

SHARING INDIAN EXPERIENCE

STAKEHOLDER'S WORKSHOP ON "FEEBATE AND FUEL ECONOMY LABELLING
PROGRAMME FOR KENYA" 12 TH MAY 2016 NAIROBI KENYA

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India



INDIAN WAY OF LIFE

वसुधैव कुटुम्बकम्

Vasudhaiva Kutumbakam

The world is a family

One is a relative, the other Stranger

Say the small minded

The entire World is a family, live the

Magnanimous

Maha Upanishad

INDIA

- Continent-Asia
- Region-South Asia (Indian Subcontinent)
- Area-3.288 Million Sq. Km.
- Population-1.252 Billion
- GDP-7th in Nominal terms, 3rd in PPP basis

AUTOMOTIVE INDUSTRY AT A GLANCE

- Indian automobile industry- Emerging as a global player
 - 2nd largest two-wheeler(2W) manufacturer
 - 6th largest Passenger vehicle(PV) manufacturer
 - 2nd largest small PV manufacturer
 - 8th largest Commercial vehicle(CV) manufacturer
 - 2nd largest bus manufacturer
 - 5th largest heavy truck manufacturer

INDIAN AUTO INDUSTRY CONTRIBUTE TO:

- 7.1% to Indian GDP
- 27% of Indian Industrial GDP
- 45% of Manufacturing GDP
- 4.3% of overall Exports
- 13% of Excise revenue
- 8% of Country R&D expenditure
- Employs 29 million people

INDIAN REGULATORY AND OTHER AGENCIES

- **Bureau of Indian Standards (BIS)**- Formulation of standards of national interest and their harmonization with international standards.
- **Central Pollution Control Board (CPCB)**- Ensure the quality of water and improve the quality of air by preventing, controlling, or abating air pollution.
- **Ministry of Environment and Forest (MoEF)**- Preserving the health of natural resources by following the path of sustainable development and enhancement of human well-being.
- **Ministry of Petroleum and Natural Gas (MoPNG)**- Planning, development and regulation of Petroleum and Natural Gas resources.
- **Ministry of Road Transportation and Highways (MoRTH)**- Creation and administration of policies and research surrounding road transport and highways in India.

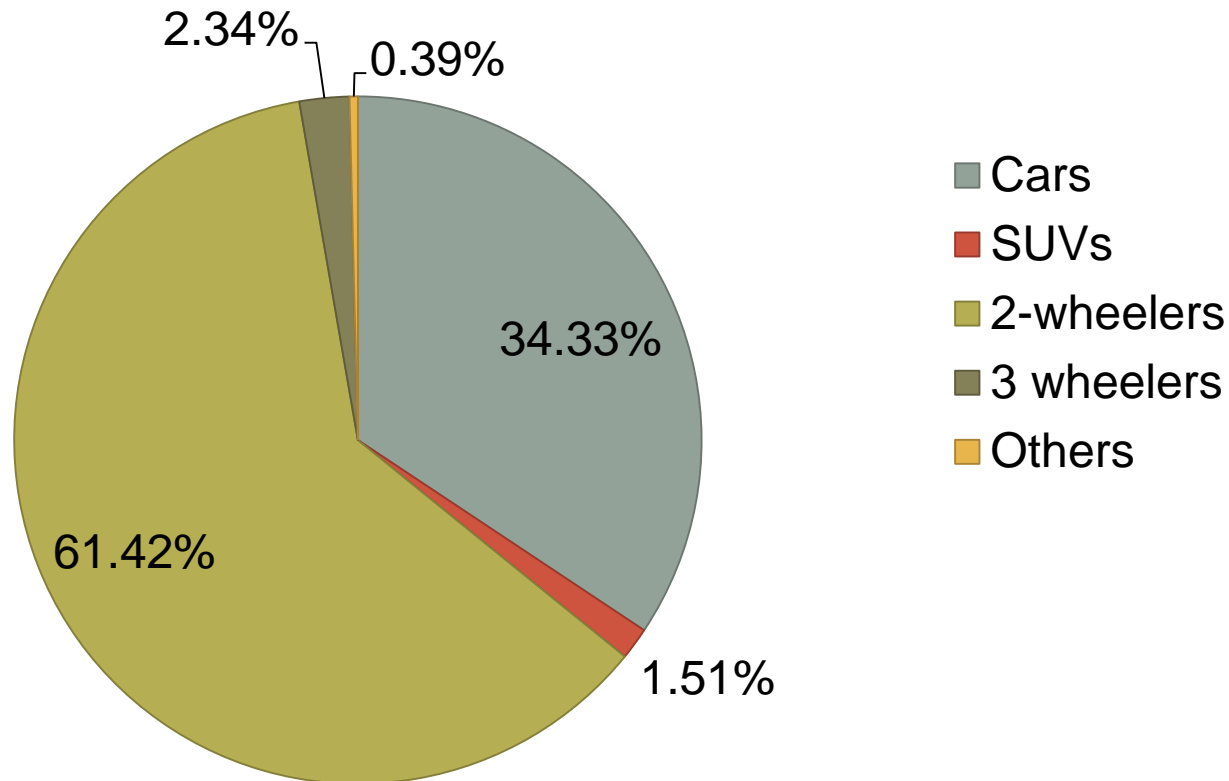
INDIAN REGULATORY AND OTHER AGENCIES ETC

- **Department of Heavy Industry-** The Department of Heavy Industry entails promoting engineering industry i.e. machine tools, heavy electrical, industrial machinery and auto industries.
- **NATRIP-National Automotive Testing and R&D Infrastructure Project (NATRiP)**, the largest and one of the most significant initiatives in Automotive sector, represents a unique joining of hands between the Government of India, a number of State Governments and Indian Automotive Industry to create a state of the art Testing, Validation and R&D infrastructure in the country.
- **Automotive Research Association of India (ARAI)**-ARAI has been providing various services to the Indian Automotive Industry in the area of design & development and know how for manufacturing and testing of components to National and International Standards
- **Bureau of Energy Efficiency-** The Bureau of Energy Efficiency is to assist in developing policies and strategies with thrust on self-regulation and market principle, within the overall framework of the Energy Conservation Act 2001 with the primary objective of reducing energy intensity of the Indian Economy.
- **Petroleum Conservation Research Association**-Petroleum Conservation Research Association (PCRA) is a registered society set up under the aegis of Ministry of Petroleum & Natural Gas, Government of India. As a non-profit organization, PCRA is a national government agency engaged in promoting energy efficiency in various sections of economy. It helps the government in proposing policies and strategies for petroleum conservation, aimed at reducing excessive dependence of the country on oil requirement. Over the years, PCRA has enlarged its role in improving productivity in use of various sources of energy.
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SECTOR-WISE SHARE OF PETROL-2012-13

Out of Total sale of petroleum products-157.1 MMT

Total sale of petrol- 15.74 MMT

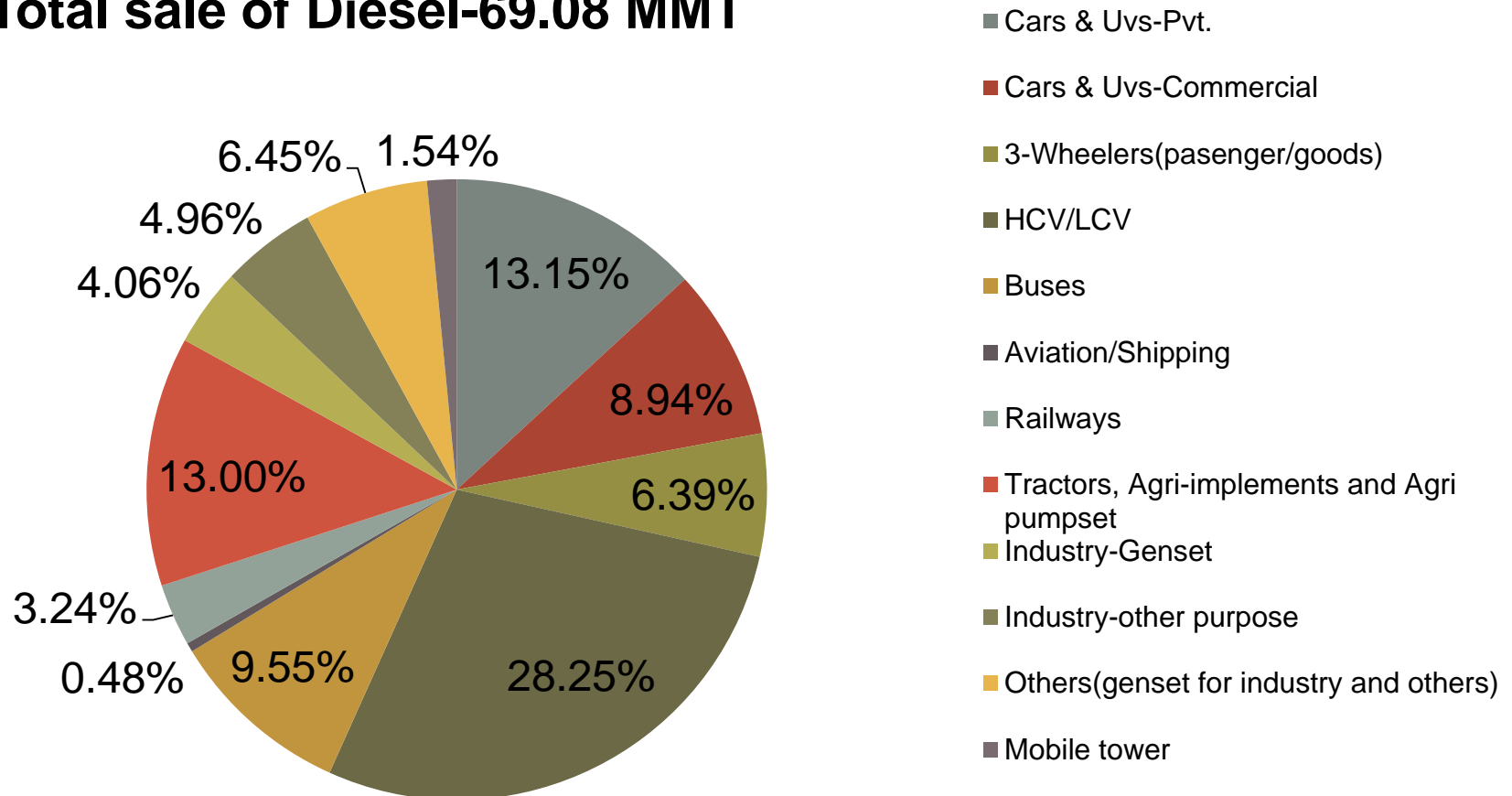


Source- Petroleum Planning and Analysis Cell

SECTOR-WISE SHARE OF DIESEL-2012-13

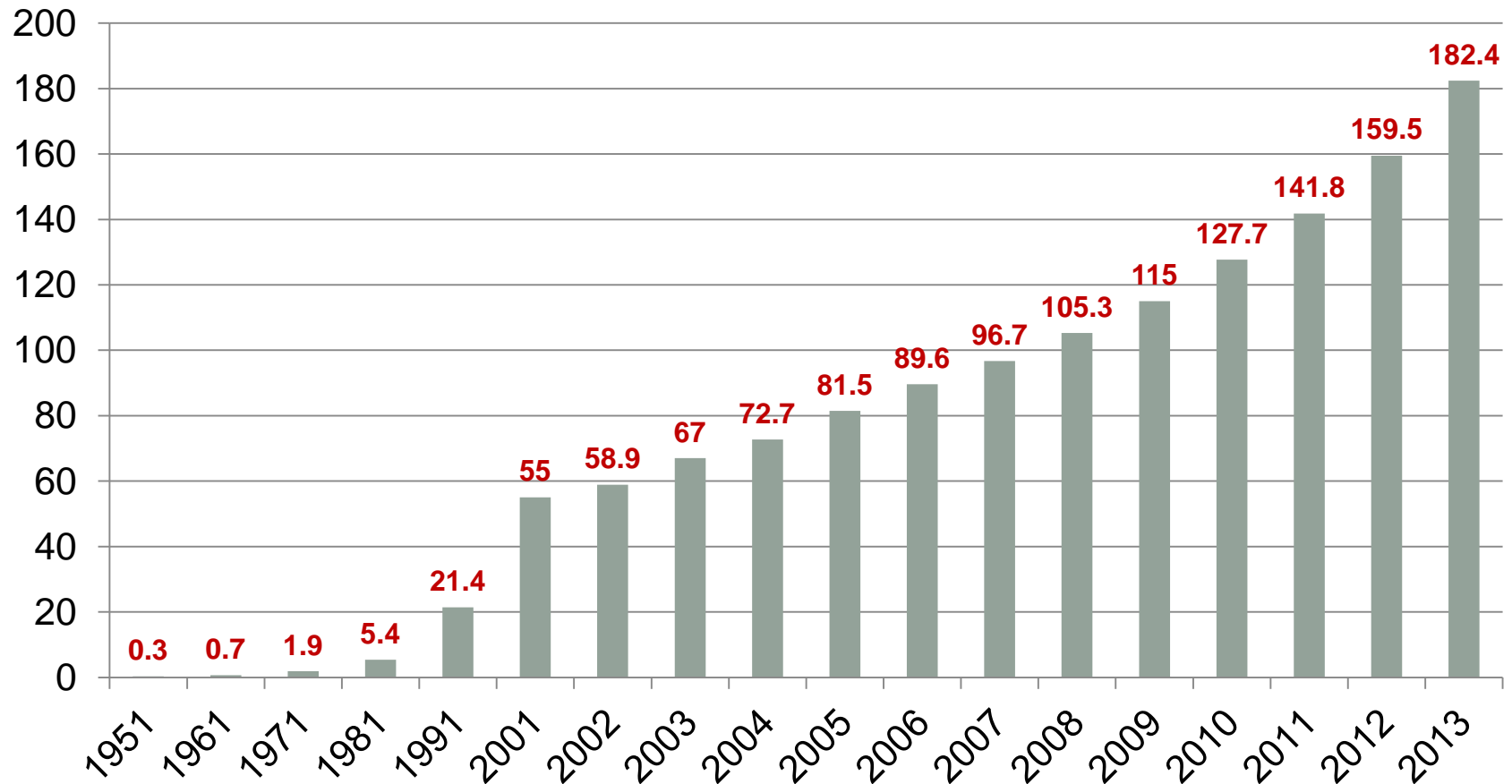
Out of Total sale of petroleum products-157.1 MMT

Total sale of Diesel-69.08 MMT



Source- Petroleum Planning and Analysis Cell

TOTAL NO. OF REGISTERED MOTOR VEHICLES (IN MILLION 1951-2013)



Source: Ministry of Road Transport & Highways

AUTO INDUSTRY IS GEARING FOR:

- Comfort
- Aesthetics
- Safety regulations
- Emission regulations
- Fuel efficiency regulations

EMISSION REGULATIONS

Photograph by Alan Andrews, Client Earth in CSE conclave 2016

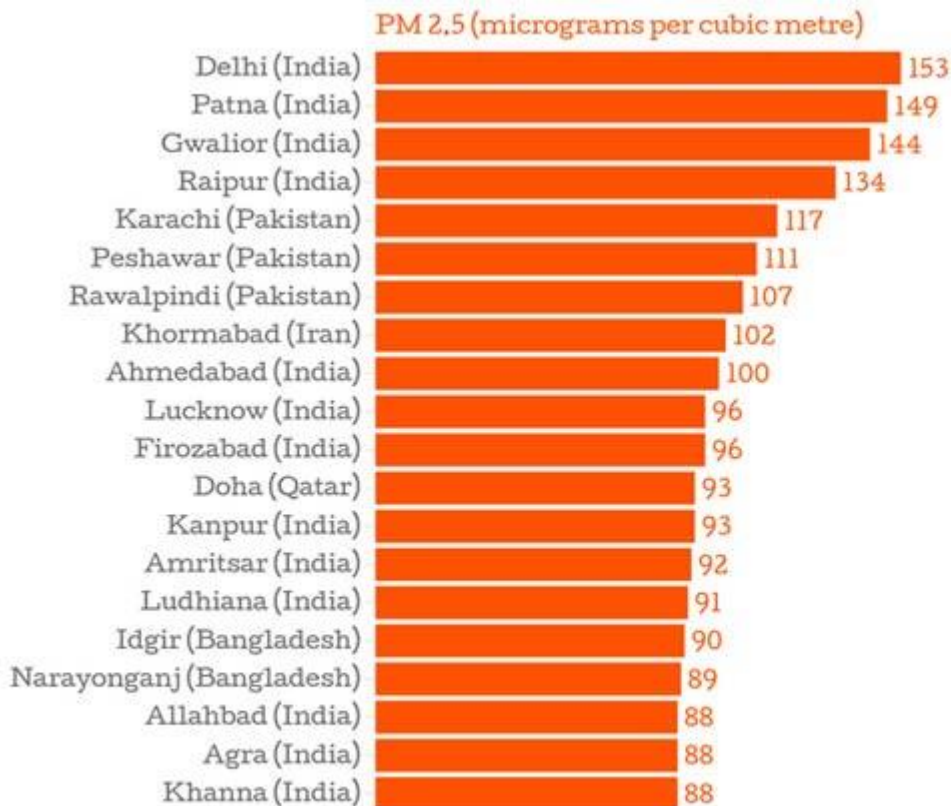


Photograph by Alan Andrews, Client Earth in CSE conclave 2016



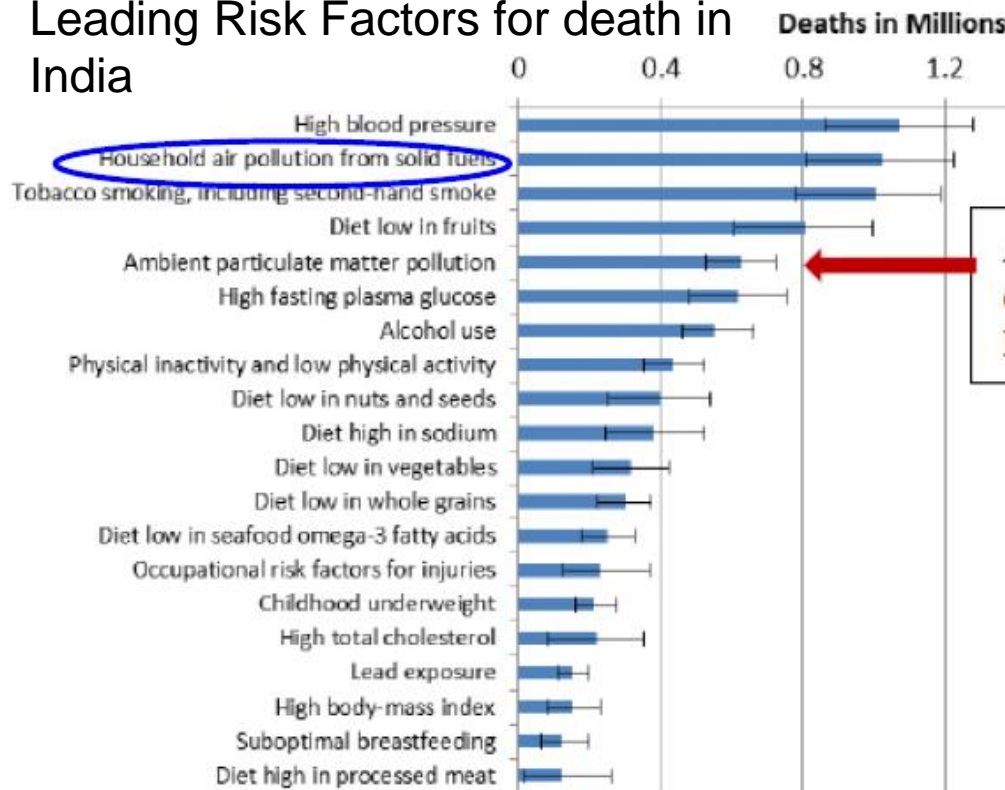
13 OUT OF 20 MOST POLLUTED CITIES IN WORLD ARE FROM INDIA BY PARTICULATE MATTER CONCENTRATION EMISSION REGULATIONS

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TOXIC AIR: TOP KILLER IN INDIA

Leading Risk Factors for death in India

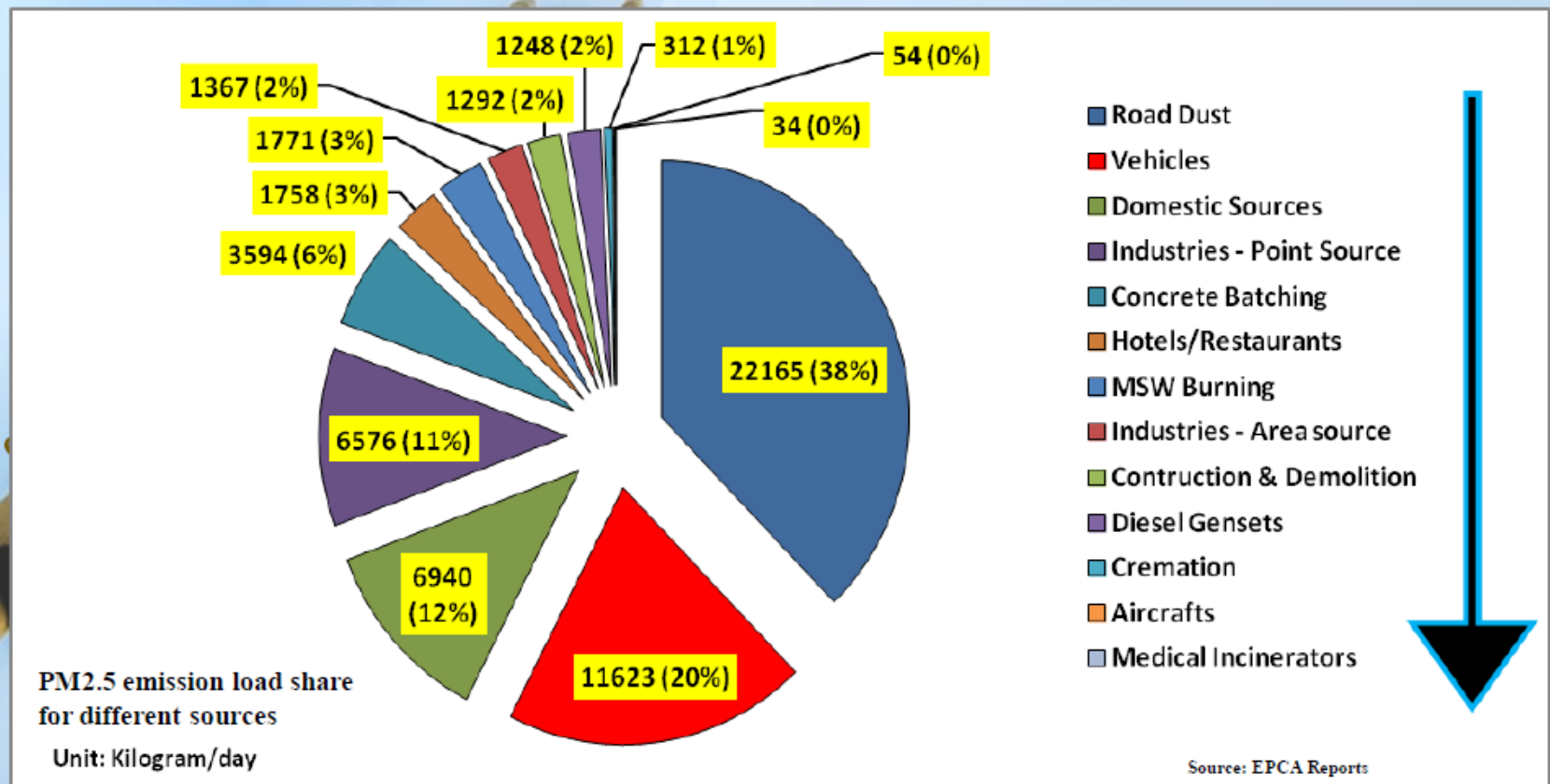


Ambient PM_{2.5} caused an estimated 627,000 deaths in India; ~6% of all deaths in 2010

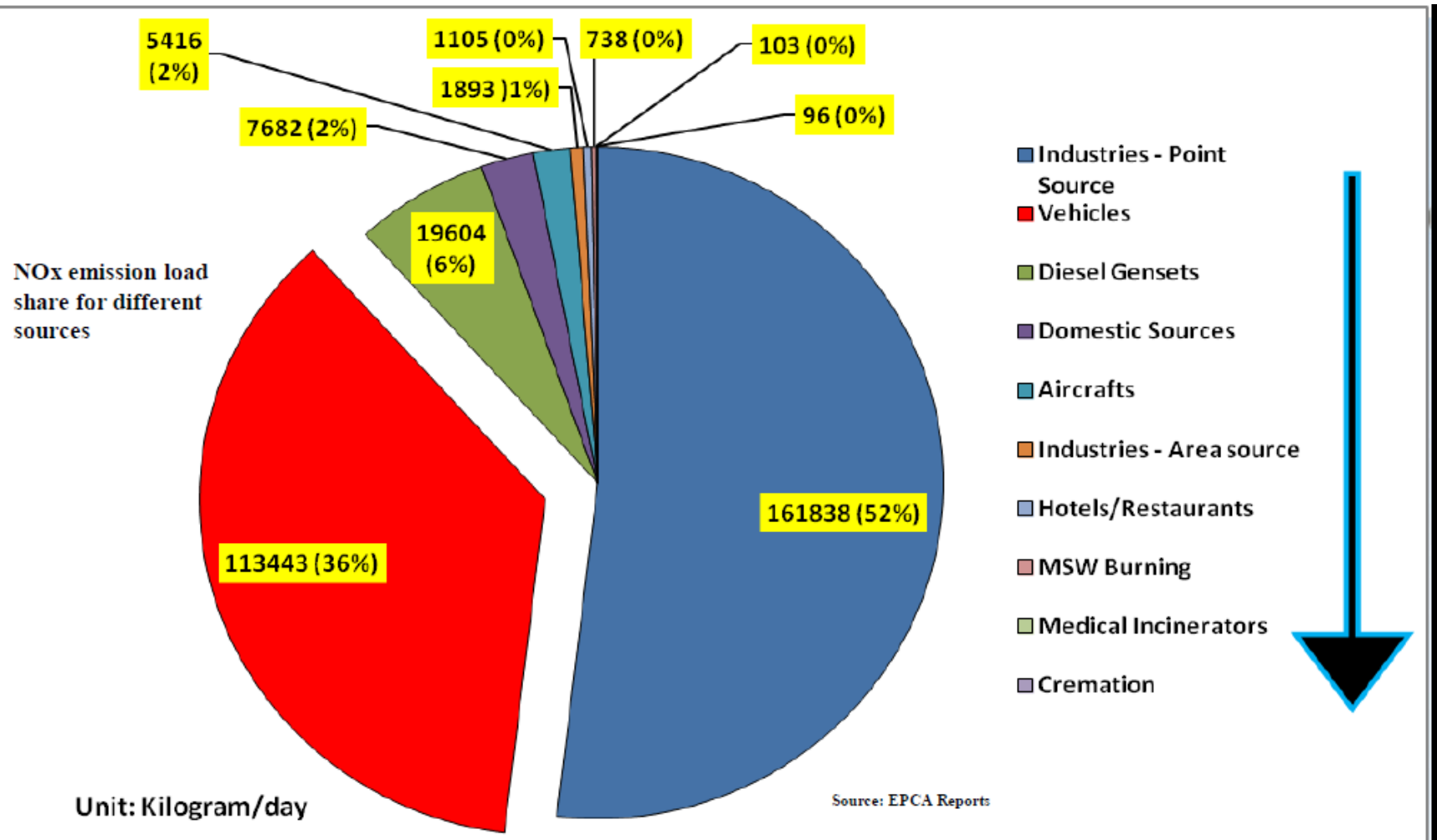
More than 18 million healthy life years lost due to air pollution. Air pollution triggers stroke, cardiovascular and respiratory diseases, cancer.....

DELHI'S DUST AND VEHICLES: PM 2.5 COMBINED IMPACT AND TOXICITY

⑩ Sources of PM2.5 in Delhi sources.

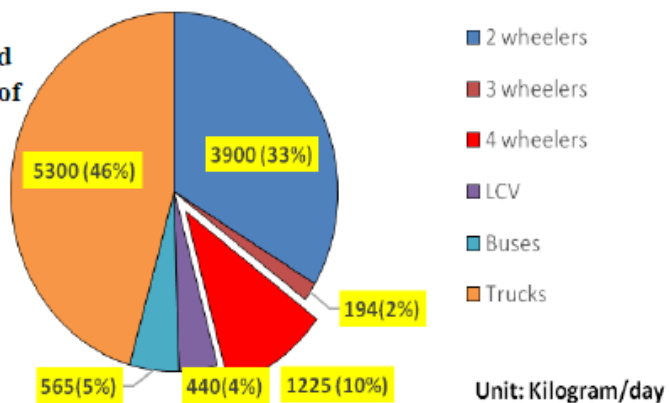


DELHI'S NOX: EQUALLY DEADLY: LEADS TO OZONE –SUMMER POLLUTANT CONTRIBUTORS: INDUSTRY AND THEN VEHICLES



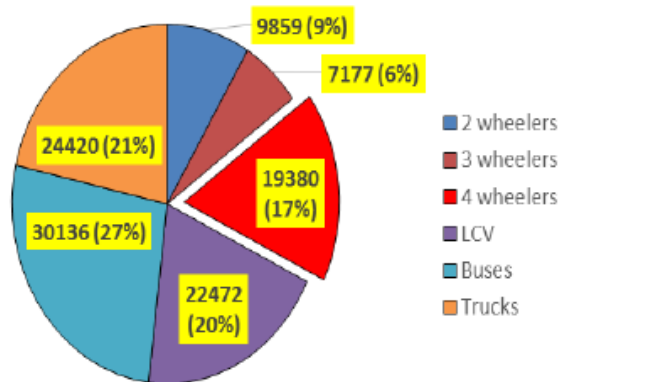
DELHI'S VEHICULAR EMISSION: DELHI HAS THE SINGLE LARGEST FLEET FOR ANY CITY IN THE COUNTRY. IN 2015, IT HAD A LITTLE LESS THAN 9 MILLION VEHICLES ROUGHLY 5% OF THE COUNTRY'S TOTAL VEHICULAR FLEET

PM 2.5 emission load by category of vehicle

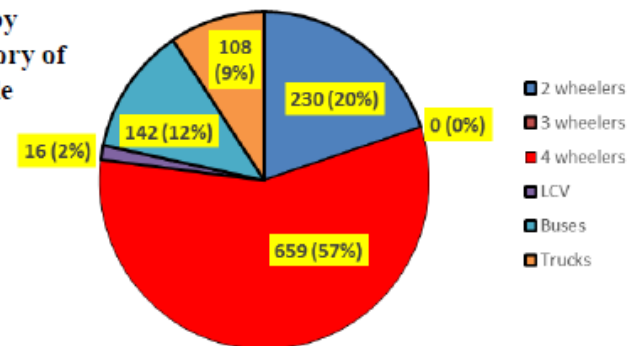


Trucks
2-wheelers
Cars

NOx emission load by category of vehicle



SO2 emission load by category of vehicle



Source: EPCA Reports

STEPS TAKEN TO REDUCE POLLUTION IN DELHI

- Massive plantation drive along all arterial roads across the city
- Massive plantation of grass and putting tiles on pavements
- Vacuum cleaning of the roads started
- Every day 40,000 to 50000 trucks enter Delhi through 127 entry points, 13000 use Delhi as transit route.
- To curb entry in Delhi Rs1300/ and Rs 700/ charged as fee for large and small trucks respectively
- Peripheral road is being constructed around Delhi
- Odd and Even Formula
- All city Commercial vehicles on CNG
- Ban on burning of Garbage

STEPS TAKEN TO REDUCE POLLUTION IN DELHI

- Ban on use of ten year old diesel vehicle in NCR and no further registration of vehicles older than 15 years in NCR
- Ban on registration of diesel vehicle beyond 2000 CC in NCR
- On purchase of diesel vehicles, Hon'ble Supreme Court of India has given permission with 30% Environment Compensation charge on total cost
- Petrol and Diesel Taxis banned from plying in NCR by the order of Hon'ble Supreme Court of India from 1st May 2016

STATUS OF IMPLEMENTATION OF FUEL EMISSION NORMS-TIMELINE- 4 WHEEL VEHICLES

BS-II implementation-By 2005 Nationwide and **BS-III implementation**-By 2010 Nationwide

BS-IV implementation

- Apr-10 Initial launch in 13 cities: NCR and Agra, Ahmadabad, Bangalore, Chennai, Hyderabad, Kanpur, Kolkata, Lucknow, Mumbai, Pune, Secunderabad, Sholapur and Surat,
- Oct-14- 20 additional cities were added
- Apr-15 30 additional cities were added
- Oct-15 Implemented in seven states: Haryana, Himachal Pradesh, Jammu and Kashmir (except districts of Leh and Kargil), Punjab, Rajasthan (select districts) Uttarakhand and Uttar Pradesh (select districts)
- Apr-16 Under implementation in additional states: Goa, Gujarat (select districts), Karnataka, Kerala, Odisha, Maharashtra(select districts), Telangana and the union territories of Daman and Diu, Dadra and Nagar Haveli and Andaman and Nicobar Islands
- Apr-17 Country-wide implementation

BS-VI implementation

- Apr-20 Country-wide implementation

Leapfrogging BS V

POTENTIAL INCREASE IN COSTS ACROSS AUTOMOTIVE SEGMENTS TO MOVE TOWARDS BS-VI STANDARD

	FY2019E domestic volumes (Units)	Cost increase/vehicle (Rs/unit)	Total cost increase (Rs mn)	Price increase required (Rs/unit)	Price increase required (% of current selling price)
Two-wheelers	19,358,980	2,500	48,397	3,075	5
Passenger vehicles					
Petrol vehicles	2,407,429	9,000	21,667	11,070	2
Diesel vehicles	1,539,176	100,000	153,918	130,000	20
Three wheelers	591,141	4,400	2,601	5,412	4
MHCVs	388,629	206,000	80,058	253,380	13
LCVs	580,687	100,000	58,069	123,000	23

Total cost increase for the auto industry (Rs mn) 364709 ~ \$ 5476 mn

Source: SIAM, Kotak Institutional Equities estimates

IMPLEMENTATION OF FUEL ECONOMY MEASURES

- Eco-driving
- Light-duty vehicle efficiency standard
- Heavy-duty vehicle efficiency standard

WHAT IS ECO DRIVING

Fuel conservation opportunities	Potential of Saving
• Improve engine efficiency	60 -70%
• Improve drive train efficiency	1.5- 5%
• Improve aerodynamics	3- 17%
• Reduce rolling resistance	6- 15%
• Reduce vehicle weight	-
• Reduce auxiliary loads	1.5- 5%
• Optimize driver behaviour	15- 25%
• Maintenance of vehicles	
• ECO Driving is low cost Intervention in achieving Fuel Efficiency	

ECO DRIVING PROGRAM WITH THE HELP OF ECCJ JAPAN



Government of India and Ministry of Economy Trade and Industry, Japan jointly signed 7th India Japan Energy Dialogue statement. As per that Energy Conservation Centre, Japan gave training on ECO Driving. On 5th Nov2013 workshop was held on ECO Driving which was inaugurated by Transport Minister of Karnataka State. The workshop was followed by two days practical training on ECO Driving.

Great Examples in India

Source: PCRA

(North Bengal State Transport Corporation saved fuel worth Rs 125 Lacs in 6 months

GMR Hyderabad International Airport Ltd saved Rs 17 Lacs in addition to reduction of 88MT Carbon Emission in one year.

Source: PCRA

Rajasthan State Transport Corporation improved KMPL from 5 to 5.09 in one year

Source: Clean Air Asia

Clean Fleet Bus Program for India can save 2200 millions liters of fuel and save generation of 6.3 millions tons of CO₂.

International Examples

Source: ICCT

- Edmonton, Canada improved city bus fleet fuel economy by 5.5% over 10 months through driver training

Source: ICCT

- Jakarta, Indonesia revamped bus maintenance program and instituted driver and technician training to decrease fuel consumption by 5%

Light-Duty Vehicle Efficiency Standard

How much people travel in India?

- Motorized passenger mobility in India
 - 2011-12 : ~5,967 km/person (7,255 BPKM)
- Compares lowly to international transport demands
 - UK 2011 - 14,247 km/person
 - US 2011 – 28,500 km/person
 - EU 2009 – 11,700 km/person
- Transport demand is expected to increase over 3 times
 - Increased economic activity
 - Higher levels of urbanization
 - Improved access to transport systems

Energy Demand- Transport Sector

- Transport sector estimated to consume about 18% of the national commercial energy (2012)
- Single largest petroleum based energy consuming sector
- Sector wise Petroleum Product consumption (2012-13) in MMT

Petrol

• Cars	5.40
• SUVs	0.24
• 2-Wheelers	9.67
• 3-Wheelers	0.37

Diesel

Cars & Uvs-Pvt.	9.08
Cars & Uvs-Commercial	6.17
3-Wheelers	4.41
HCV/LCV	19.51
Bus	6.60
Railways	2.24
Aviation/ Shipping	0.33
Tractors etc.	8.98

Source : BEE & PPAC

Fuel Efficiency Standard

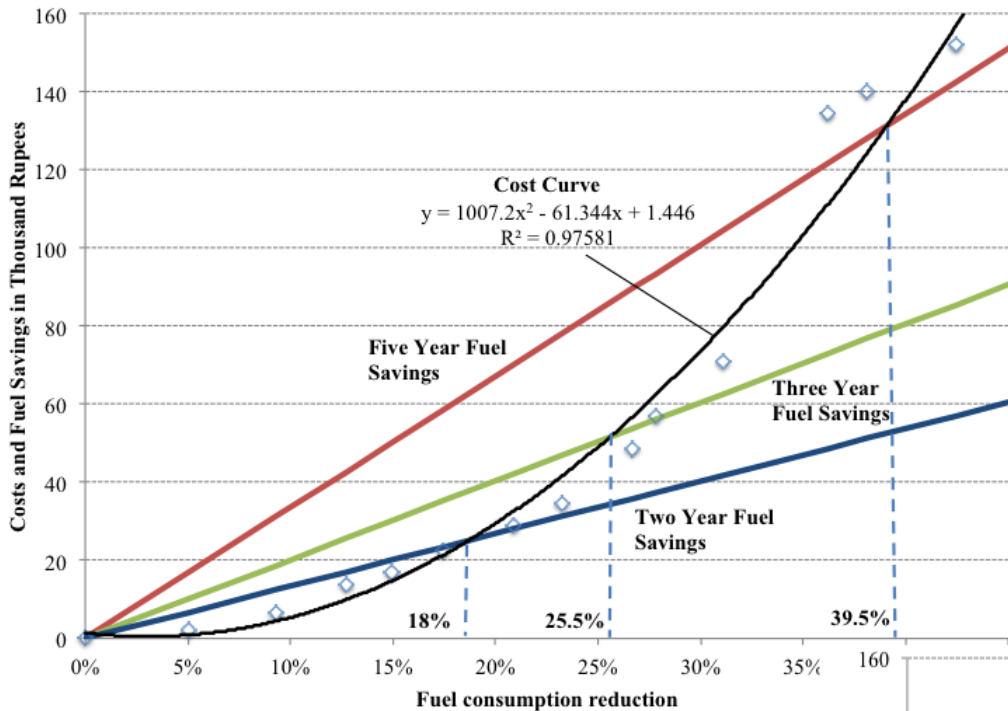
- PMO asked for Fuel Efficiency Standards and labels to be issued by MoP under EC Act, 2001 and implemented by MoRTH. (4th Aug, 2010)
- Fuel Efficiency Standards are based upon litre/100 km.
- Notification is applicable to category M1 vehicles as defined by the Central Motor Vehicle Rules (CMVR) and its subsequent revisions
- Based on CAFC (Corporate Average Fuel Consumption) approach
- Ministry of Power notified 'Energy Consumption Standards for Motor Vehicles' on 30th January, 2014 under Energy Conservation Act, 2001.

Scope of Standards

- “..... specifies energy consumption standard for the motor vehicle which are type approved under CMVR 1989, with at least four wheel, other than quadricycles, of petrol or diesel or liquefied petroleum gas or compressed natural gas or electricity, used for the carriage of passengers and their luggage and comprising not more than nine seats including driver’s seat, and of Gross Vehicle Weight not exceeding 3,500 kilogram.....”

Approach for Standards

- Standards notified were based on
 - Cost-benefit analysis for small cars and medium sized cars
 - Savings due to the investments were discounted from the European / US experience due to poor road and fuel standards
 - Costs could be recovered within a 3 years period due to fuel savings
 - Allowance was provided because of the additional weight that would occur due to the addition of safety features



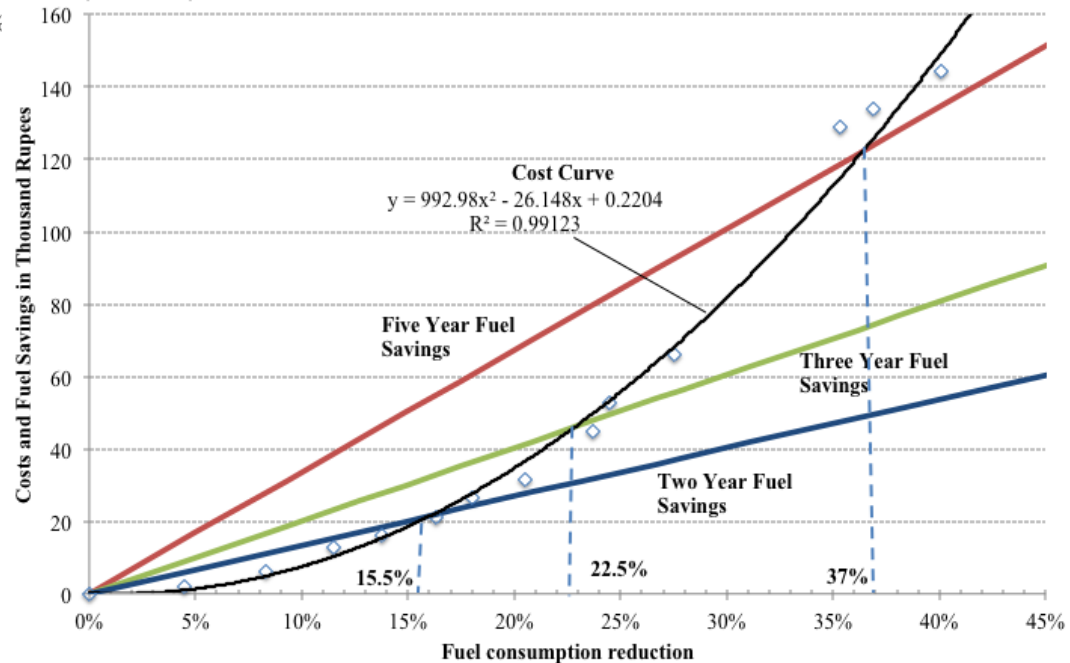
Cost and Fuel Savings benefits associated with various technology packages for mid-size cars.

← 18-25% reduction is possible due to technology assessment

Cost and Fuel Savings benefits associated with various technology packages for small cars.

→ 15-23% reduction is possible due to technology assessment

- 15.5-18% for a 2 year payback
- 22.5-25% for a 3 year payback
- 37-39% for a 5 year payback



Highlights of Fuel Consumption standards

- Defines Average Fuel Consumption Standard for manufacturer, in petrol equivalent (liter per 100 kilometer) & the procedure to determine the same
 - First Phase – up to 2017-18,
 - Second Phase – 2017-18 to 2022-23,
- Specifies the standard, for testing & determination of the Fuel Consumption of a motor vehicle
- Specifies equation to find equivalent CO₂ emission factor for various fuel type
- Specifies Enforcing body to regulate the notified fuel consumption standards

Notified Standards

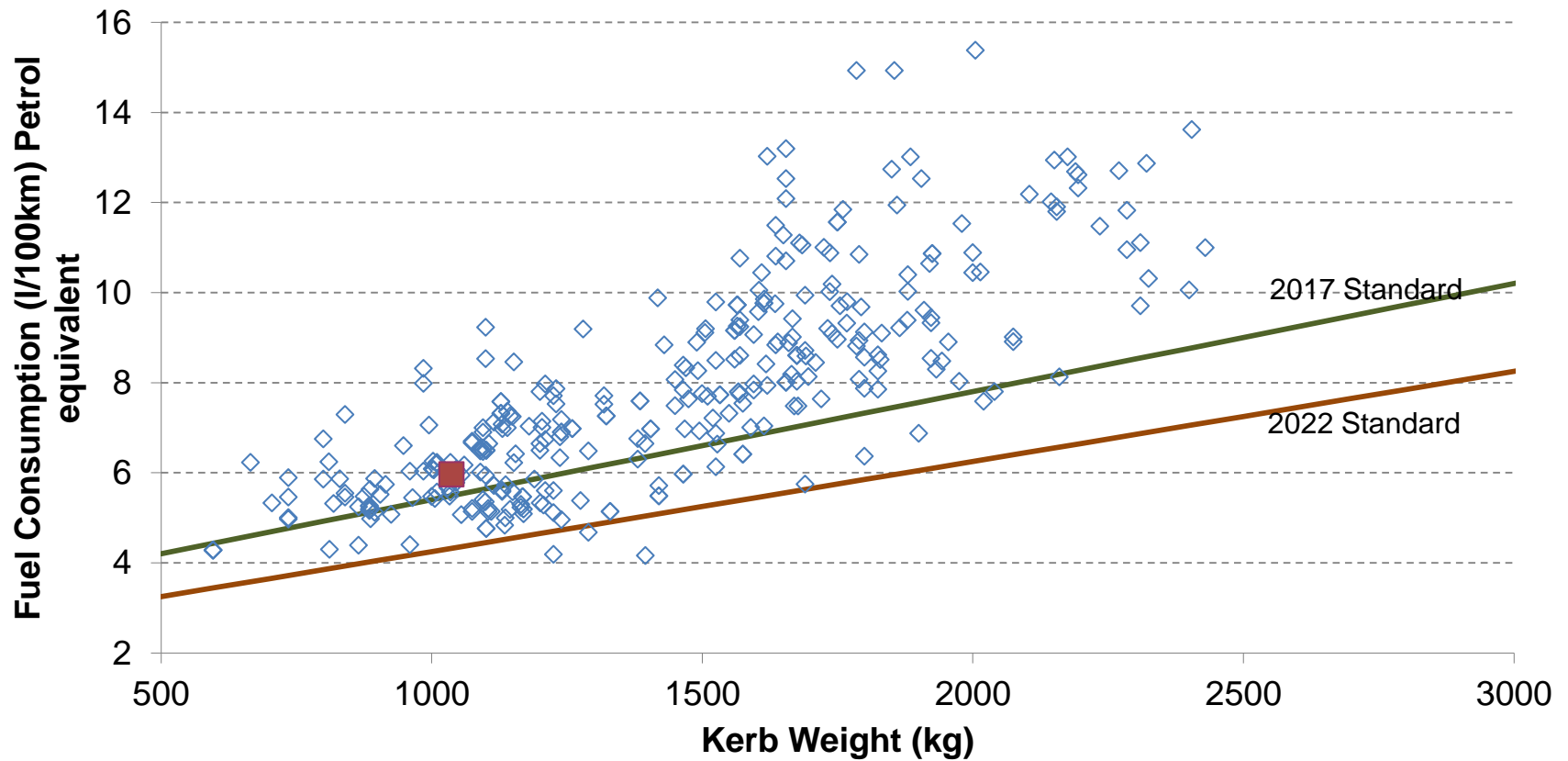
- Preliminary estimate indicates that the overall average fuel efficiency of Indian passenger vehicles was around 14.5 km/l in the year 2000.
- The industry data of the year 2010 indicates that the average fuel efficiency of passenger vehicles sold in India improved to about 16.5 km/l. This improvement between 2000 and 2010 is 14%, on an annualized basis of 1.3%.

Notification	Compliance Year	Corporate Fuel Consumption Standard	Energy Savings by end of 2025
Fuel Consumption Standard	2017-18	5.5 l/100 km (129.8 gmCO ₂ /km) @1037 kg	22.97 million toe
	2022-23	4.78 l/100 km (113.0 gmCO ₂ /km) @1145 kg	

Rate of decrease in fuel consumption in India & others countries

Country	Fleet average CO2 emissions (g/km) In 2010 (approx)	Fleet average CO2 emissions (g/km) target proposed for 2020	% improvement /year
European Union	145	95	3.44
United States	187	121	3.53
China	179	117	3.47
Japan	130	105	1.92
India	141	113 (now notified for 2022-23)	1.98

Relative Position of Models (2009-10 base)

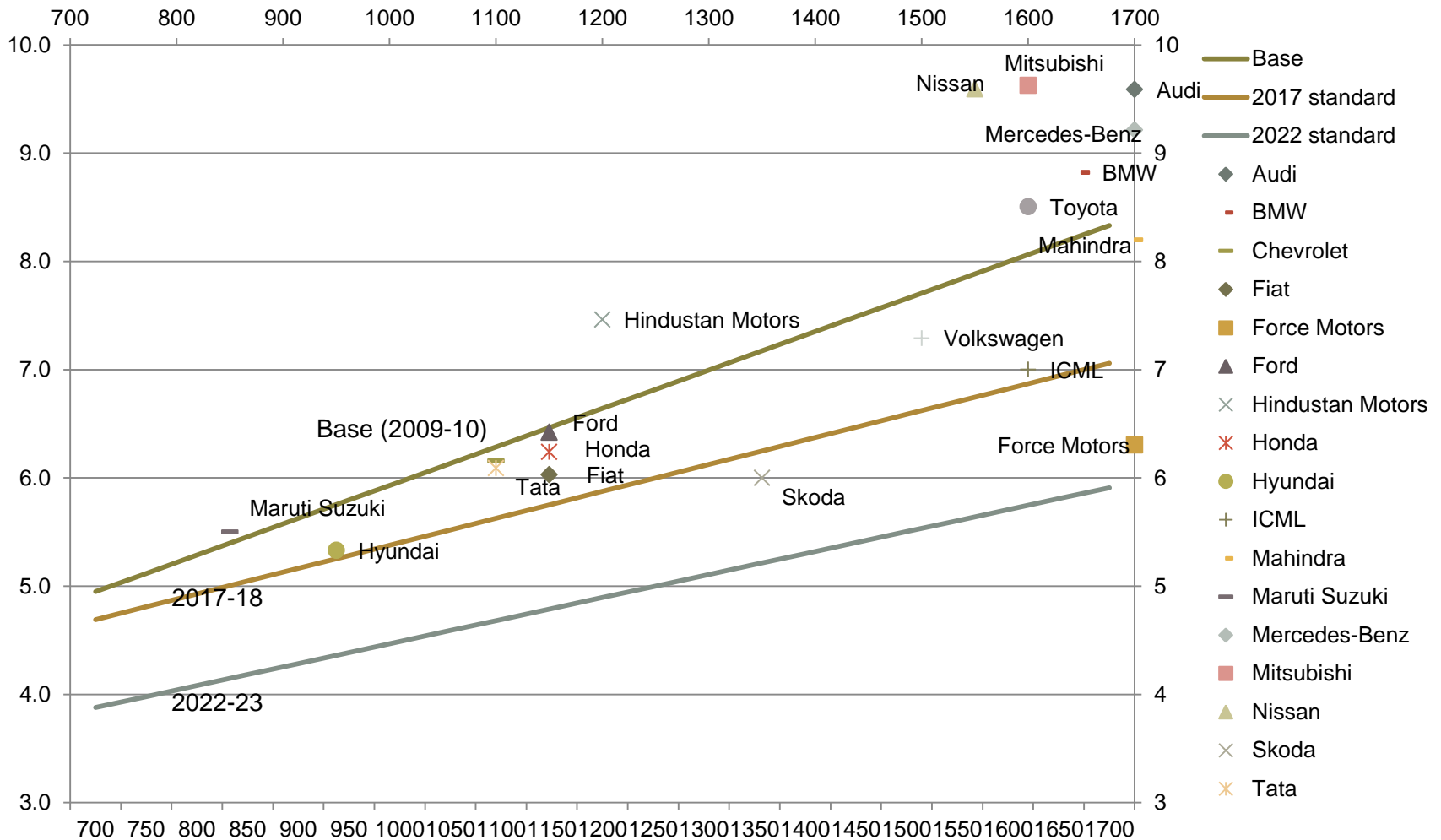


Source: BEE

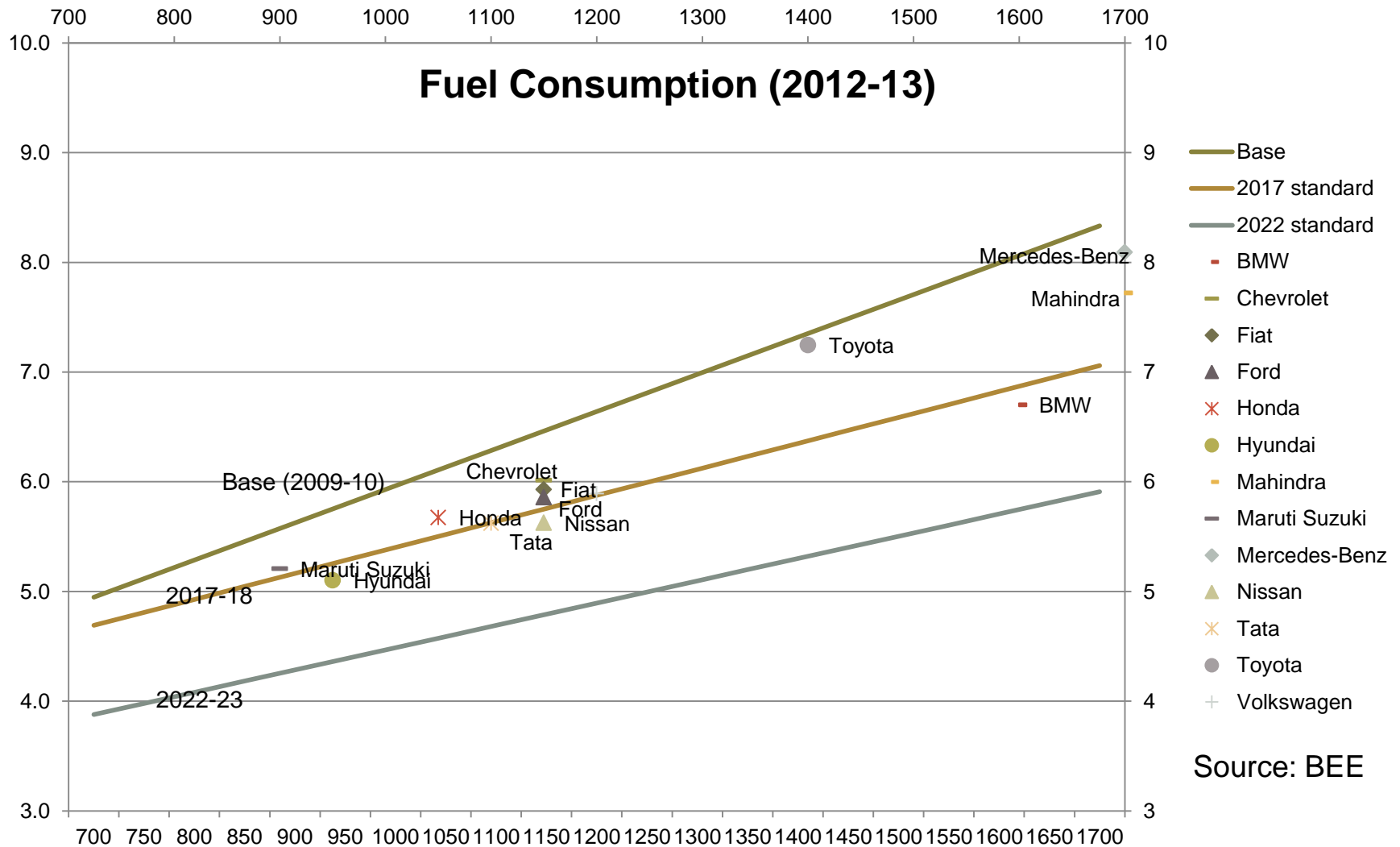
◇ Fuel Consumption All Vehicles

■ 2009-10 Sales Weighted Fuel Consumption

Actual Scenario (2009-10)



Actual Scenario (2012-13)



Source: BEE

Heavy-Duty Vehicle Efficiency Standard (Big picture – to show the potential only)

Relative fuel Efficiency of LDV and HDV in India

- LDV

- HDV

- India

- Buses compose 15% of HDV fleet

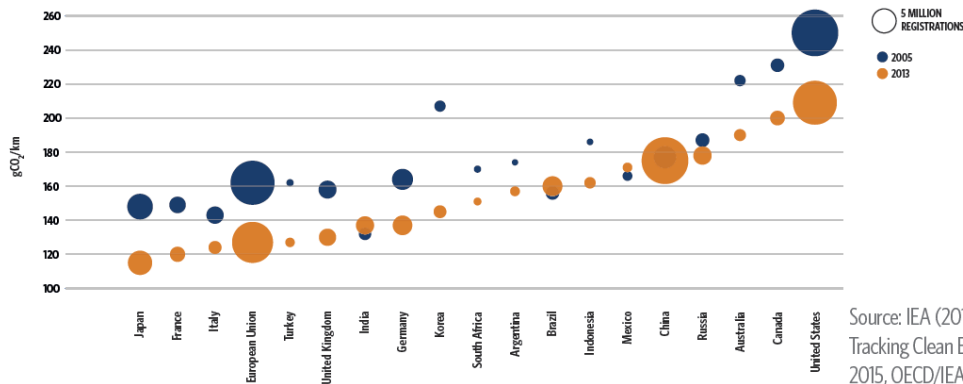
- Buses use 25% of fuel consumed by HDV fleet

- United States

- Buses compose 4% of HDV fleet

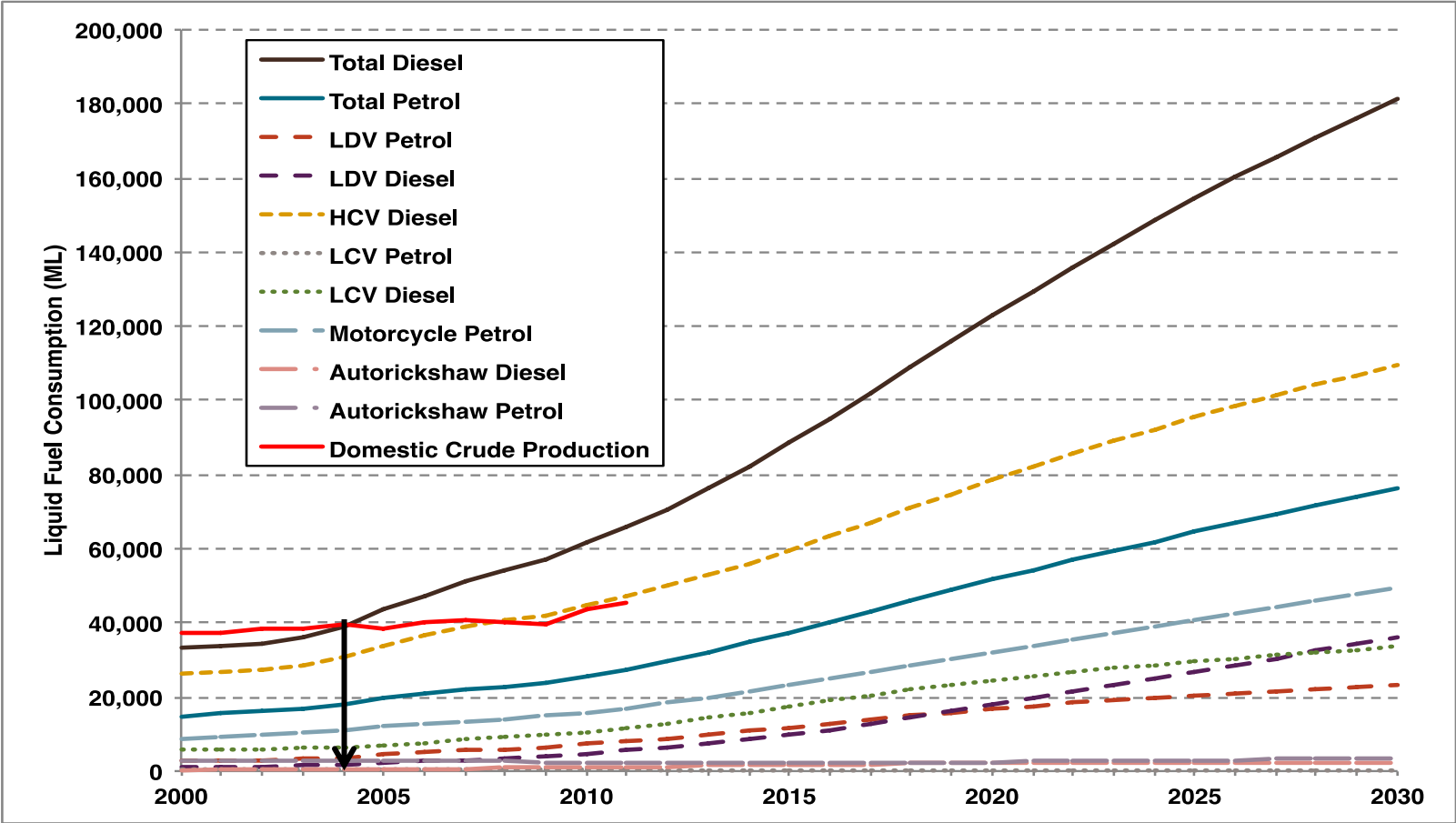
- Buses use 4% of fuel consumed by HDV fleet

FIGURE 3



Source: IEA (2015),
Tracking Clean Energy Progress
2015, OECD/IEA, Paris

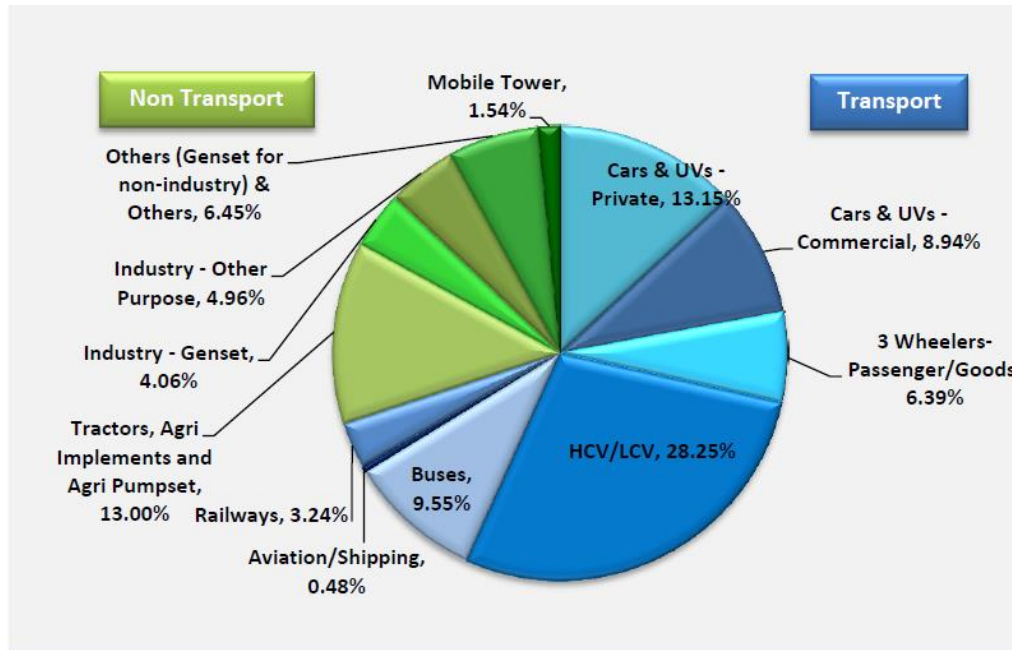
Heavy commercial vehicles (HCV) consume overwhelming share of fuels in India



Source: ICCT

Diesel consumption pattern in India

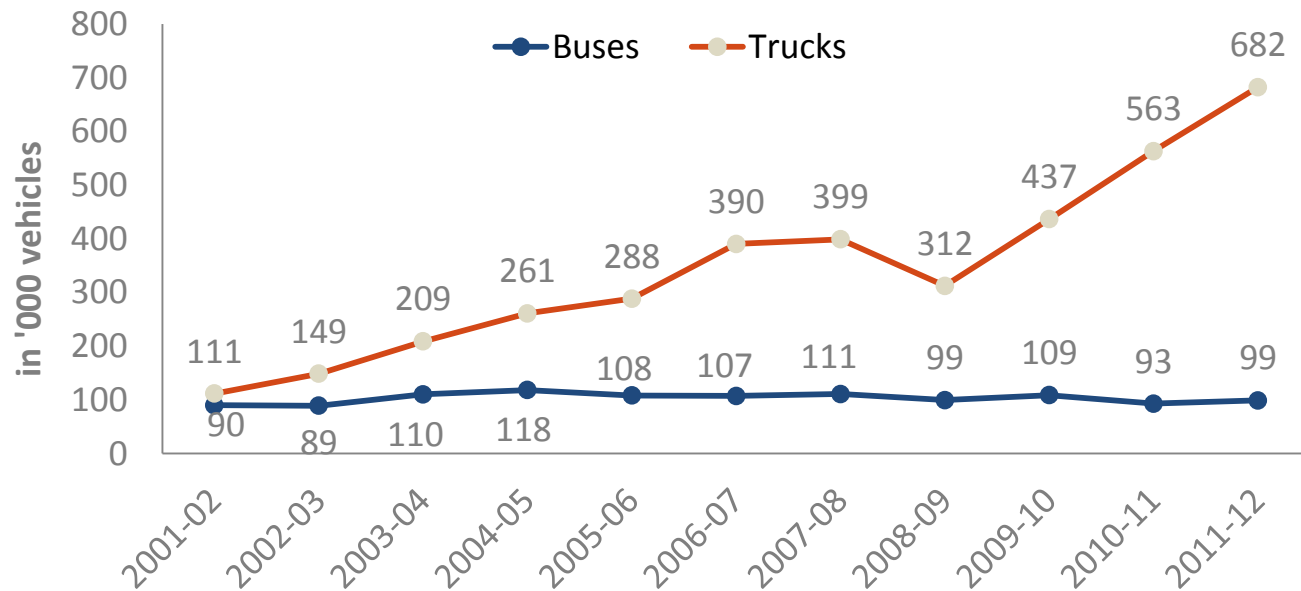
- ❑ India's total Petroleum Products consumption in 2012-13 stood at about 157.1 MMT.
- ❑ Diesel consumption in 2012-13 stood about 69.0 MMT.
- ❑ Road transport is the biggest segment accounting for about 70% of diesel consumption
- ❑ Trucks and buses accounted for about 77% of the fuel consumed in this segment



Source: PPAC

Strong growth in sales of buses and trucks in the last decade

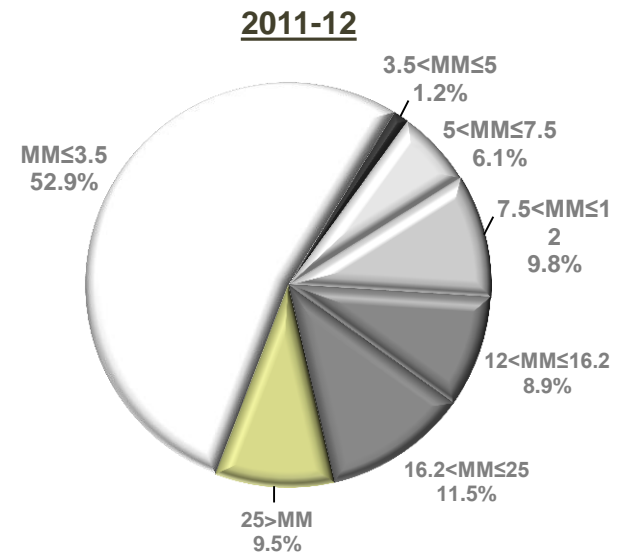
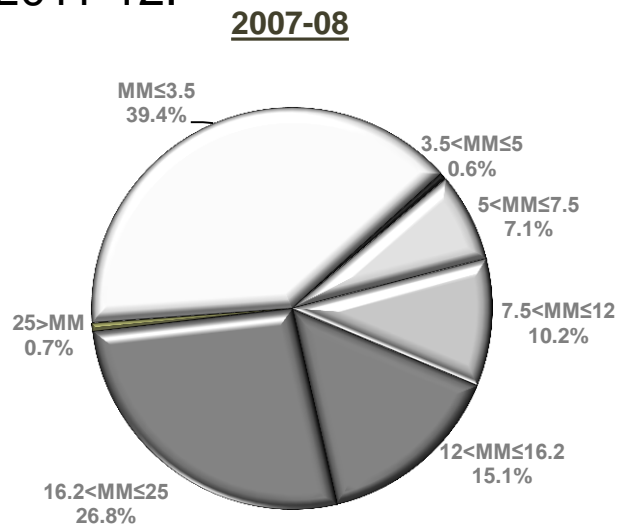
- Annual sales of trucks and buses in India has grown at a CAGR of around 20 per cent and 1 per cent between 2001-02 and 2011-12.
- Major reason for flat growth in buses is
 - Drastic reduction in demand for vehicles in MM \leq 5 tonnes (M2 (A1)) category, which has gone down from 59,481 buses in 2001-02 to 8,650 buses in 2011-12.
 - Excluding this segment, annual sales of buses in India has grown at a CAGR of around 12 per cent.



Source: PCRA

Changing sales mix of trucks in India

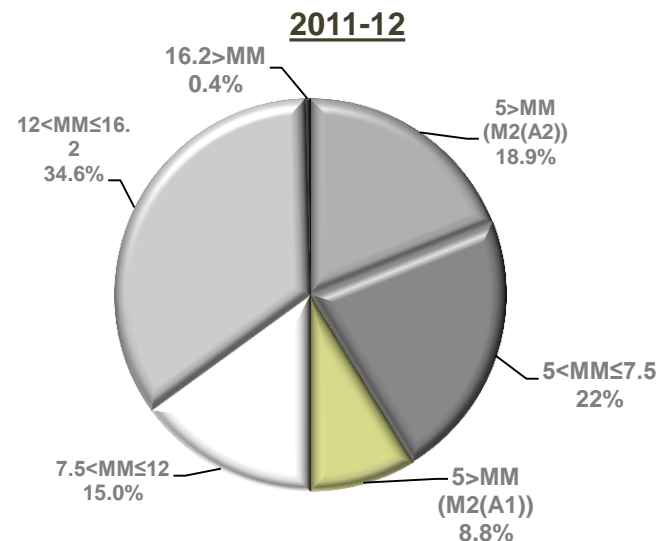
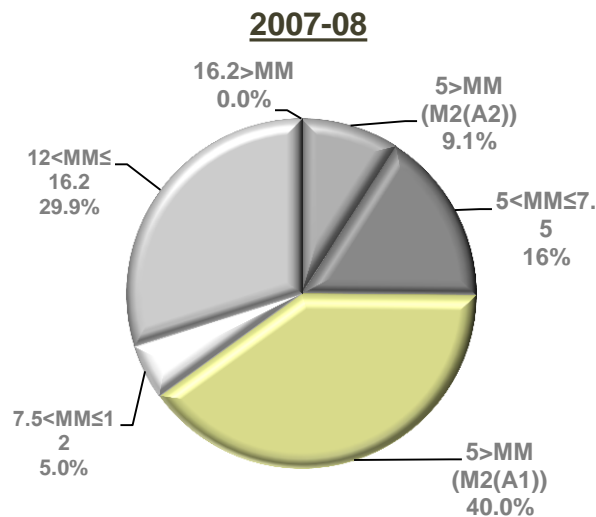
- With “Hub & Spoke” model increasingly adopted across India, there is clear evidence of polarization of tonnage in the CV segment towards heavy and lower tonnages
- The share of vehicles in $MM \leq 3.5$ tonne category and $MM > 25$ tonne category in the total domestic truck sales has grown substantially between 2007-08 and 2011-12.



Source: PCRA

Changing sales mix of buses in India

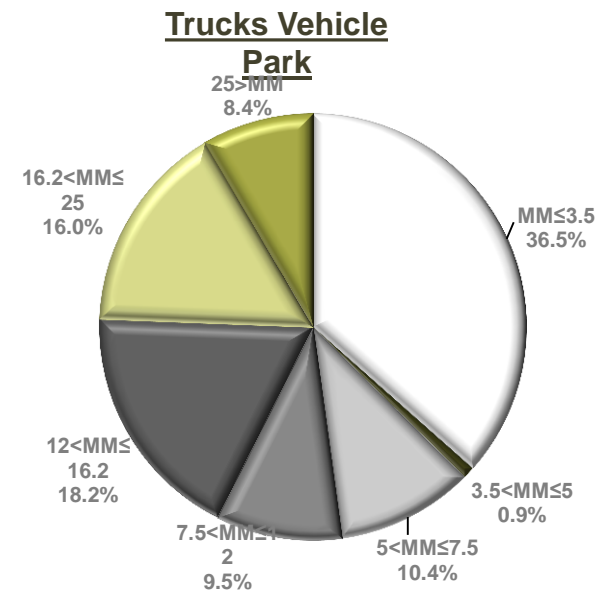
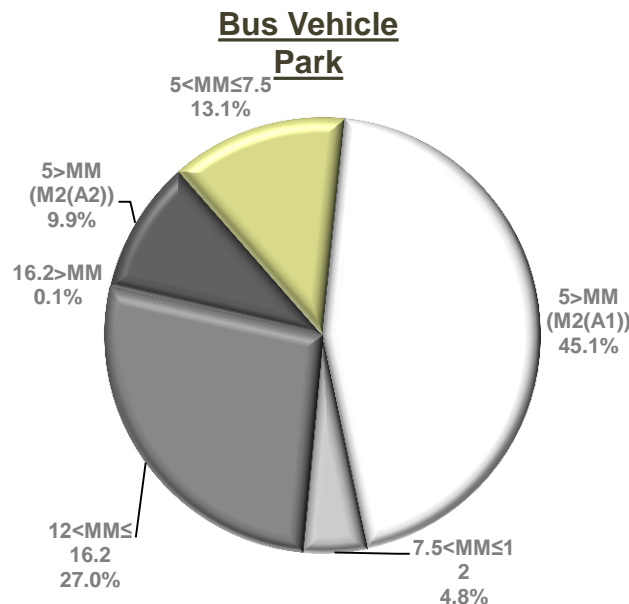
- Buses in the segment $5 > MM$ (M2 (A2)) and $7.5 < MM \leq 12$ have registered the fastest growth indicating the increasing demand for intra-city travel
- Growing demand for buses in the $MM > 16.2$ category, which are the buses in the luxury segment used for inter-city travel.



Source: PCRA

Estimated Vehicle Park

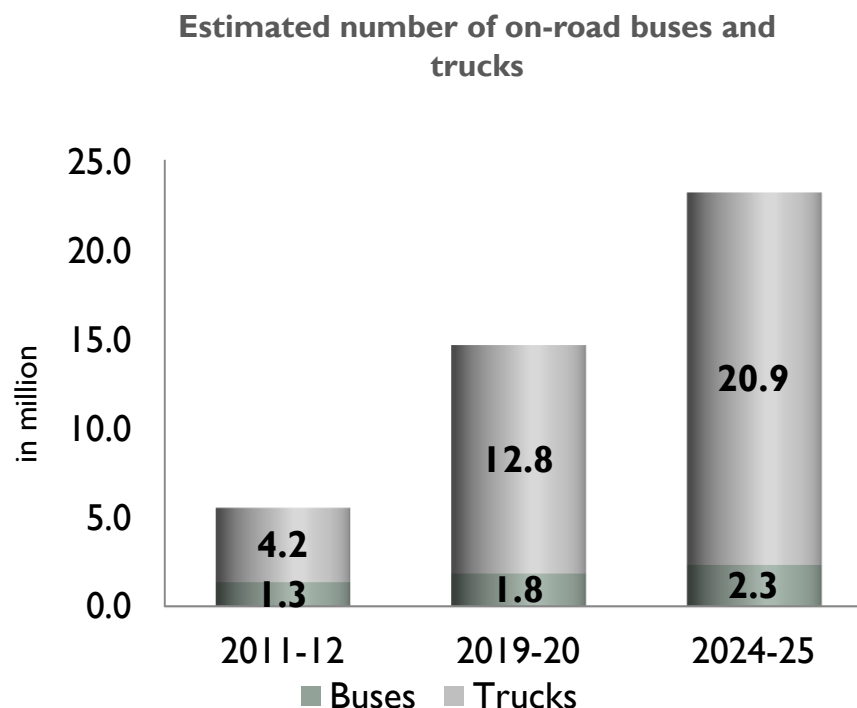
- There are around 1.3 million buses and 4.2 million trucks plying on the roads in India.
- Buses in the 5>MM (M2(A1)) category form the largest segment of on-road buses at around 45%.
- In case of trucks, vehicles with MM ≤3.5 form about 36.5% of the total on-road trucks.



Source: PCRA

Future vehicle projections

- ❑ Rising incomes, increasing government focus on infrastructure development and increasing economic activity are the key drivers, which are expected to fuel the demand for commercial vehicles in India
- ❑ Between 2012-13 and 2024-25, sale of buses is expected to grow at a CAGR of 5.7 per cent to increase from 0.11 million to 0.21 million
- ❑ Trucks sales is estimated to register strong growth of around 8.9 per cent to increase from 0.80 million in 2012-13 to 2.23 million in 2024-25
- ❑ Total number of on-road buses and trucks in 2025 is estimated to be around 23 million



Source: : IMaCS Analysis

Challenges and Outcome in Implementing HDV Norms

- Bringing all stake holders on Board
- Lot of potential exists in implementing HDV norms which will depend on the target fixed for the norm

CONCLUSION

India should strive to improve its position on global map by holistically enhancing vehicular comfort, aesthetics, safety, regulations, emission regulations and fuel efficiency regulations in Automobile Manufacturing sector.

Thanks for patient hearing!

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