MECA International Committee Meeting

Arlington, Virginia, USA

27 February 2024

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Overview and Updates from ECMA (India)

(Emission Control Manufacturers Association)

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Contents

- About ECMA
- Brief on a project by ECMA
- Green Transportation & Emission Regulations Road Map in India
- Future Plans of ECMA

What is ECMA ?

- ECMA is a non-profit Association, representing 18 manufacturers of exhaust after treatment control systems, ensuring reduced tail-pipe emissions to achieve cleaner air environment from automotive & stationary sources.
- <u>ECMA is committed to collaboratively lead India towards achieving the goal of Cleaner Ambient Air.</u>

ECMA Members

- ECMA regularly participates in the meetings of SCoE (MoRTH) & CPCB in connection with developing road maps of emission regulations for engines/vehicles used in on-road, off-road and stationary applications.

- With the changing scenario in transportation pattern in India, ECMA is now poised to expand the scope in different areas in a phased manner.

ECMA project on Study of Efficacy of PM Filter with a BS-6 diesel (1/5)

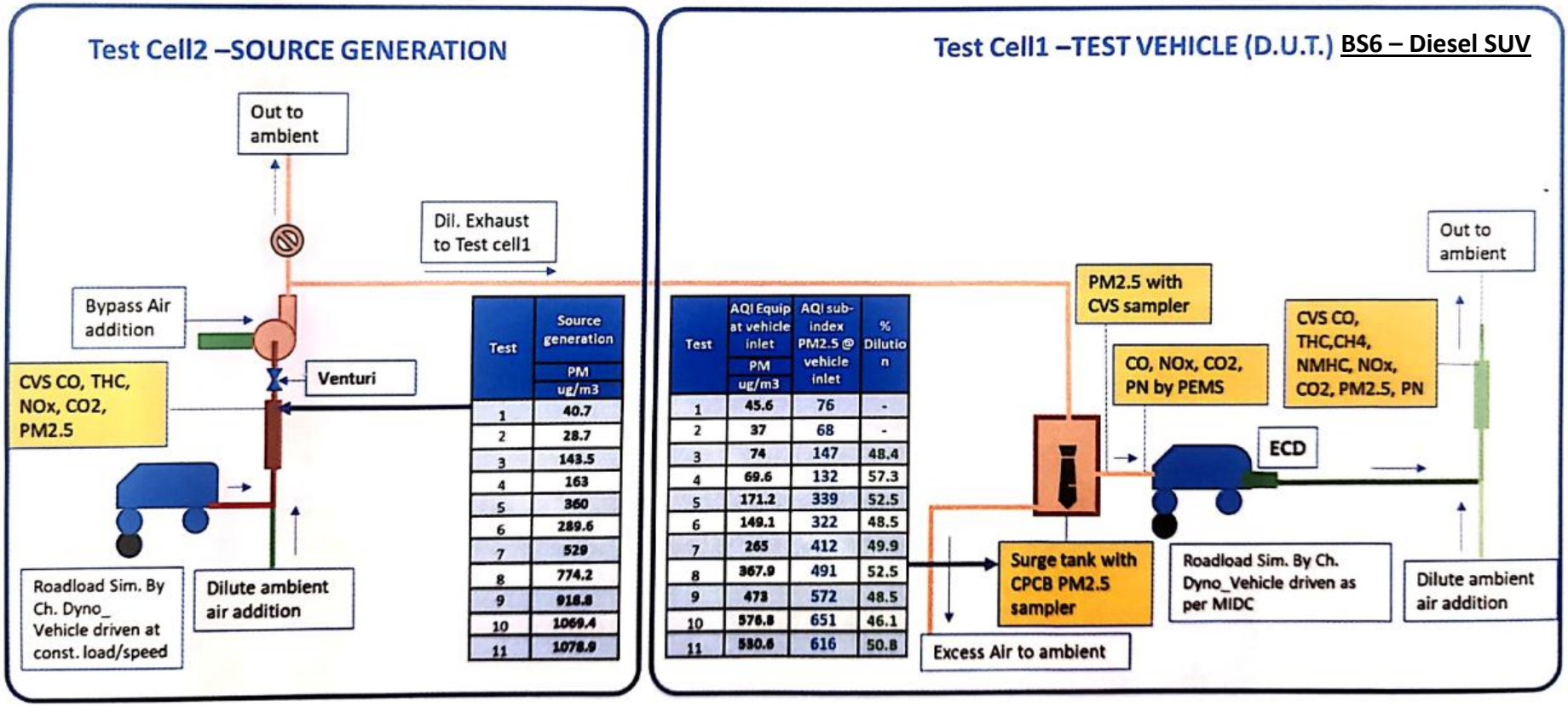
- **ECMA did a project in association with ARAI, to evaluate the efficacy of PM Filter device on a BS6 Diesel SUV.**
- **<u>Project Objective</u> – To study the cleaning effect of Emission Control Devices (ECD) fitted on BS6 vehicles in polluted urban environment. Study of PM and PN performance was focused in this project.**
- **<u>Methodology adopted</u> – Polluted environment was created with regard to PM and PN values in a test cell using a BS4 Source Diesel Vehicle, thus providing a polluted inlet air of varied Air Quality Index (AQI) to the project vehicle in the adjacent test cell.**
- **Project vehicle was tested with different AQIs (ranging 75 to 665) on a Chassis Dynamometer and emissions were measured at the tail-pipe.**
- **Project vehicle was also tested for On-Road RDE tests, in differing AQ levels, using PEMS. RDE test comprised of combination of Urban, Rural and Highway routes.**

<u>The title of the presentation in ECT 2023</u> –

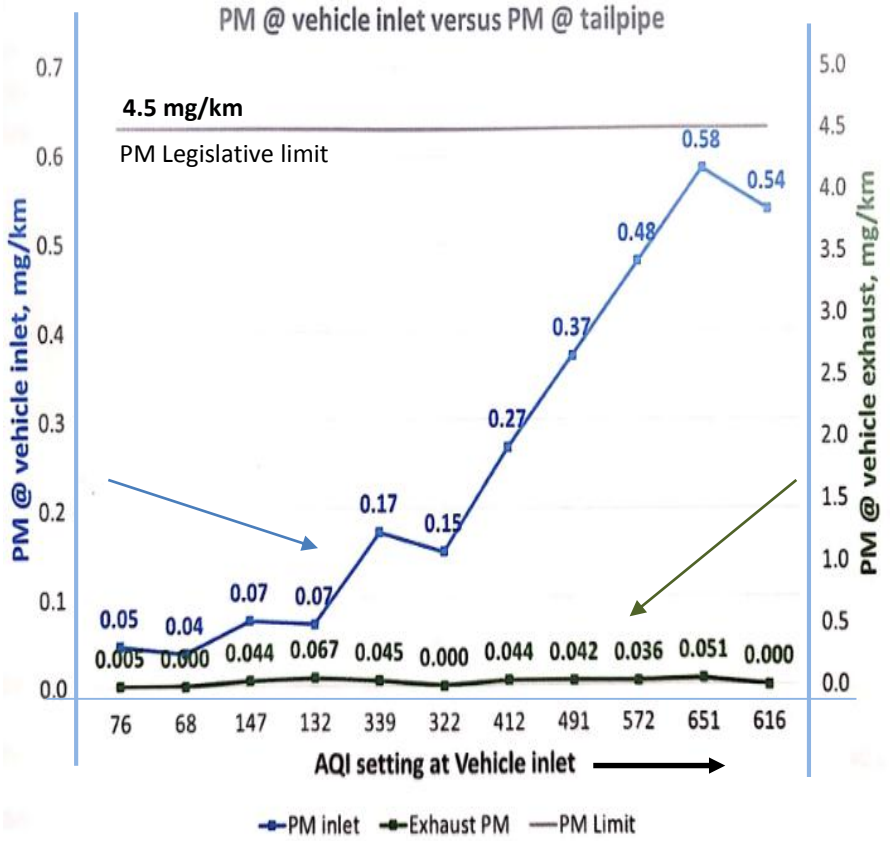
Evaluation of Particulate Filtration and Air Quality Index by Particulate Filter on a BS6 Compliant Vehicle in Polluted Urban Environment

ECMA project on Study of Efficacy of PM Filter with a BS-6 diesel (2/5)

Schematic of Laboratory Experiment Set-up

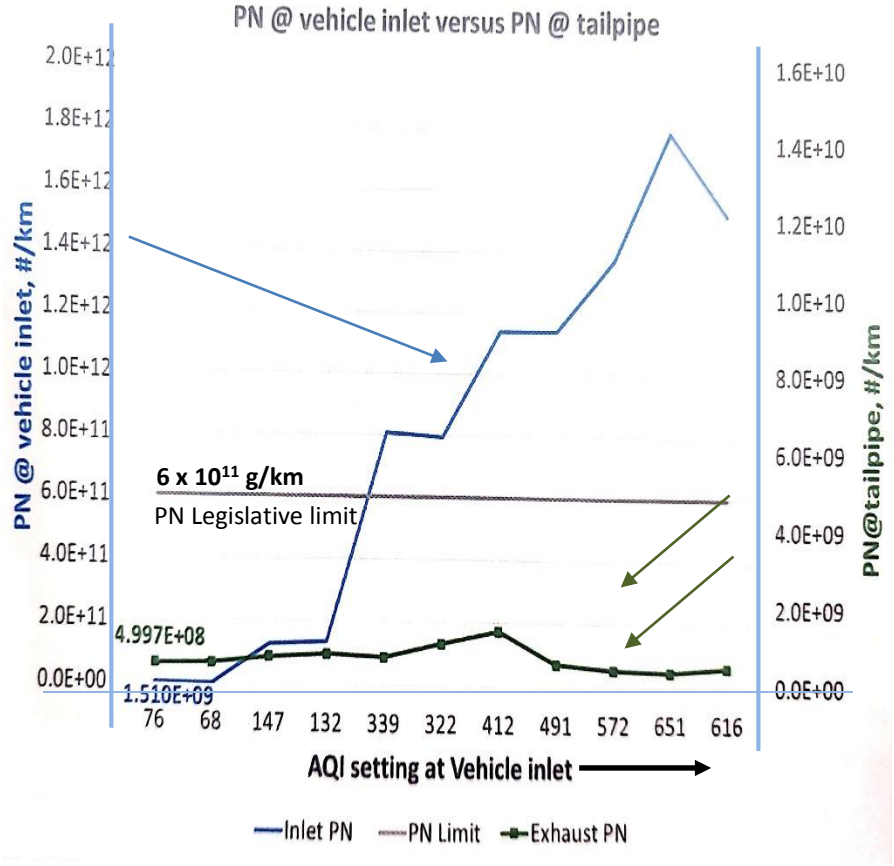


ECMA project on Study of Efficacy of PM Filter with a BS-6 diesel (3/5)



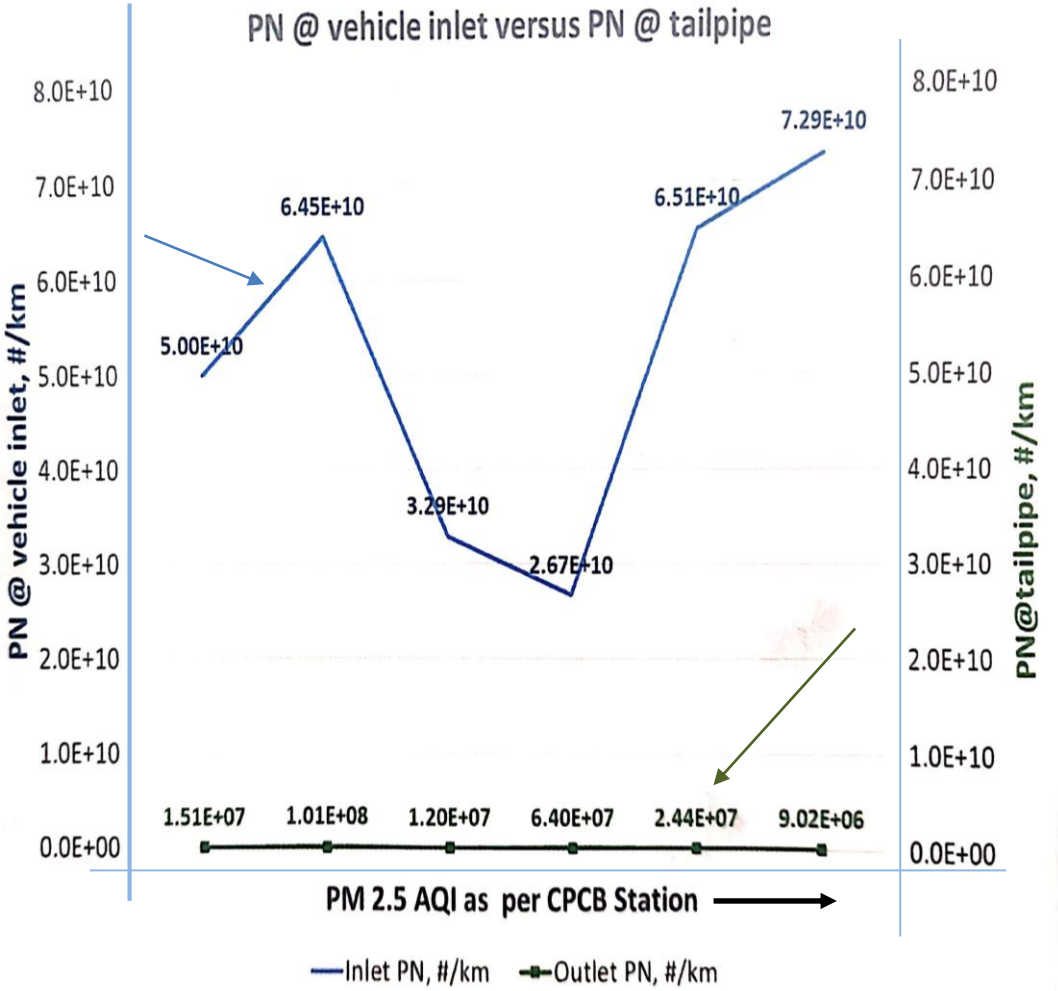
- **PM and PN increase as AQI increases.**
- **PM and PN emissions show a very good correlation irrespective of the AQI.**
- **For any level of PM and PN in the inlet air (at various AQIs) of the vehicle, tail-pipe emission of PM and PN are more or less flat and well within legislative limits of PM and PN.**

Laboratory testing on Chassis Dynamometer
Project vehicle – BS-6 Diesel SUV



ECMA project on Study of Efficacy of PM Filter with a BS-6 diesel (4/5)

On-road RDE testing
(urban+rural+highway route)
Project vehicle – BS-6 Diesel SUV



- On-road tests were carried out on different time and days and of course in different driving conditions.
- PN concentration at vehicle ambient inlet has been varying due to above conditions.
- In spite of the varying PN concentration at vehicle ambient inlet air under mentioned testy conditions, it can be seen that PN concentration at the vehicle tail-pipe remains more or less flat.
- PN reduction at tail-pipe level has been observed to be more than 99%.

ECMA project on Study of Efficacy of PM Filter with a BS-6 diesel (5/5)

Highlights of the Results

- It is observed from the test results that, both in Lab and on-road RDE tests; PM and PN emission at tail-pipe is very low compared to that in Vehicle inlet air. That means, a well-optimised BS6 diesel SUV vehicle fitted with PM filter, demonstrated tail-pipe PM and PN emissions much lower than at the Vehicle inlet air irrespective of the air quality index it is exposed to i.e. any quality of ambient air environment.
- It is, therefore, evident that PM filter in a BS-6 diesel SUV vehicle cleans the inlet ambient air substantially.

ECMA plans to promote this technical feature of BS-6 emission control / PM after-treatment technology and systems –

- Diesel vehicles with BS-6 emission control technology is not bad and has a great potential to bring down the tail-pipe emissions of most talked PM2.5 and PN substantially. Moreover, PM filter showing a great opportunity to clean the ambient air of any grade of pollutant quality.
- More the BS-6 diesel vehicles with PM Filter technology operate on the road, is a better preposition for cleaning the ambient environment effectively .
- ECMA believes that this trend of PM filter will also work effectively with Gasoline and E100 GPF, heavy duty diesel engines, off-road engines, genset engines

well optimised PM filter technology, will act like a promising Ambient Air FILTER

Updates on Green Transportation & Emission Regulations Road Map in India (1/8)

Driving Forces-

- Import cost of crude petroleum
- reduction in dependence on imported fossil fuels and feed stocks
- reduction in emissions and CO2 emissions due to fossil fuels

India has set target to become Energy Independent by 2047, decarbonizing transport and achieving Net Zero Carbon Emission by 2070.

India targets reducing the carbon footprint by 30 – 35% by 2030. These targets will be achieved by adopting electrification, biofuels and renewables.

Central Objective is to promote Zero Emission Vehicles (ZEVs) –

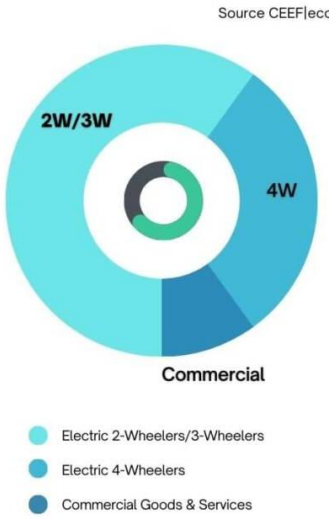
- Battery Electric Vehicle (BEV)
- Hydrogen Fuel Cell Vehicle (H-FCV)

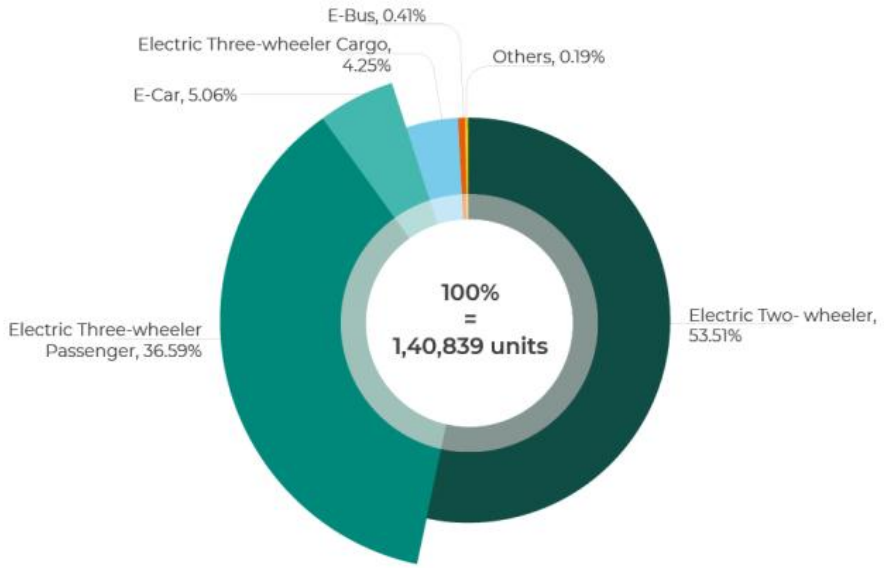
Updates on Green Transportation & Emission Regulations Road Map in India (2/8)

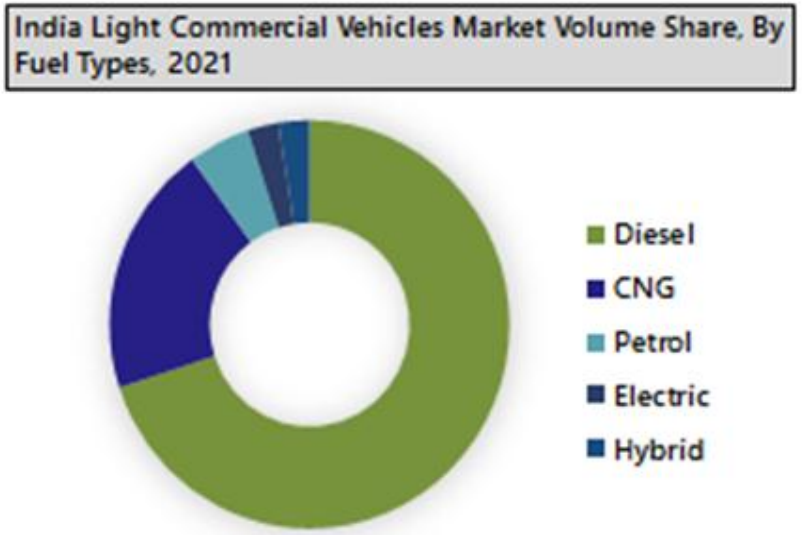
- India has notified the National Policy on Biofuels – 2018. All SI engines will be mandatory to use 20% blending of ethanol in petrol and 100% gasoline from April 2025 (flex-fuel operation).
- On the similar lines, blending of ethanol in diesel is also being experimented. Indian Oil Co and two domestic OEMs are actively working on 5% ethanol blending in diesel to begin with.

- Govt of India has announced that auto manufacturers will be required to add biofuel-compatible vehicles to their portfolio.
- By making flex fuel engines mandatory, the government also hopes to give a much-needed boost to India's agricultural sector.
- Existing surplus of sugarcane, corn and wheat is proposed to produce the automotive grade ethanol.

Updates on Green Transportation & Emission Regulations Road Map in India (3/8)



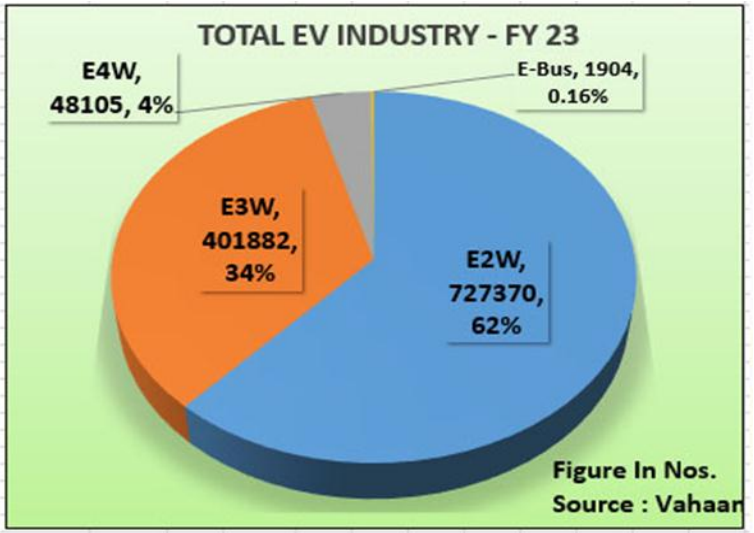




- India is pushing hard for Electrification of transportation through several incentives and schemes.
- There is a growing presence of electrification in the Urban Bus transport sector.
- CNG buses are gaining numbers for the inter-city Coaches. E-buses too entering in this application.

Updates on Green Transportation & Emission Regulations Road Map in India (4/8)

- In the last quarter of 2023, there has been a dramatic rise for HEVs in SUV segment, more than BEVs.
- SCV, LCV and ICV segments have 15 – 30% share with CNG fuel. About 1% Electrification is reported predominantly for SCV and LCV.
- Almost all commercial goods vehicles (GVW>15t) run on diesel.
- Most of the heavy-duty OEMs are developing prototypes of H2-ICE. A few H2-ICE vehicle prototypes have been demonstrated in the recent Auto Shows.
- A few prototype cars and buses are running on the road with the Fuel Cell.



Currently, Electric buses in India is only 2% of total bus population.

More than 75% buses run on diesel. Remaining operate on CNG.

Govt plans to increase EV bus share to 20% by 2026.

- H2-ICE is coming up as a promising prime-mover in India for buses and HCVs
- H2-ICE is being explored for off-roads

Updates on Green Transportation & Emission Regulations Road Map in India (5/8)

Target –

EV sales penetration by 2030

- **30% of private cars, 70% of commercial cars (taxis)**
- **40% of buses, 80% of 2-and 3-wheelers**

Govt of India Schemes / Policies / Measures to promote EVs in India

- **Faster Adoption of Manufacturing of (Hybrids &) Electric Vehicles in India Scheme (FAME)**
- **Production Linked Incentive (PLI) for Auto sector Scheme (PLI-Auto Scheme)**
- **PLI Scheme for National Programme on Advanced Chemistry Cell (PLI-ACC Scheme)**
- **Custom duty exemption to the import of capital goods and machinery required for the manufacture of lithium-ion batteries used in EVs**
- **Green License plate and exemption from permit requirements to both commercial and private BEVs**
- **GST on EVs reduced to 5% from 12%**
- **GST on chargers/charging stations for EVs reduced to 5% from 18%**
- **Waiver on road tax on Evs**
- **Private players are allowed install charging stations for EVs**

Updates on Green Transportation & Emission Regulations Road Map in India (6/8)

National Green Hydrogen Mission

(Decarbonizing India. Achieving Net-Zero Vision)

Green Hydrogen is a promising alternative for enabling the goal of Net Zero Carbon Emission by 2070.

National Green Hydrogen Mission is launched in January 2022 aiming at :

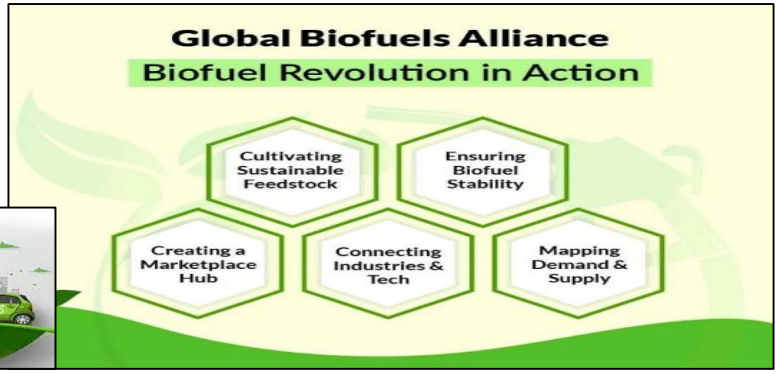
- Making leading producer & supplier in the world
- Creation of export opportunities
- Reduced dependence on imported fossil fuels
- Development of indigenous manufacturing capabilities
- Attracting investment and business opportunities for the industry
- Creating opportunities for employment and economic development
- Supporting R&D projects

Global Biofuel Alliance (GBA)

It is launched at G-20 Summit in New Delhi in September 2023.

GBA aims to expand the use of sustainable biofuels by :

- Helping enable advances in biofuel technology – act as a knowledge hub
- Increasing use of biofuels
- Shaping "Robust Standard Setting and Certification"



Updates on Green Transportation & Emission Regulations Road Map in India (7/8)

- **BS6-Phase 2 norms (with OBD 2) has been implemented from 1st April 2023. All new cars must undergo RDE testing for certification in addition to lab testing.**
- **Corporate Average Fuel Efficiency norms Phase-II (Y2022) is effective for Light Duty Vehicles upto 3.5 tGVW (CO_2 : 113 g/km)**
- **Heavy Duty Vehicles greater than 12 tGVW are required to meet the prescribed fuel efficiency norms**
- **FE norms for Medium Duty Vehicles between >3.5 tGVW and <12 tGVW is in development stage**

- **AIS-175 Draft 3 has been put up to MoRTH for approval and publication.**
- **This document covers different topics related to WLTP like Type-I test, Coast-down, Type-IV test, RDE test etc.**
- **Discussion is going slow at the moment regarding BS-7. India is awaiting the final document on Euro-7 including procedure and calculations.**

Vehicle Scrappage Policy 2021

All commercial vehicles older than 15 years and private vehicles older than 20 years shall be scrapped, if they fail the fitness test.

Updates on Green Transportation & Emission Regulations Road Map in India (8/8)

- CPCB 4+ emission norms for SI and CI engines upto 800 kWm for stationary power generation application has been implemented from 1st July 2023.
- Construction Equipment Vehicle (CEV) Emission norms CEV-V (for wheeled and tired vehicles) has been postponed to 1st January 2025
- Agricultural Tractor engine Emission norms TREM-V has been postponed to 1st April 2026.

EAT opportunity

Potential for EATs in Off-road application in India to meet the applicable emission limits in pipe line	TREM – V and CEV – V (Tractor / CEV emission norms)				CPCB 4+ emission Norms (Stationary Genset application)					
	Upto 19 kW	19 – 56 kW	56 – 560 kW	> 560 kW	SI - Portable	Diesel / diesel Dual fuel *(for CNG and other SI engines, DPF will not be required.)*				
					upto 19 kW	Upto 8 kW	>8 – <19 kW	19 - <56 kW	56 – <560 kW	> 560-800 kW
3-way CAT	SI									
Oxidation Catalyst	D					D				
Partial Oxidation Catalyst	D			D		D	D	D	D	D
DPF		D/DDF						D/DDF		
SCR			SI/D/ DDF						SI/D/DDF	
Ammonia CAT									SI/D/DDF	

SI – SI engines D – diesel engines DDF - diesel dual fuel engines

Future Plans and Road-Map for ECMA (1/2)

- **Broadening the scope of activity, enhancing visibility, expanding membership boundaries**
  (hybrids, H2-ICE for heavy duty & off-roads, flex-fuels, synthetic fuels)
- **Active participation in conferences, meetings, publications**
- **Close working with Government agencies, NGOs, oil companies, industry, institutes, R&D organisations and academia**
  (technology, procedures, policies, regulations)
- **Collaboration with test agencies/design houses/OEMs/domestic and global organisations**
  (technical projects, reports, case studies, status papers)
- **Training Programmes for ECMA members for continuous updating of regulations and according technologies**

Future Plans and Road-Map for ECMA (2/2)

- **Participate in Life Cycle Assessment (LCA) of ICEV, BEV, HEV**
- **EVAP, ORVR regulations – need of evaporative emission control for India climate**
- **BS7 for India – alignment of regulations, further emission reduction, technology development, export opportunity**
- **Emission regulations for Off-road applications**
  (other than tractors, wheeled CEVs, Gensets)
- **ECT 2024 is tentatively proposed in November 2024 in New Delhi, focusing on the topic of – "*Off-Road Emissions covering Engines for Agricultural Tractor, CEV and Power-generation Genset applications*"**

ECMA

ECMA wishes to working in close collaboration with

MECA

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Thank you