



Indian Diesel Engine Manufacturers' Association

India CEV Emission Stage-V - Migration Challenges and ISM

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IDEMA Technical Committee

For reference only. Please refer to documents from concerned ministries
for correctness.



Indian Diesel Engine Manufacturers' Association

- Affiliated to Confederation of Indian Industry (CII)
- In Existence for >50 years
- Actively engaged with Legislators in new regulations' formulation for IC engines in India;
 - Recent highlights –
 - ✓ CEV/TREM Stage-V;
 - ✓ CPCB-4+;
 - ✓ RECD for < 800kW;
 - ✓ NCR regulations for Stationery Engines
- Committed to deliver Technologically feasible, Cost-effective, Safe and Environmentally friendly engine solutions for the nation
- Members are from Non-road and Stationery IC engine Industry (*includes engines for Construction Equipment Vehicles, Agricultural Tractors, Power tillers, Combined Harvesters and Stationery Gensets*)



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India CEV Emission Stage-V Regulations

Summary Highlights



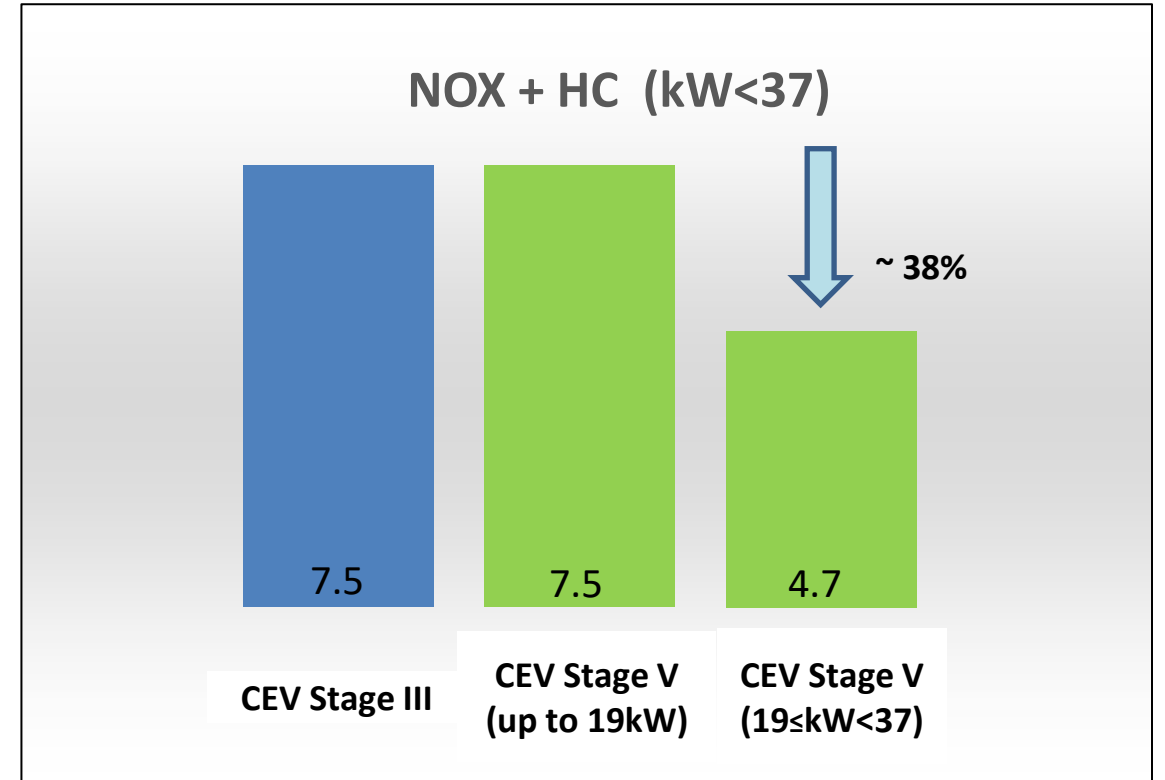
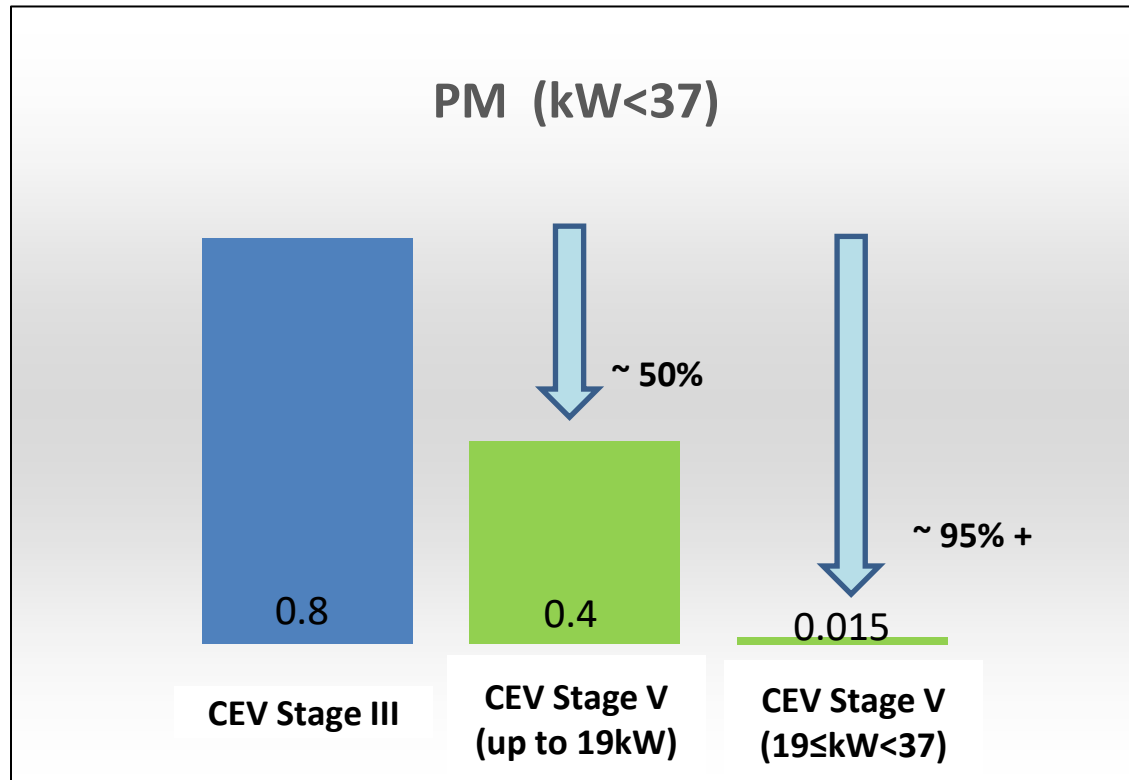
- ✓ Harmonized with global (particularly EU) regulations
- ✓ Emission limits harmonized (First time) with India TREM Stage-V
- ✓ In Service Monitoring (ISM) requirements applicable from Apr-2026



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India CEV emission Stage-V Regulations

Emission Reduction requirements – P < 37 kW



PN limits are additionally applicable for power range 19 ≤ kW < 37



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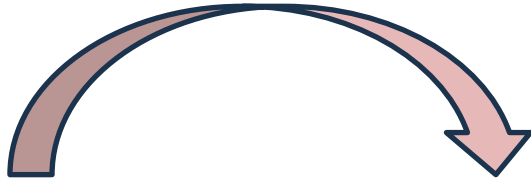
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Technological Leap - $P < 37 \text{ kW}$



Stage III



Stage-V



- Mechanically controlled engines
- Minimal /No electronic controls
- No After treatment
- Engines need NOT have Ultra Low sulfur diesel (15-500 ppm)

- Mechanical/ Electronic engines
- Smart electronic controls
- No / moderate after treatment (EGR, DOC, POC)
- DPF mandatory for $19 \leq \text{kW} < 37$ power category
- Engines must run on Ultra low sulfur diesel (<15ppm)

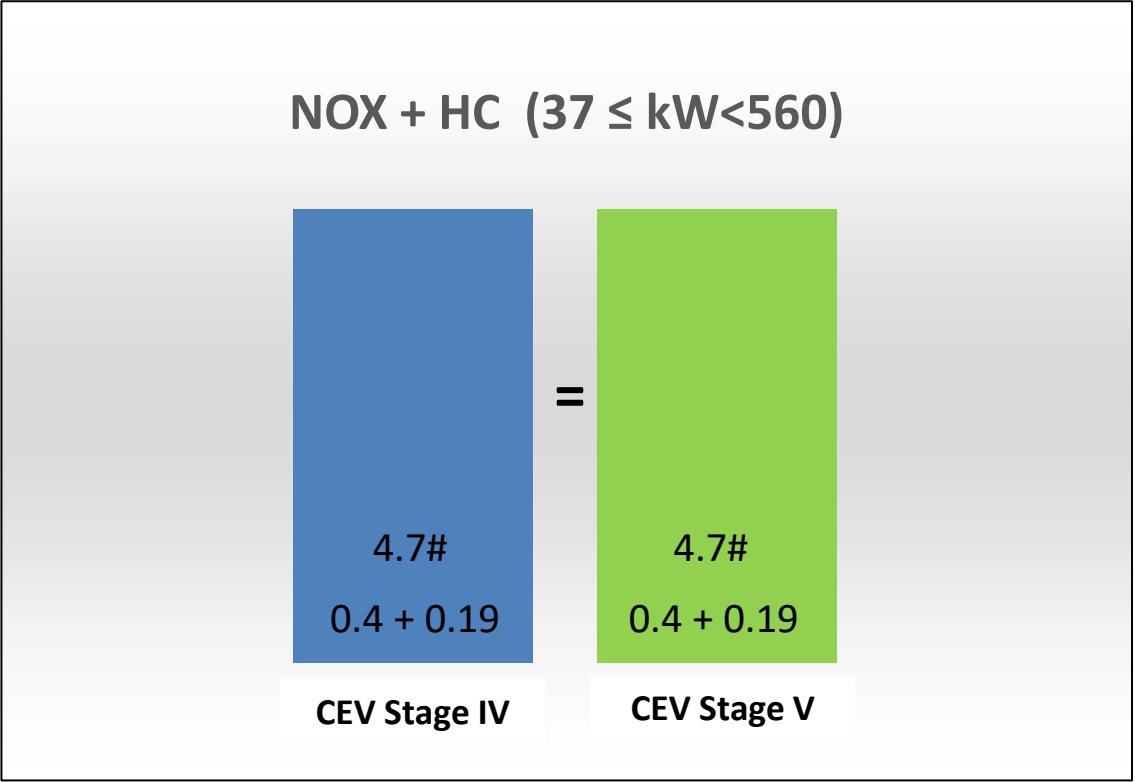
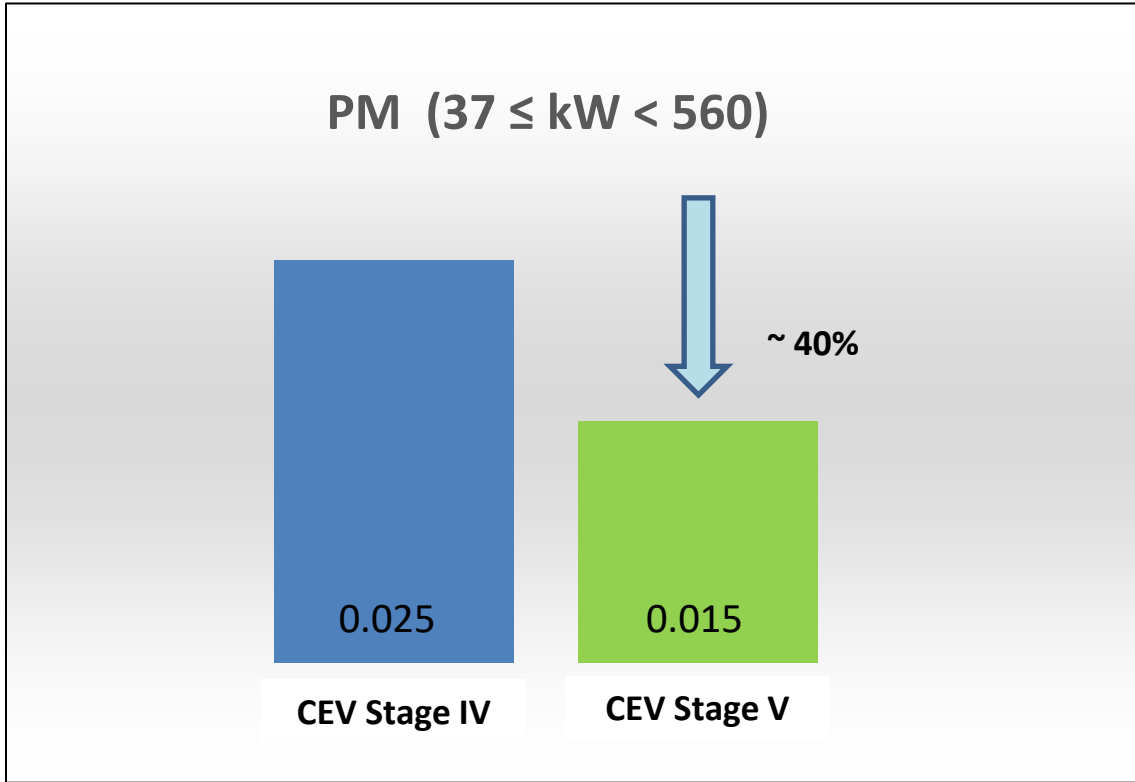


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Emission Reduction requirements - $37 \leq kW < 560$



PN limits are additionally applicable for $37 \leq kW < 560$ for CEV Stage-V

NOx + HC limit for power range $37 \leq kW < 56$



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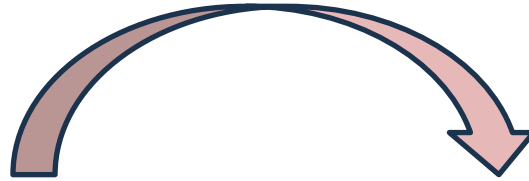
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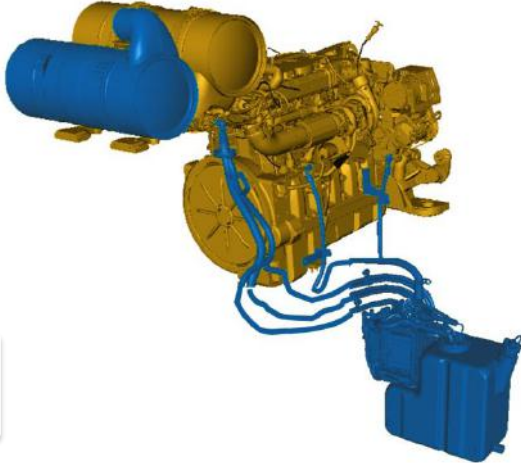
Technological upgrade - $37 \leq \text{kW} < 560$



Stage IV



Stage-V



- Electronically controlled engines (most cases)
- Smart electronic controls
- After treatment primarily for NOX control (Combination of EGR/SCR/DeNOX/DOC)

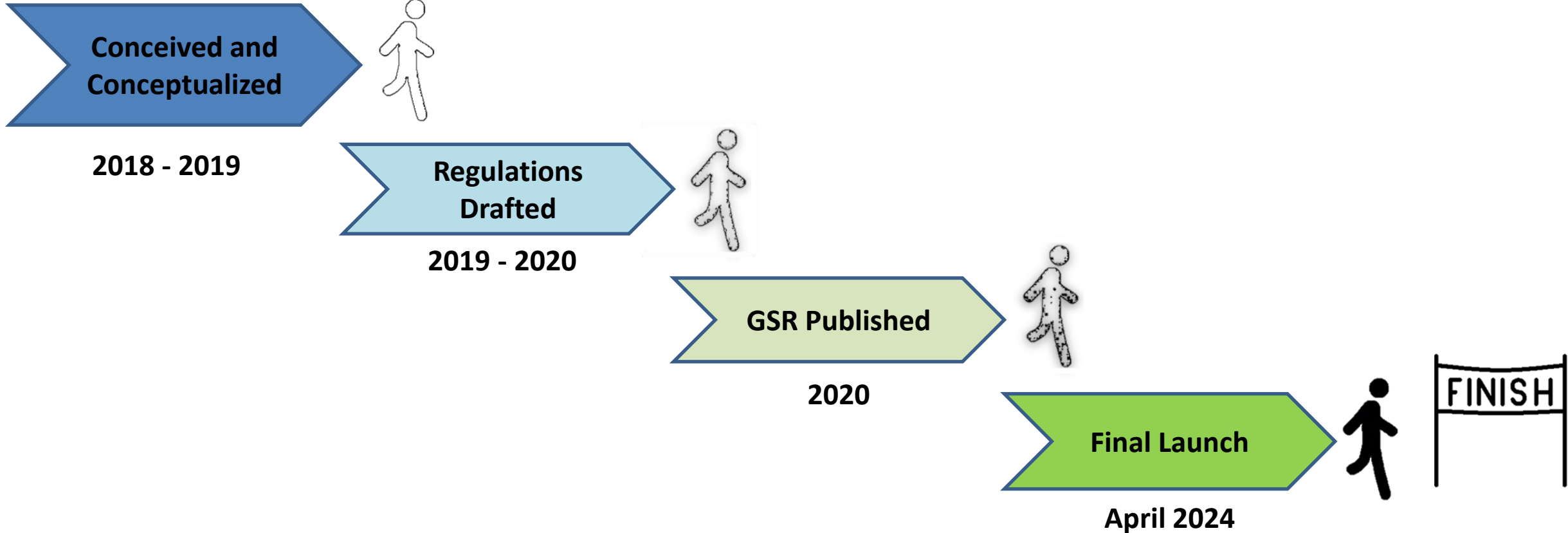
- Advanced Electronically controlled engines
- Advanced Smart electronic controls
- Advanced after treatment for NOX and PM/PN control (combinations of EGR/SCR/DeNOxASC/DOC/ DPE)



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Timelines and Gates





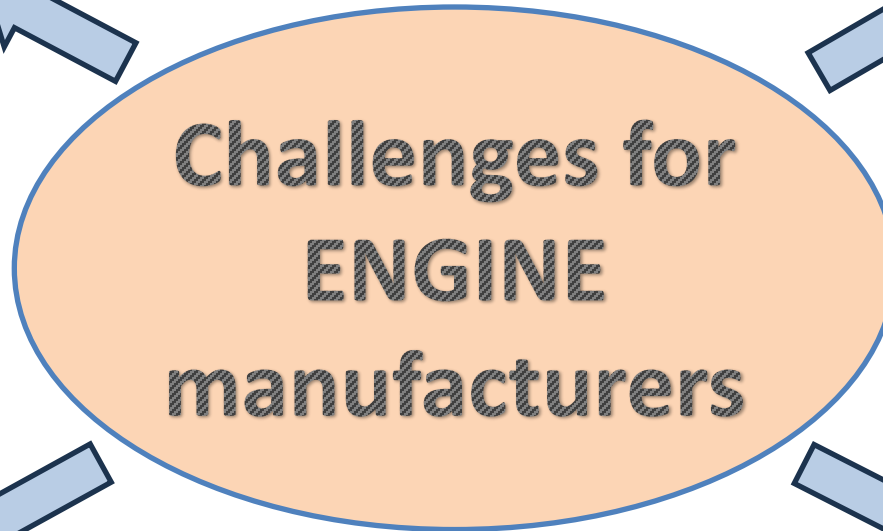
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India CEV emission Stage-V Regulations



Migration Challenges



Packaging and Integration
on end application

DPF system development
with regeneration
strategy

**Managing incremental
costs** of engine package

Infrastructure availability

In Service Monitoring and
Emissions Compliance
demonstration

**Technology adoption and
User training** in field

IDEMA members already offered Stage-V engine packages to CEV OEMs !!



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Migration Challenges



Packaging and Integration
in existing limited envelopes

Technology adoption for equipment variety and complexity

Managing incremental costs of equipment

Infrastructure availability and varying **environmental conditions**

In Service Monitoring and **Compliance demonstration**

Training and up-skilling of end users in field for **service and troubleshooting**



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India CEV emission Stage-V Regulations



In Service Monitoring – Scope

In Service Monitoring (ISM) as per AIS 137 (Part 7 – A2) Annex 13 –

- Agricultural tractors, construction equipment vehicles and combine harvesters **manufactured after the 1st April 2026** shall be monitored for gaseous pollutant emission from **in service** internal combustion **engines**.

Scope –

- This applies to **gaseous pollutant emissions monitoring** from the following power categories of in-service Bharat Stage (CEV/TREM) V engines :
 - (a) NRE-v-5 ($56 \leq P < 130$)
 - (b) NRE-v-6 ($130 \leq P < 560$)



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In Service Monitoring - Requirements



General requirements of ISM –

- Emission **data sampling** and Measurement of **exhaust parameters**;
- **Data logging** on a CEV over its normal operating duty cycles **using PEMS**;
- Minimum **prescribed test duration**

Scope for Engine subjected to ISM shall have –

- Machine **operation** with CEV **Stage-V engine** after **1st April 2026**;
- Sound **maintenance record** - engine serviced as per manufacturer's recommendations;
- Exhibit **no indications of misuse** (e. g., overloading/misfuelling), other factors (e. g. tampering)
- **Conformity with type approval** documents with regard to emission control system components



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In Service Monitoring – Challenges



Complexities
and Varieties of
Equipment





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In Service Monitoring – Challenges



Remote area
Operations in
extreme
environments



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In Service Monitoring – Challenges



Infrastructure
availability





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In Service Monitoring – Challenges



Manging downtime with customers for PEMS measurements





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THANK YOU