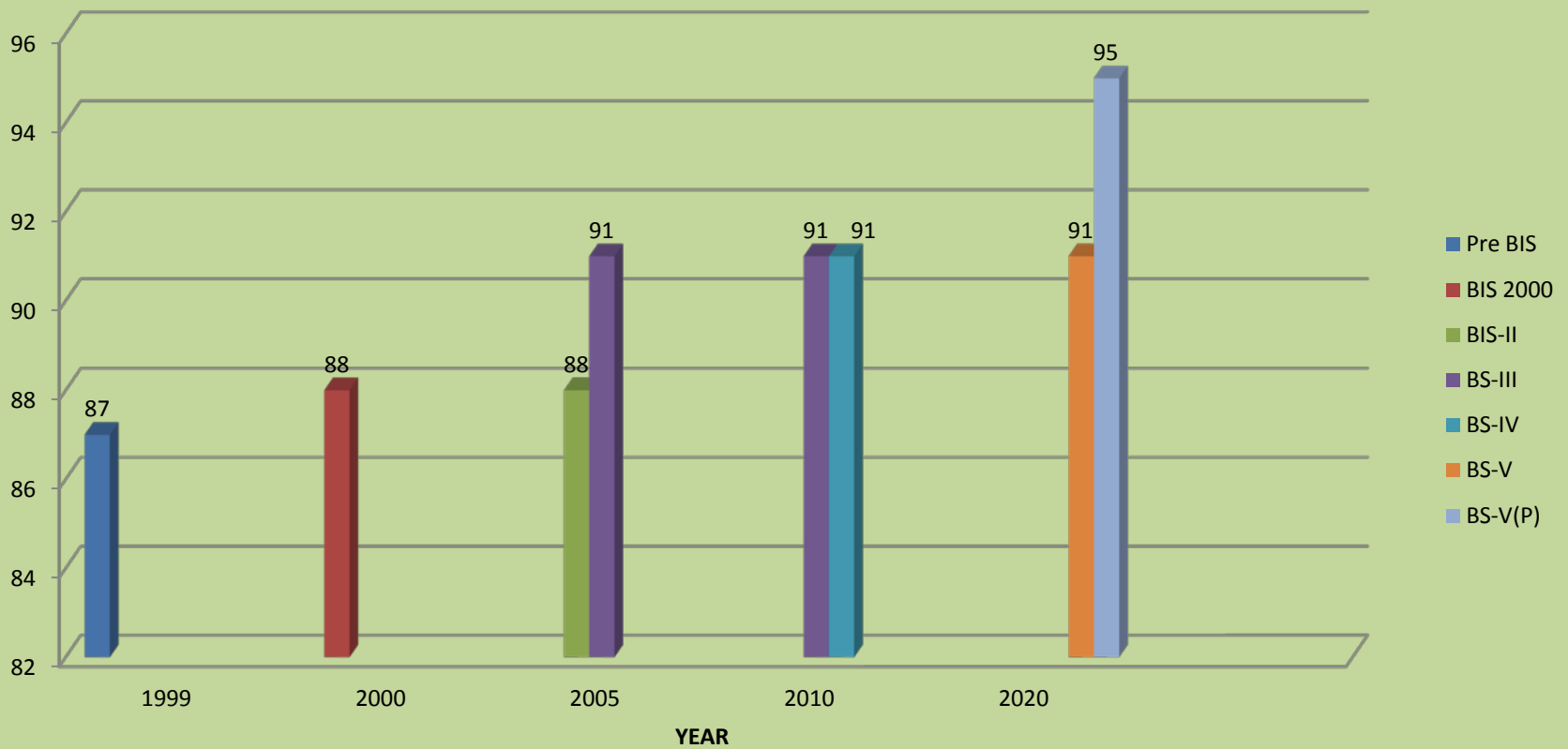
In the 49th meeting of the Standing Committee of Emissions (SCOE) held on 10th Feb. 2015, SIAM requested for extension of 6 months for regions to be covered by 1st April, 2015 for BS IV for Emission Norms which was agreed.

Proposed BS V and BS VI Road Map

- It has been proposed to move to BS V from April, 2020.
- Fuel Specs and emission norms have been prescribed.
- It is also proposed to move to BS VI from April, 2024. No emission limits are proposed as of now, which has been suggested to be decided in 2019.

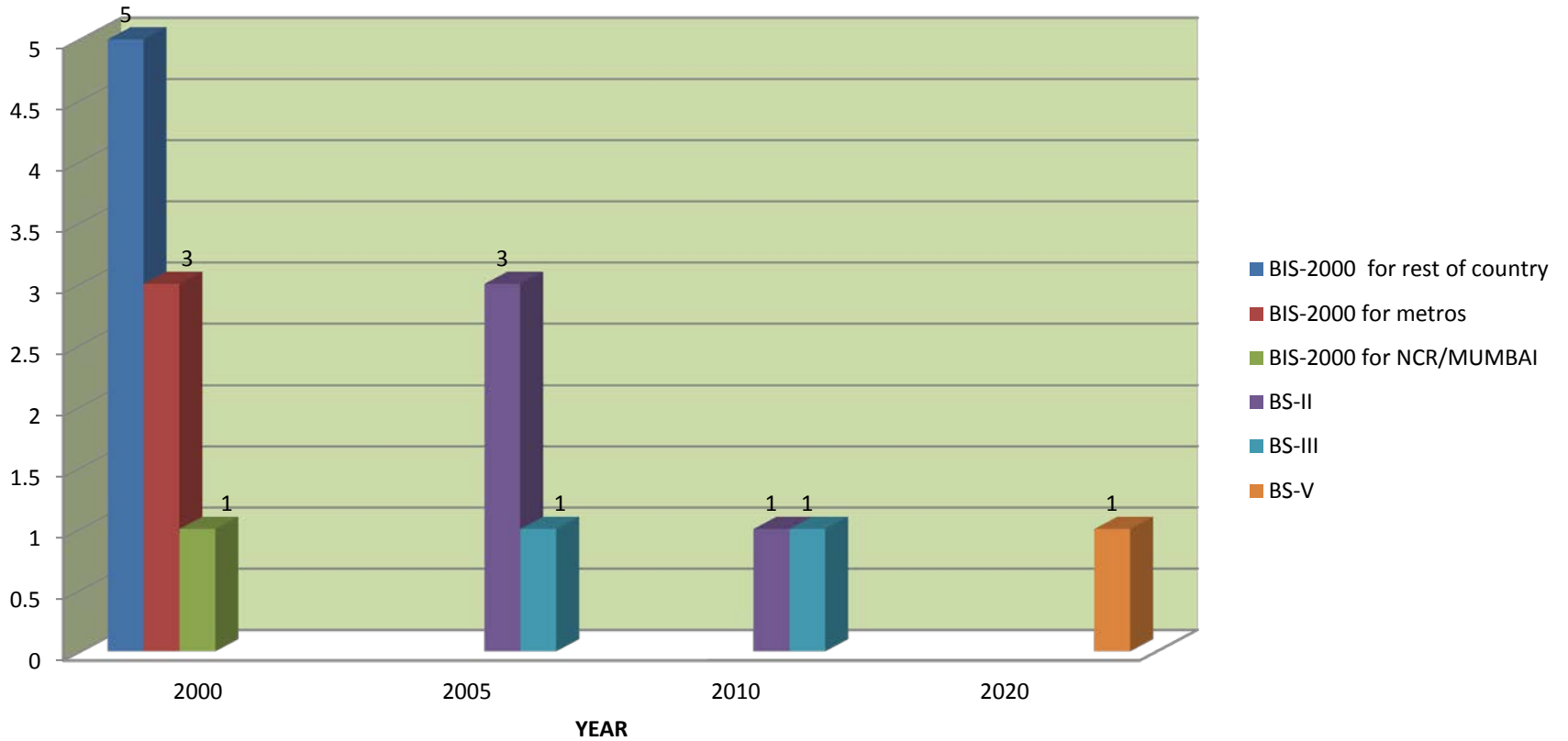
Fuel Quality Changes

RON of gasoline

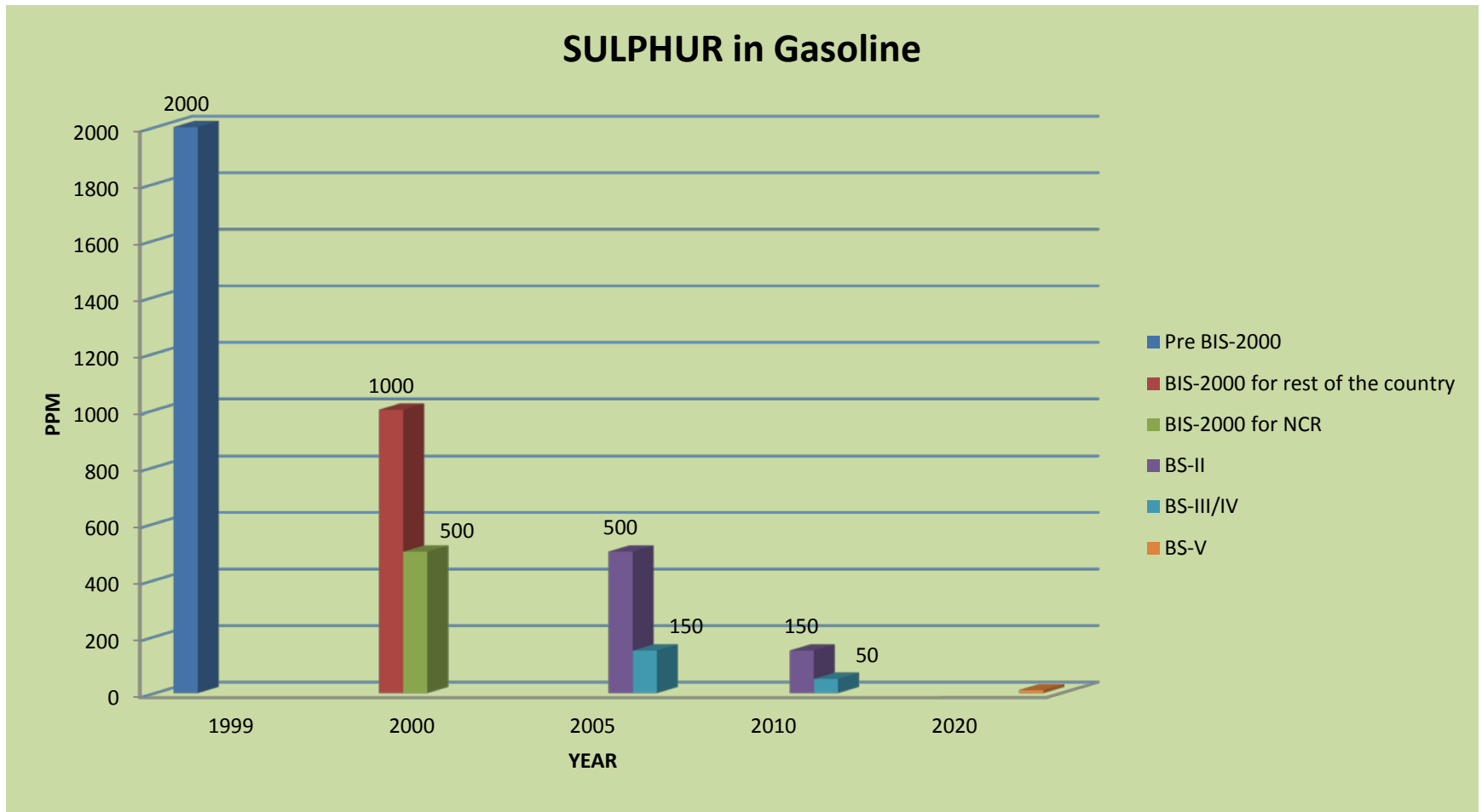


Fuel Quality Changes

Benzene in Gasoline

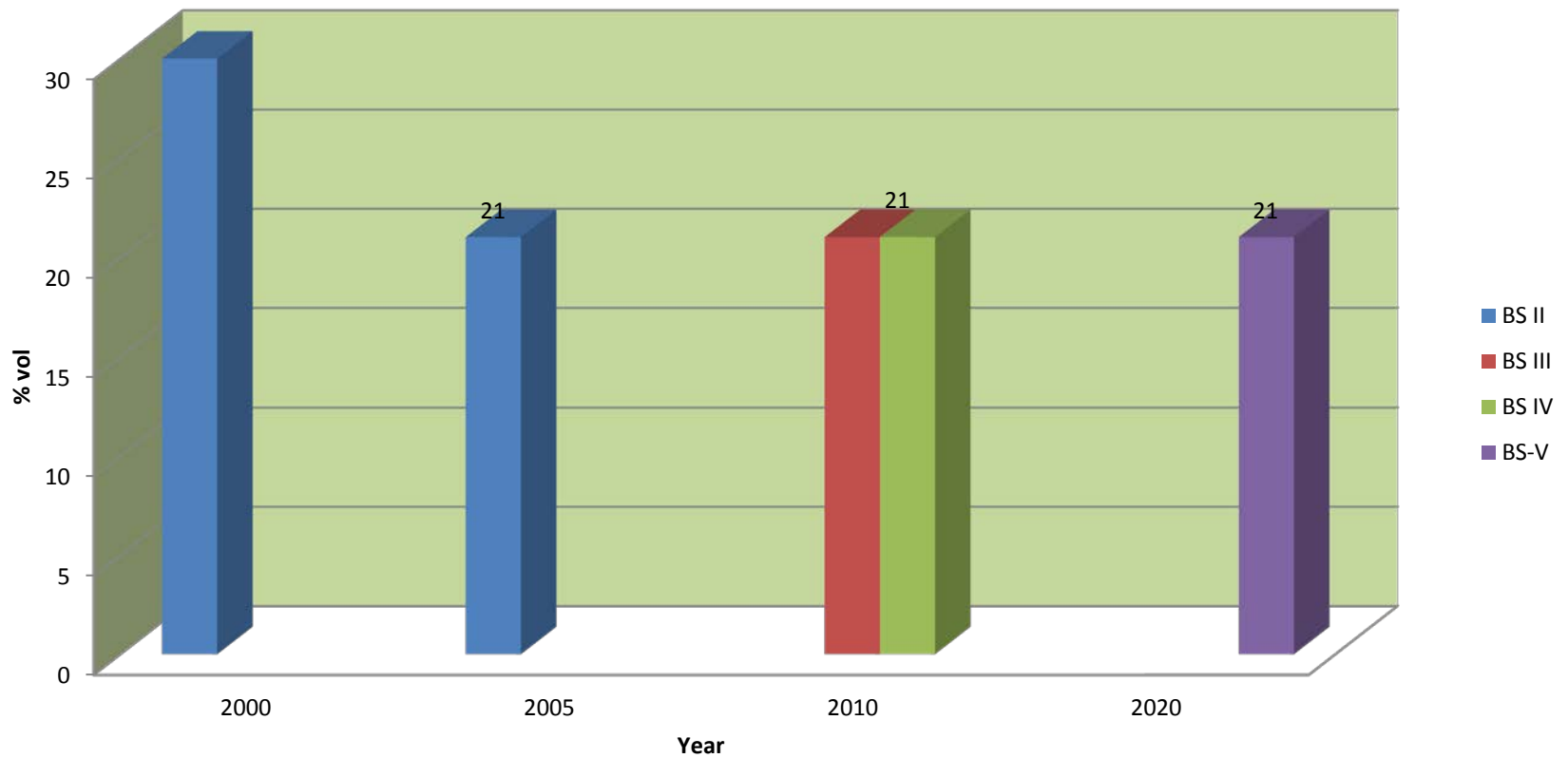


Fuel Quality Changes

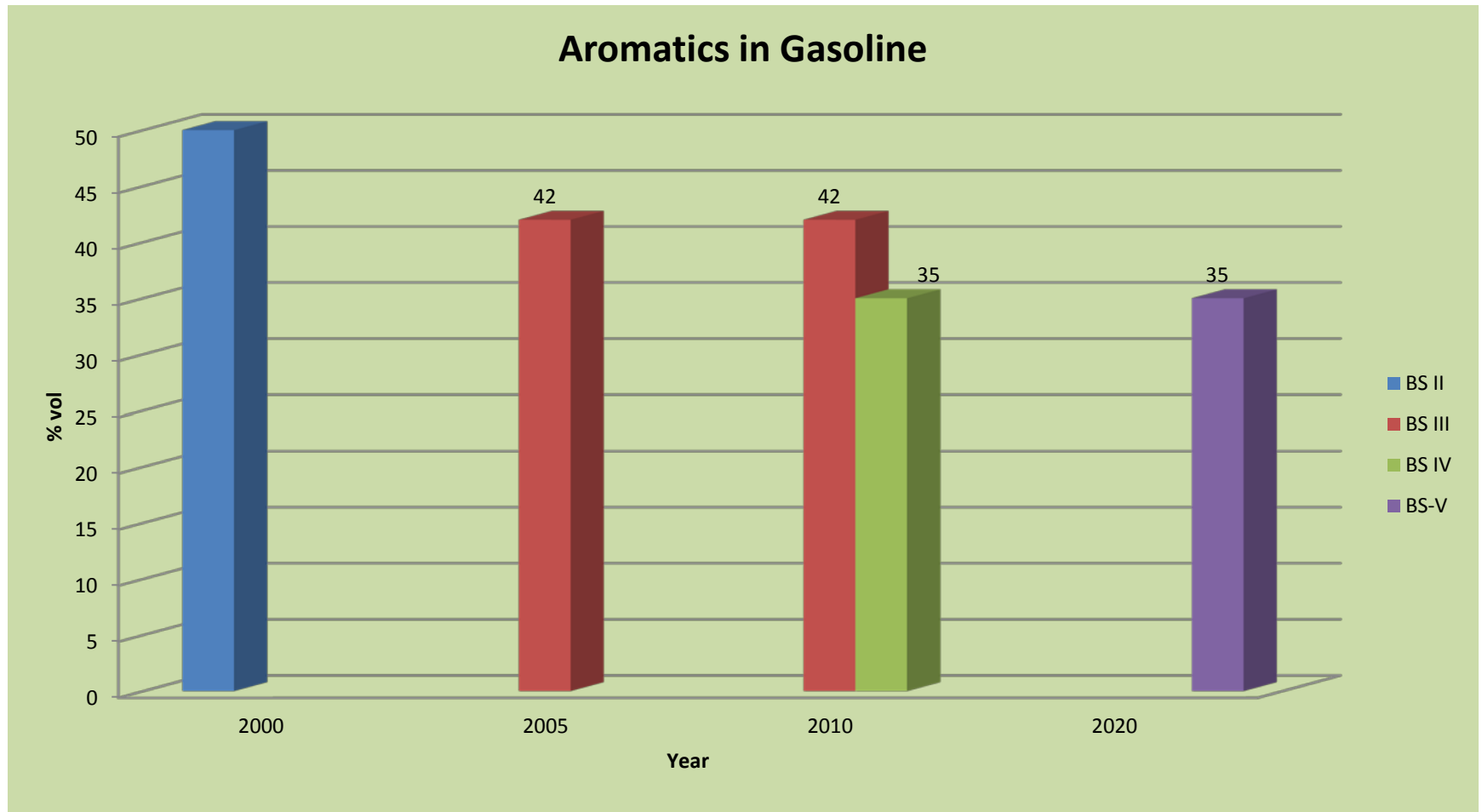


Fuel Quality Changes

Olefin in Gasoline

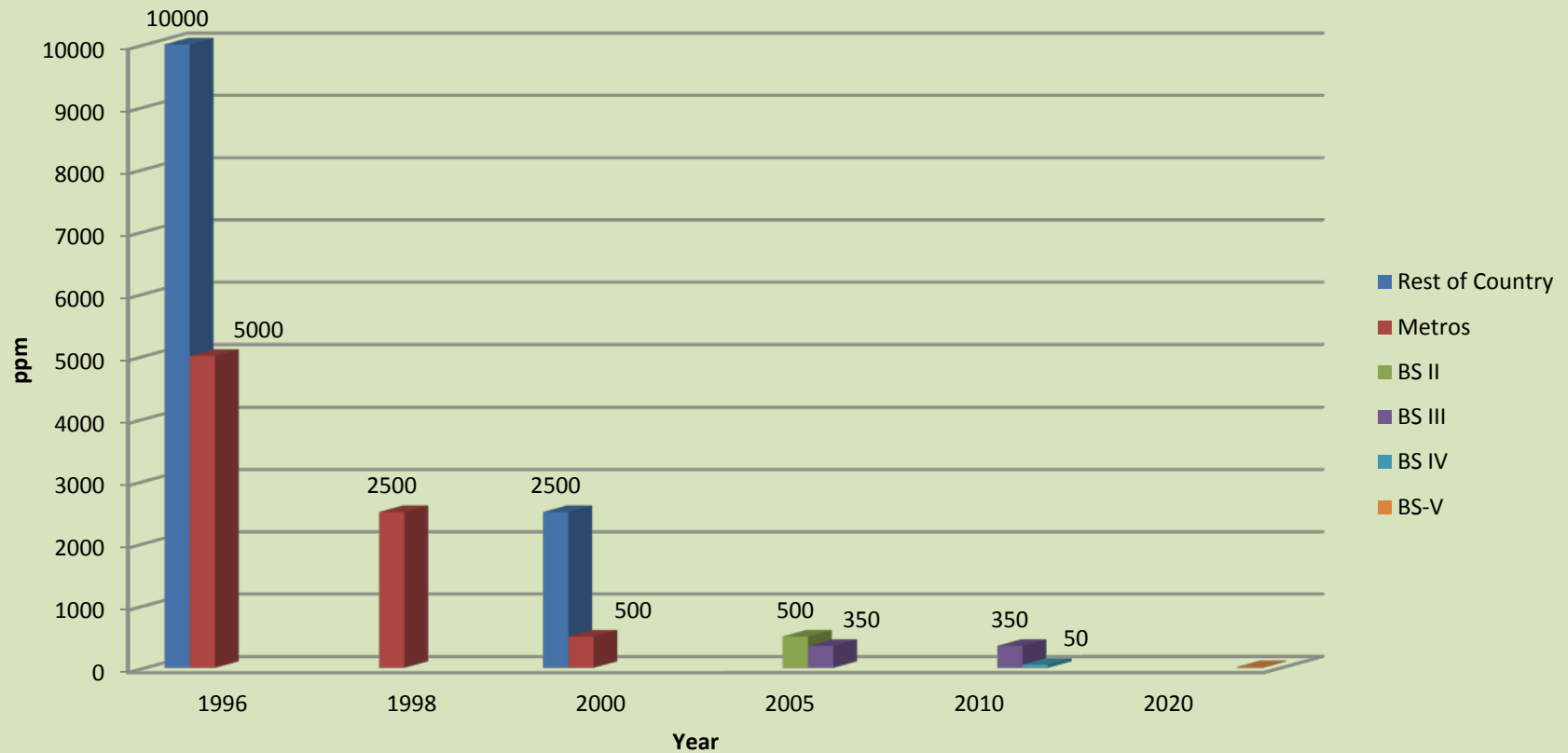


Fuel Quality Changes

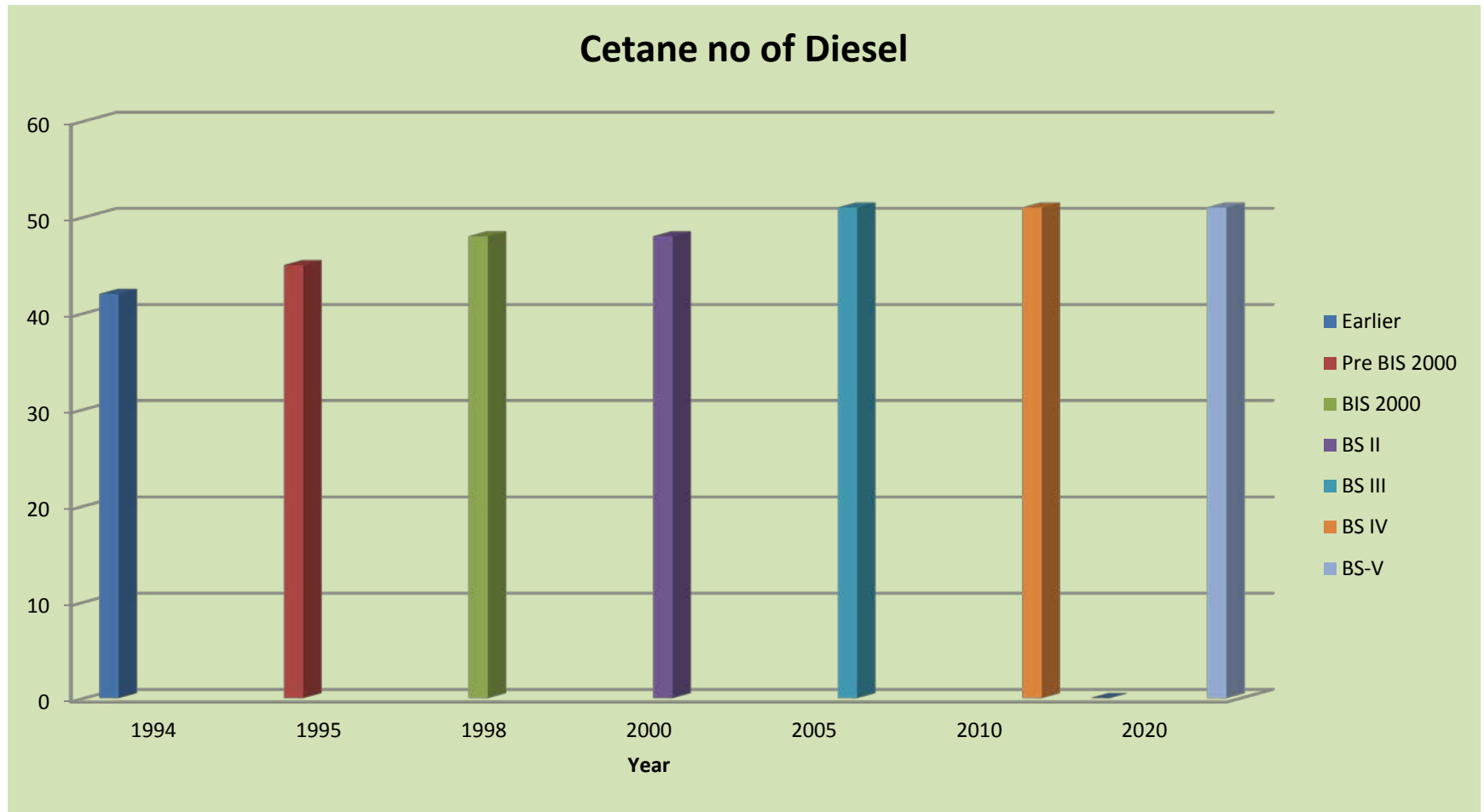


Fuel Quality Changes

Sulphur in Diesel

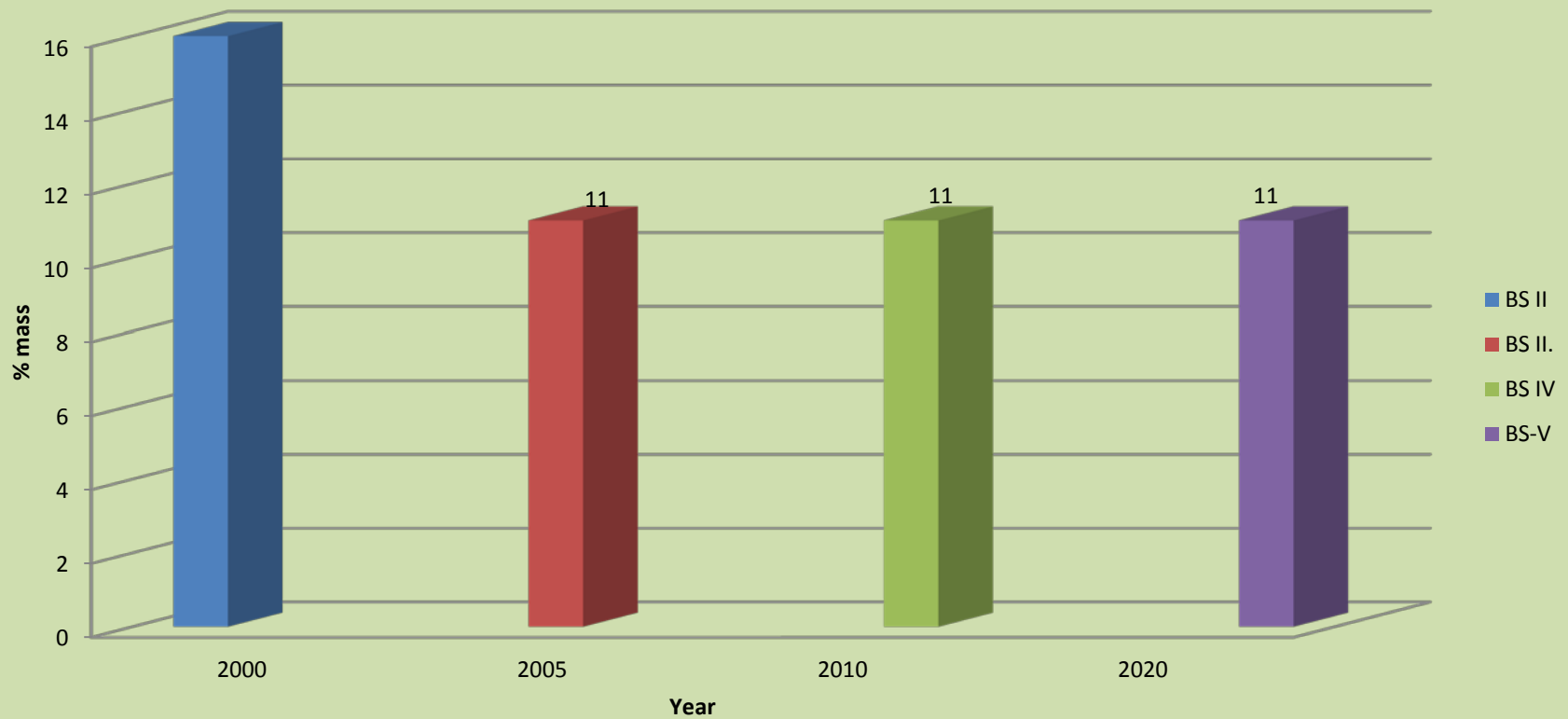


Fuel Quality Changes



Fuel Quality Changes

PAH in Diesel



Comparison of Euro V and BS V Fuel Specs.

Gasoline

- The difference in Euro V and BS V gasoline spec is related to Olefinic content which is 18 as per Euro V and 21 as per BS V.
- Euro Notification gives the option to member countries to choose between 89 and 95 as prescribed minimum RON. Although most European member countries have set it at 95, it has been decided to have min spec of 91 RON in India, though premium brands with 95 RON may be made available by oil companies.

Diesel

- In case of diesel the specs of Euro V and BS V have no major difference except in the flash point which continue to be lower in India compared to European Spec even after revision in BS V.

Scope of adopting BS VI directly from BS IV

- There is difference of following minor specs of Euro-V and Euro- VI fuels.
 - In case of gasoline as per Euro-VI, Reid Vapor Pressure (RVP) at 38 degree C is allowed in range of 45 to 70 in place of 45-60 kPa and vapor lock index (VLI) up to 1250 in place of 1050 max.
 - In diesel the max Poly Aromatic Hydrocarbon (PAH) content allowed only as per Euro VI is 8 percent against 11 percent as per Euro- V.
- Oil companies have major cost to go to Euro-V of 10 ppm sulfur, but they will have no problem in complying to other specs of Euro- VI with minor changes only.
- The Auto fuel policy and vision 2025 committee however has not given any specs for BS- VI. Although it indicated that BS VI can be effective from 2024 onwards.
- Capital investment estimated for the refiners for fuel quality changes for BS-IV all over the country and further to BS- V/VI is Rs.45,000 crore and Rs.35,000 crore respectively.

- ***Automobile manufacturers have been indicating following challenges to meet Euro/BS-VI standards:***
 - Exponential increase in investments in R&D and facilities required and domestic calibration efforts etc.
 - Due to low speeds in India calibration is to be done differently which can be done only after BS-V fuel is available all over in 2020 and will require few years time for trials.
 - Substantial increase in manufacturing, supply chain and service support will be required.
 - AUS 32 will be extensively required for Euro-VI vehicles to be equipped with SCR technology.
 - The incremental total cost estimated for diesel cars for BS V to BS VI is Rs. 30,000. In case of gasoline passenger cars, however the cost increase will be less than Rs. 10,000.

Challenge for Oil Industry

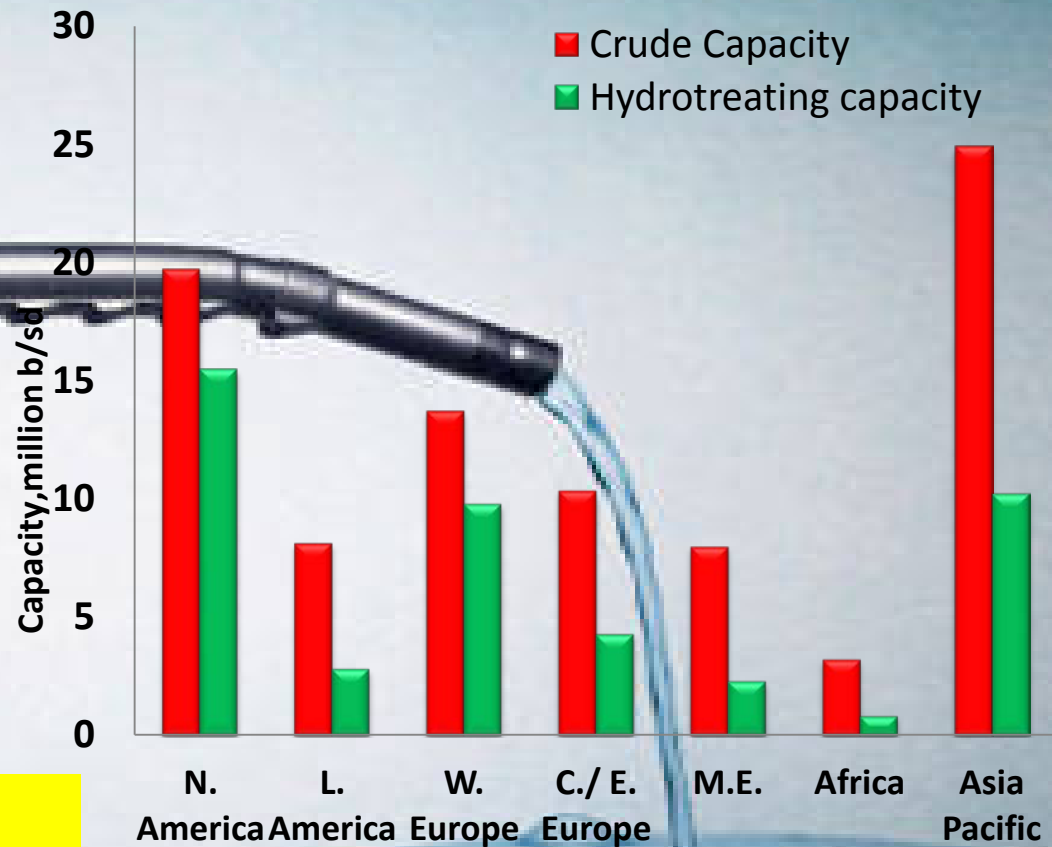
-Change in Crude Quality

Year	1985	1990	1995	1999	2010
Sulfur (wt%)	1.14	1.12	1.31	1.41	1.51
API Gravity	32.7	32.6	32.4	32.2	31.8
Residue (vol%)	19	19.4	19.8	20.2	21.3
'S' in residue (wt%)	3.07	3.26	3.61	3.91	4.0
Metals in Residue (ppm)	275	286	297	309	320

Other Challenges For Oil Refineries

- In spite of deteriorating crude quality, refineries have technical capabilities to move to BS VI fuel specs.
- Finding financial resources could be a challenge due to lower refinery margins in recent time.
- Space constraint in case of many refineries for secondary process units may pose difficulties.

Clean Fuel Programme



**Major Thrust in
Hydroprocessing**

What is required to be done:

- Govt. should announce the road map at the earliest for next stage of norms i.e. BSV/BSVI.
- As technology is available both for refineries and auto manufacturers to even leapfrog to BS VI, cost factors need to be fixed through fiscal policy interventions/incentives.
- Tax Incentives for voluntary compliance to BSV emission levels with BS IV i.e. 50 ppm fuel with effect from April 2017 and for BS VI compliance with 10 ppm fuel from April 2020 may be offered to automobile manufacturers.
- Global experience for retrofit options need to be made use of once 50 ppm fuel is available all over the country to reduce emissions to the extent possible from in use LDV/HDVs.
- Suitable measures for on road emission testing/compliance by the in- use vehicles need to be implemented without any delay. (Beijing Example may be considered).
- Fuel efficiency norms need to be in line with best global practice.
- Clean fuels like Bio-fuels, CNG and Hydrogen need to be encouraged.