

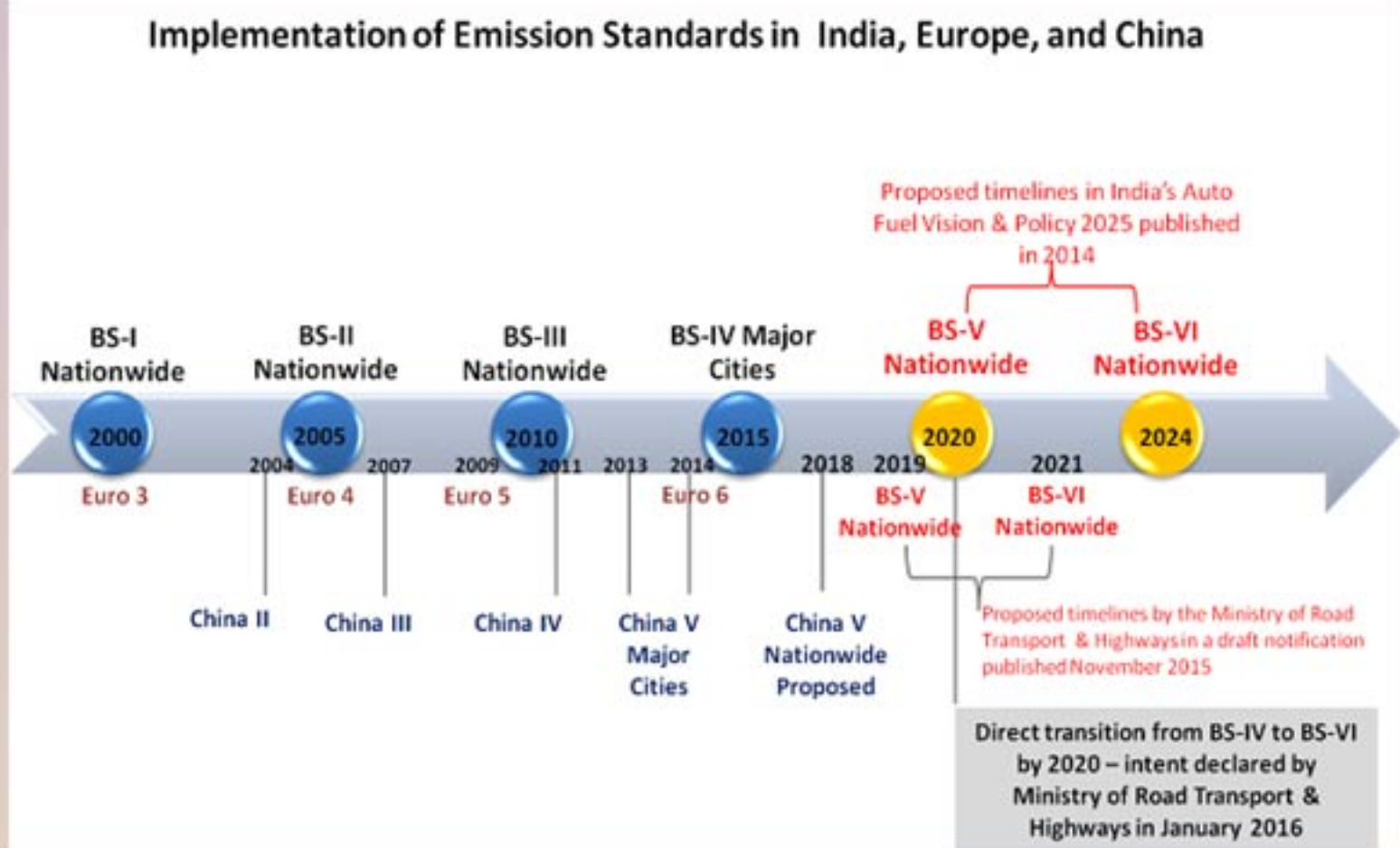
IMPACT OF PROPOSED INTRODUCTION OF BS-VI NORMS ON GROWTH OF INDIAN AUTO INDUSTRY AND IMPROVEMENT IN AIR QUALITY

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WHAT IS BS-VI NORMS..??

- Set by the central Government to regulate the output of air pollutants from motor vehicles
- Vehicle Emission standard was first introduced in 1991 by Ministry of Road Transport and Highways (MoRTH)
- Emission of greenhouse gases responsible for air pollution, climate change and adverse public health



CHALLENGES IN IMPLEMENTATION

- Bypassing the BS-V
- Major reform in Automobile industry
- Lesser time period for the successful implementation
- Huge changes in manufacturing facilities involved in both automobile and oil industry

OBJECTIVES OF THE STUDY

- To prove that there is a very high positive correlation number of vehicles and PM 2.5 (air quality) level in major cities in India
- To examine the increase in cost of petrol and diesel vehicles after the introduction of BS-VI norms. Is the cost increase is justified in order to improve the air quality and expected reduction in medical treatment
- To give suggestions regarding the satisfactory implementation of BS-VI norms, so that the time of implementation in minimised.

RESEARCH METHODOLOGY

Only secondary data has been used in this paper. The sources of the secondary data is from government publications. Using this data, the statistical computations have been worked out to prove the objectives of the study.

Emission Standards for Light Duty Vehicles ⁱⁱⁱ							
		BS-IV Norms			BS-VI Norms		
Petrol Vehicles	Unit	M & N1 Class I	N1 Class II	N1 Class III	M & N1 Class I	N1 Class II	N1 Class III
CO	g/ km	0.50	0.63	0.74	0.50	0.63	0.74
HC	g/ km	-	-	-	-	-	-
HC+NOx	g/ km	0.30	0.39	0.46	0.17	0.195	0.215
NOx	g/ km	0.25	0.33	0.39	0.08	0.105	0.125
PM	g/ km	0.025	0.04	0.06	0.0045	0.0045	0.0045
Diesel Vehicles	Unit	M & N1 Class I	N1 Class II	N1 Class III	M & N1 Class I	N1 Class II	N1 Class III
CO	g/ km	1.00	1.81	2.27	1.00	1.81	2.27
HC	g/ km	0.10	0.13	0.16	0.10	0.13	0.16
HC+NOx	g/ km	-	-	-	-	-	-
NOx	g/ km	0.08	0.10	0.11	0.060	0.075	0.082
PM	g/ km	-	-	-	0.0045	0.0045	0.0045

M category include motor vehicles having at least four wheels and for the carriage of passengers
N1 Class I include Power-driven vehicles having at least four wheels and for the carriage of goods (< 3.5 tonnes)
N1 Class II include Power-driven vehicles having at least four wheels and for the carriage of goods (>3.5 tonnes and < 12 tonnes)
N1 Class III include Power-driven vehicles having at least four wheels and for the carriage of goods (> 12 tonnes)
Source: http://transportpolicy.net/index.php?title=India:_Light-duty:_Emissions

ESTIMATED CHANGES IN AUTOMOBILES

- Introduction of Diesel Particulate Filter (DPF) and Selective Catalytic Reduction Module (SCR) will be the major changes in the design of vehicles suiting to BS-VI norms.
- Petrol Vehicles – 20,000 to 30,000
- Diesel Vehicles – 75,000 to 1,00,000
- Developed countries – 6 to 8 years
- India – 15 to 20 years

AIR QUALITY IN INDIAN CITIES

- Most Indian cities have recorded high level of Particulate Matter in their ambient air
- High level of pollutants present in the ambient air in Indian cities has become a public health crisis

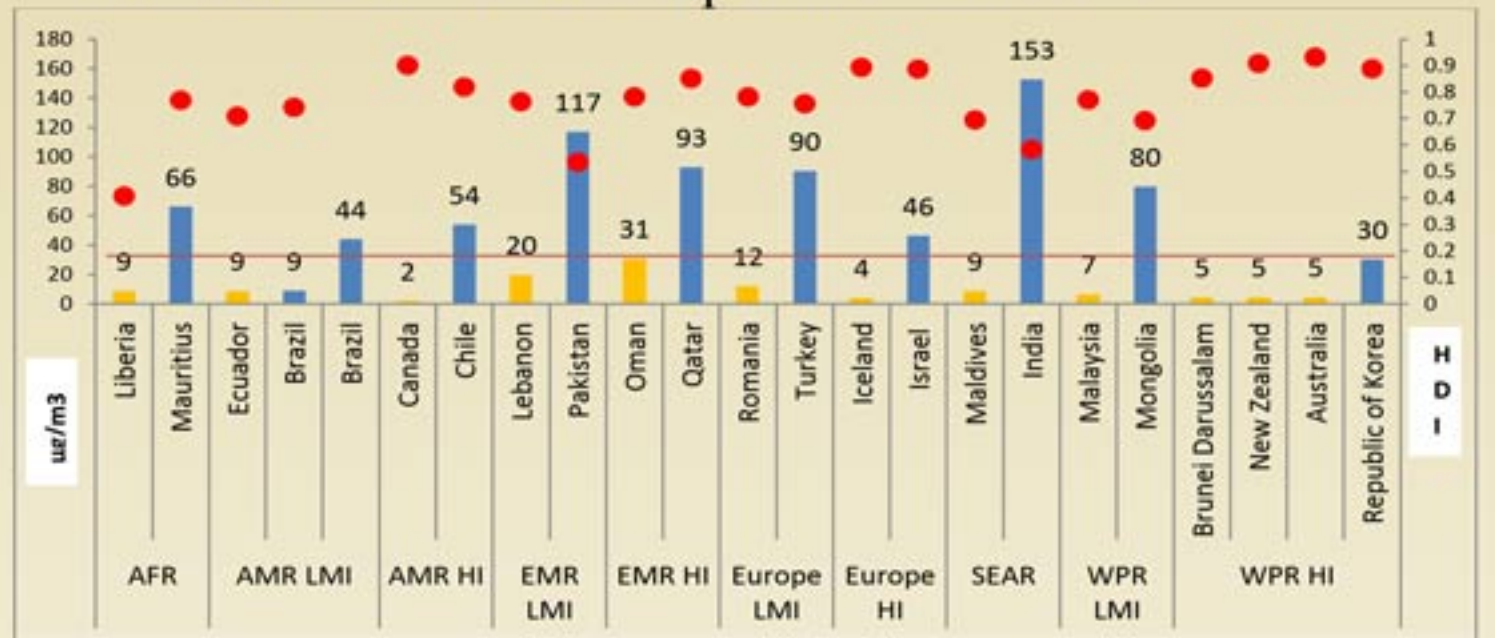


Figure 2: Annual mean concentration of PM_{2.5} (ug/m3) in regions of the world²

CORRELATION FACTOR

S. No.	City	No. of Vehicles (Lakhs) X	Particulate Matter (PM 2.5) Y	X ²	Y ²	XY
1.	Ahmedabad	31.91	100	1018.24	10000	3191
2.	Delhi	72.27	153	5222.95	23409	11057.31
3.	Hyderabad	30.32	70	919.30	4900	2122.4
4.	Kolkata	36.50	100	1332.25	10000	3650
5.	Mumbai	18.70	53	349.69	2809	991.1
6.	Pune	20.93	70	438.07	4900	1465.1
7.	Nasik	11.27	27.35	127.01	748.02	308.23
8.	Puducherry	8.44	22	71.23	484	185.68
Sum (Σ)		230.34	595.35	9478.74	57250.02	22970.82

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$
$$= \frac{8(22970.82) - (230.34)(595.35)}{\sqrt{[8(9478.74) - (230.34)^2][8(57250.02) - (595.35)^2]}}$$
$$= \frac{183766.56 - 137132.919}{\sqrt{[75829.92 - 53056.5156][458000.16 - 354441.6225]}}$$
$$= \frac{46633.641}{\sqrt{(22773.4044)(103558.5375)}}$$
$$= \frac{46633.641}{48563.16}$$
$$r = 0.96$$



ECONOMIC COSTS OF AIR POLLUTION

	2005					2010				
	No. of deaths	VSL 2005 in USD millions	Mortality costs, USD millions	Mortality + morbidity (health) costs, USD millions if add-on ~10%	Health costs as a percentage of GDP	No. of deaths	VSL 2005 in USD millions	Mortality costs, USD millions	Mortality + morbidity costs (health), USD millions if add-on ~10%	Health costs as a percentage of GDP
OECD countries	4,97,958	..	1,470,487	~ 1,617,536	4.44%	4,78,104	..	1,571,170	~ 17,28,287	3.98%
India	6,20,622	0.375	2,32,736	~ 2,56,010	30.68%	6,92,425	0.602	4,16,704	~ 4,58,734	26.85%
China	1,215,180	0.61	7,41,019	~ 8,15,121	36.11%	1,278,890	0.975	12,46,713	~13,71,384	23.12%

LIMITATIONS

- In depth details about the expenses spent by the automobile companies is limited

FUTURE SCOPE

- The study is limited to the Automobile industry, it can extended to other industries in the future