Indian Diesel Engine Manufacturers' Association

Meeting Off-Highway Regulations

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&

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ECMA's 12th International Conference
"Cleaner IC Engines for Sustainable Environment with Innovative Emission Control Technologies"
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Indian Diesel Engine Manufacturers' Association

- Diesel Engine manufacture started in India in 1947, IDEMA started in 1967.
- It is affiliated to Confederation of Indian Industries (CII)
- IDEMA represents - non-road stationary and mobile use Internal Combustion Engine (ICE) Industry.
- IDEMA works proactively with government to develop legislation on emission, safety, fuel efficiency, and such matters.

Indian Diesel Engine Manufacturers' Association

Mission

To be the acknowledged voice of the Internal Combustion Engine industry in India, and thereby, be called upon by regulatory agencies and user industry for open and fair dialogue. And, be the credible source of information, affecting ICE industry.

Members

32 ICE manufacturers, 15 Small manufacturers and 4 major importers

Pro-active Approach

IDEMA works proactively with government to develop legislation on emission, safety, fuel efficiency, and such.

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Recommended Regulatory framework for Proposed Emission Regulations

	Automobile	Genset	CEV	Agricultural Tractors and Tillers	CEMM	Locomotives
Ministry	MoRTH	MoEF	MoRTH	MoRTH	TBD	MoEF
Nodal Agency	MoRTH	CPCB	MoRTH	MoRTH	TBD	CPCB
Test Agency	Test Agencies	Test Agencies	Test Agencies	Test Agencies	Test Agencies	ARAI and ICAT

MoEF – Ministry of Environment and Forests

MoRTH – Ministry of Road Transport and Highways

CPCB – Central Pollution Control Board

Test Agencies – ARAI, ICAT, IIP,IOCL, VRDE,

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- GSR Published for Future Emission Standards for CEV, Agri and Tractor

~ EU Stage IV Emission

Bharat Stage (CEV/TREM) -IV

Applicable emission limit for Non Road Steady Cycle (NRSC) and Non Road Transient Cycle (NRTC)test cycle

	Applicable with effect from	CO	HC	NOx	PM	Test Cycle*
Category, kW		g/ kWh				
37 ≤P < 56	1st October, 2020	5.0	4.7 (HC+NOx)		0.025	NRSC & NRTC
56 ≤P < 130		5.0	0.19	0.4	0.025	
130≤P < 560		3.5	0.19	0.4	0.025	

*Test cycle as described in AIS: 137and as amended from time to time.

Same as EU Stage V Emission

(Bharat Stage (CEV/ TREM) - V

Applicable emission limit for Non Road Steady Cycle (NRSC) and Non Road Transient Cycle (NRTC) test cycle

	Applicable with effect from	CO	HC	NOx	PM	PN	Test cycle
Category, kW		g/ kWh				#/kWh	
P < 8	1st April, 2024	8.0	7.5 (HC+NOx)		0.4	----	NRSC
8 ≤P < 19		6.6	7.5 (HC+NOx)		0.4	-----	
19 ≤P < 37		5.0	4.7(HC+NOx)		0.015	1×10^{12}	NRSC and NRTC
37 ≤P < 56		5.0	4.7 (HC+NOx)		0.015	1×10^{12}	
56 ≤P < 130		5.0	0.19	0.4	0.015	1×10^{12}	
130 ≤P < 560		3.5	0.19	0.4	0.015	1×10^{12}	
P ≥ 560		3.5	0.19	3.5	0.045	-----	NRSC

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Genset Emission regulations comparison with EU and USA

					EPA	
Power band	**CPCB-II**	**Proposed CPCBIV+**	**Existing EU constant speed NRMM**	**EU - Stage V**	**Non-Emergency Tier 4 Final**	**Emergency**
P < 8	7.5, 3.5, 0.3	**7.5, 3.5, 0.3**	Unregulated	7.5 8.0, 0.4	7.5 8.0, 0.60	7.5 8.0, 0.60
8 ≤ P < 19		**4.7, 3.5, 0.3**	Unregulated	7.5 6.6, 0.4	7.5 6.6, 0.40	7.5 6.6, 0.40
19 < P ≤ 37	4.7, 3.5, 0.3	**4.7, 3.5, 0.03**	7.5 5.5, 0.6	4.7 5.5, 0.015 / 1E12	4.7 5.5, 0.03	7.5 5.5, 0.30
37 < P ≤ 56	4.7, 3.5, 0.3		4.7 5.0, 0.4	4.7 , 5.0, 0.015 / 1E12	4.7 , 5.0, 0.03	4.7 , 5.0, 0.41
56 < P ≤ 75	4.7, 3.5, 0.3	**0.4, 0.19 3.5, 0.02**	4.7 5.0, 0.4	0.4 , 0.19 , 5.0, 0.015 / 1E12	0.40, 0.19 , 5.0, 0.02	4.7 , 5.0, 0.40
75 < P ≤ 130	4.0, 3.5, 0.2		75 ≤ P < 130 ---- 4.0 , 5.0 , 0.3	0.4 , 0.19 ,5.0, 0.015 / 1E12	0.40, 0.19 , 3.5, 0.02	4.0 ,5.0, 0.30
130 < P ≤ 560	4.0, 3.5, 0.2		130 ≤ P < 560 --- 4.0 , 3.5, 0.2	0.4, 0.19 , 3.5, 0.015 / 1E12	0.40, 0.19 , 3.5, 0.02	4.0 ,3.5, 0.30
560 < P ≤ 800	4.0, 3.5, 0.2	**0.67, 0.19 3.5, 0.03**	Unregulated	P > 560 ----- 0.67, 0.19 , 3.5, 0.035	P > 560 ----- 0.67, 0.19 , 3.5, 0.03	6.4,3.5, 0.20

NOx+HC, CO, PM (g/kW-hr)
NOx, HC CO, PM (g/kWh) / PN (#/kWh)

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Locomotive Future Emission Regulations ILESII & III*

XX Emission Limits for Shunter (Switch) Locomotives

Table 1

Indian Locomotive Emission Stage	Effective Year	Standards (g/kW-hr)			
		NOx	PM	HC	CO
ILES II	XXX 202X*	10.9	0.32	0.80	3.2
ILES III	XXX 202X^	6.7	0.13	0.80	3.2

XX – Emission limits for Line Haul Locomotives

Table 2

Indian Locomotive Emission Stage	Effective Year	Standards (g/kW-hr)			
		NOx	PM	HC	CO
ILES II	XXX 202X*	7.4	0.27	0.40	2.0
ILES III	XXX 202X^	7.4	0.13	0.40	2.0

*** Future Locomotive Emission regulation is Under Discussion with CPCB & Ministry of Railways**

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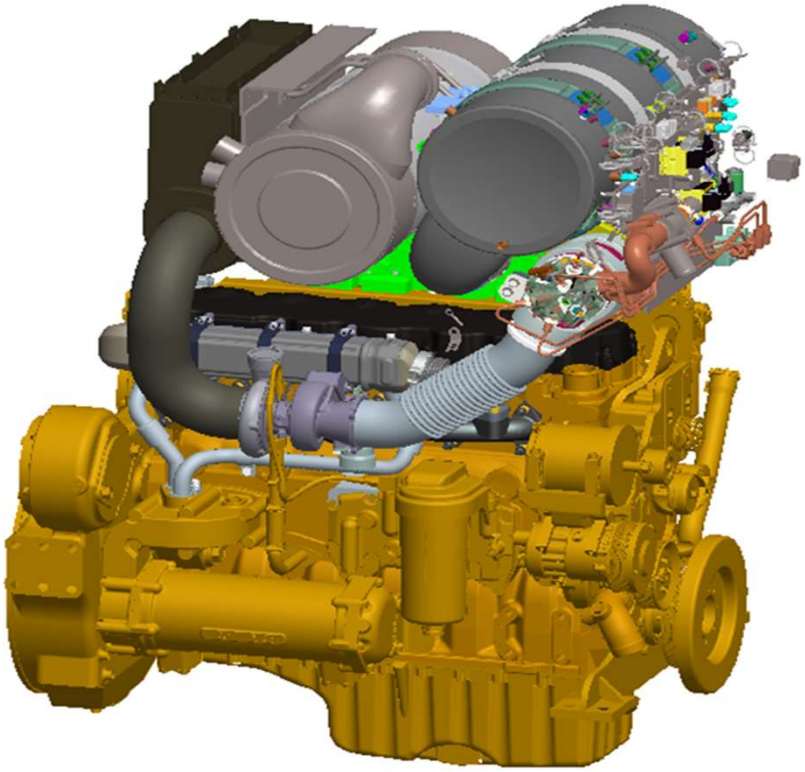
CEV BS4 and CPCB-III Challenges



- Further Emissions Reductions
- Increased Power Density
- Competitive Cost
- Fuel (Fluid) Economy
- Duty Cycle dependent
- …..

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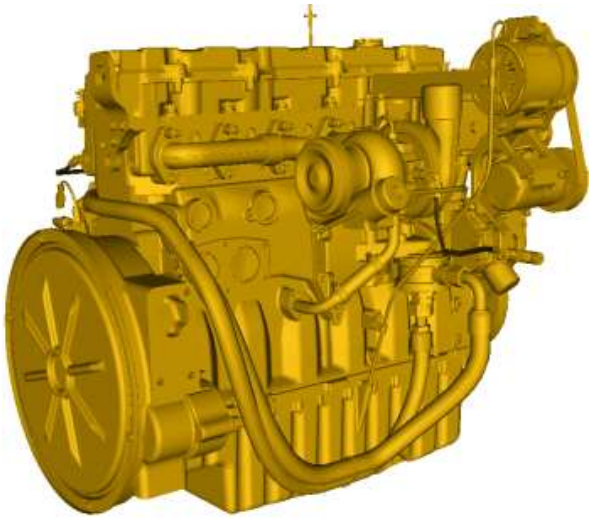
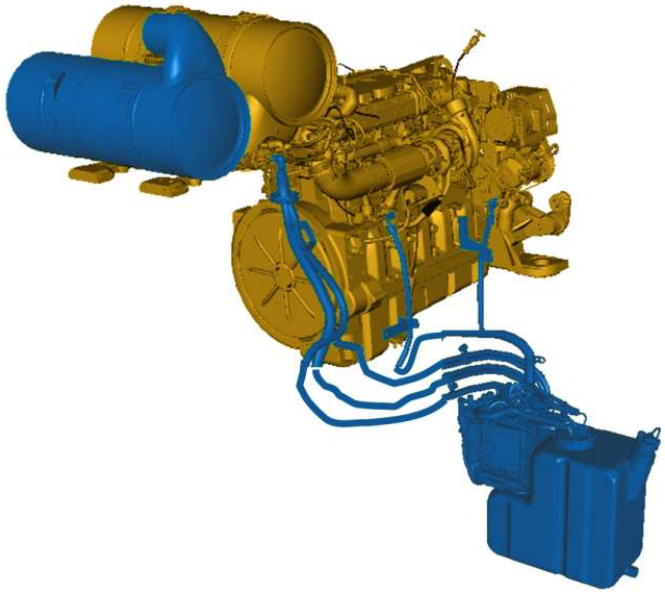
Stage IV Engine Technology

BS III



- Low Sulfur Diesel (500 ppm)

BS-IV



- Ultra Low Sulfur Diesel (10 ppm)
- NOx reduction (EGR)
- PM aftertreatment (DOC/DPF)
- SCR NOx reduction
  - Diesel Exhaust Fluid (DEF) Tank

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India Market Readiness

- Fluid Availability
  - Fuel, Lube, DEF
- Ease of operation
- Cost/Value
- Dealer Readiness and Maintenance
- Operator Training

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Thanks