

**Truck and Engine Manufacturers Association  
and  
European Association of Internal Combustion Engine and Alternative  
Powertrain Manufacturers**

**Swisscontact CALAC+ Conference**

**Air Quality and Climate Change Strategies in the Use Of Mobile  
Construction Machinery**

**Lima, Peru**

**September 27, 28, 2023**

**EUROMOT**

The European Association of Internal Combustion  
Engine and Alternative Powertrain Manufacturers

**ema** Truck & Engine  
Manufacturers  
Association®

# Agenda

---

- Introduction to EMA, EUROMOT
- How we can help
- U.S. EPA and EU Regulations and Limits
- Technology and Infrastructure
- Implementation Principles

# Truck and Engine Manufacturers Association

Since 1968, Chicago, Illinois, USA

## Mission

Advancing the interests of manufacturers of internal combustion engines, and also commercial vehicles, through advocacy and expertise

## Vision

Sound, cost-effective policy that assures clean and safe products for society

## MEMBER COMPANIES

AGCO Corporation	JCB Power Systems
American Honda Motor Company, Inc.	Kawasaki Motors Corp., USA
Briggs & Stratton LLC	Komatsu Ltd.
Blue Bird Corporation	Kubota Engine America Corporation
Caterpillar Inc.	Liebherr Machines Bulle SA
CNH Industrial	MAN Truck & Bus AG
Cummins Inc.	Navistar, Inc.
Daimler Truck North America LLC	PACCAR Inc
Deere & Company	Rolls-Royce Solutions America Inc.
DEUTZ Corporation	Scania CV AB
FPT Industrial	Stellantis N.V.
General Motors Company	Volvo Group North America
Hino Motors Manufacturing USA, Inc.	Wärtsilä North America, Inc.
INNIO	Yanmar America Corporation
Isuzu Technical Center of America, Inc.	

## U.S. and International Markets

Highway Commercial Vehicles and Engines  
Non-road Engines  
Marine Engines  
Stationary Engines  
Locomotive Engines  
Grounds Care Engines

## Activities

Government Advocacy & Regulation Development

- Exhaust emissions
- Greenhouse gases
- Commercial vehicle safety
- Advanced powertrains and automation
- Materials

Certification and Compliance

Research and Standards Development

Engine fluids

# EUROMOT

Since 1991, Brussels / Belgium



- Government advocacy and regulation development for:
  - Exhaust emissions
  - Decarbonisation
  - Alternative Powertrains
  - Engine product safety and material compliance
  - Standardisation work at CEN and ISO

- International non-profit organisation in consultative status at the UN Economic Commission for Europe (UNECE) and the UN International Maritime Organisation (IMO)
- Our mission is to be the voice of internal combustion engine and alternative powertrain manufacturers in Europe and internationally
- Our objective is to facilitate environmentally friendly and sustainable products and decarbonisation
- We are covering the following applications:
  - Nonroad Mobile Machinery (Agricultural, Construction)
  - Marine (Seagoing, Inland, Recreational)
  - Stationary applications
  - Rail
  - Outdoor power equipment
  - Alternative Powertrains (Batteries, Hybrids,...)
  - Advanced energy sources and alternative fuels

# How We Can Help

---

EMA and EUROMOT are available to connect:

- Nonroad product knowledge
- Global regulatory requirements
- Certification/type approval and importation processes

...to optimize environmental gains with market success

*Policymakers establishing or updating nonroad exhaust emissions regulations are encouraged to engage EMA and EUROMOT early in the process.*

# Reducing Emissions from Nonroad Equipment

*Adopt existing U.S. EPA and EU / UNECE exhaust emissions regulations*

- The most effective and streamlined pathway to achieving environmental benefits
- Already applied in multiple countries around the world
  - Proven, durable emissions control
  - Cost: Global economies of scale / optimum environmental cost-benefit
  - Full product line availability
  - Service network and service parts
- Products certified / homologated by qualified agencies

# “Nonroad” Engines/Equipment

U.S. EPA and EU/UNECE nonroad mobile machinery regulations discussed today apply to:

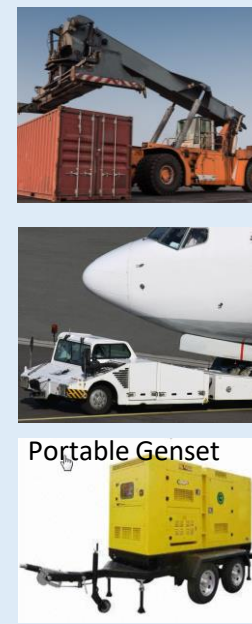
## Agricultural Equipment



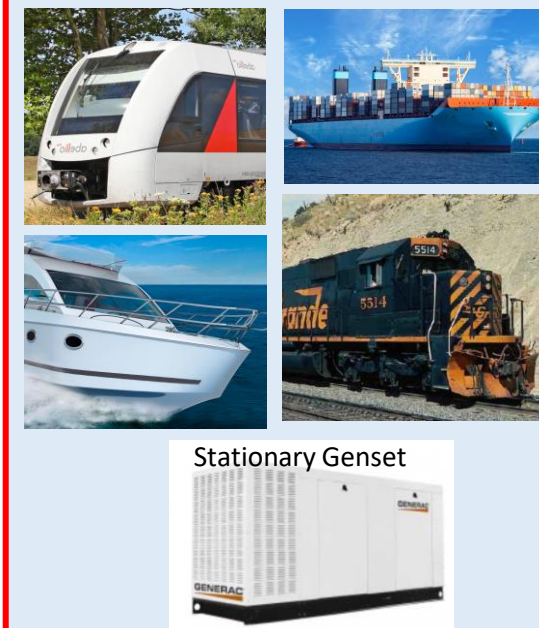
## Construction Equipment



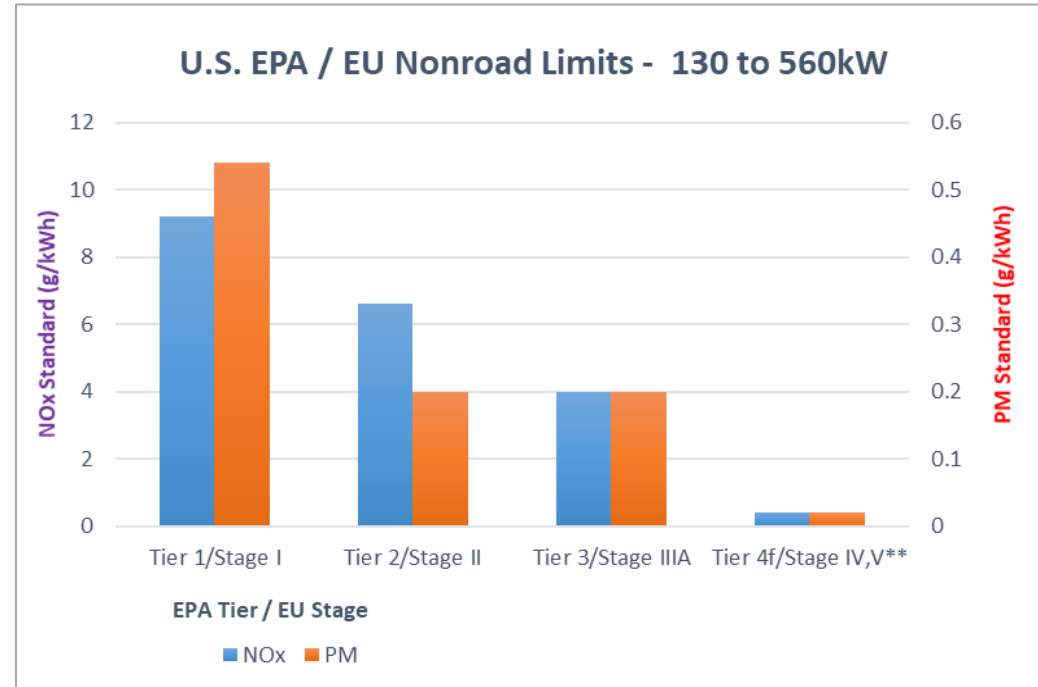
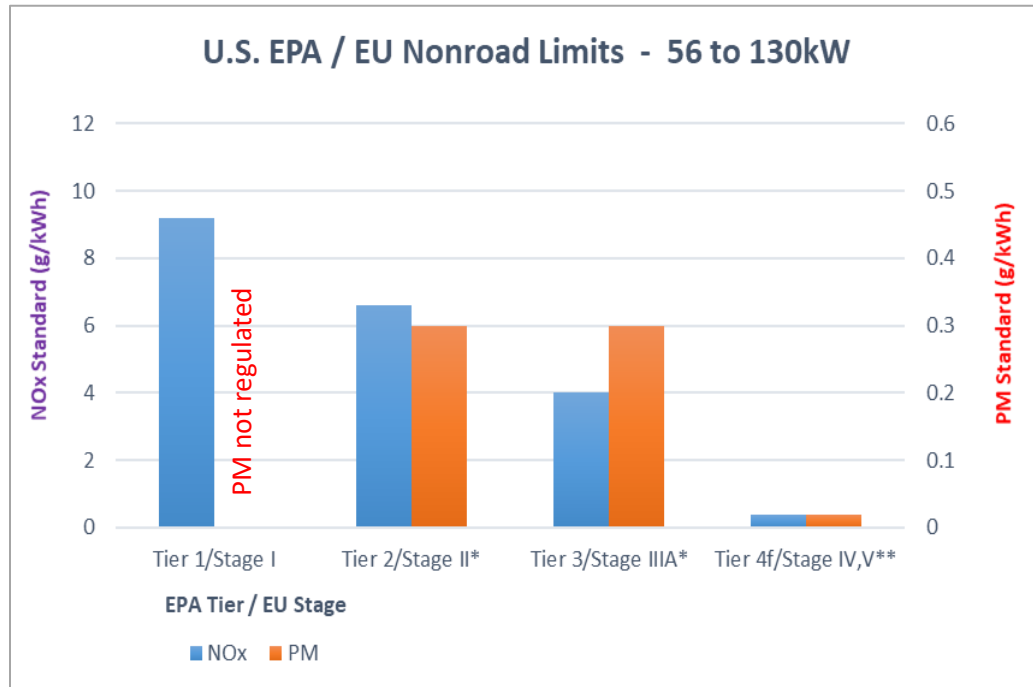
## Industrial Equipment



## *Excluded* (separate regulations)



# Progressively More Stringent Limits



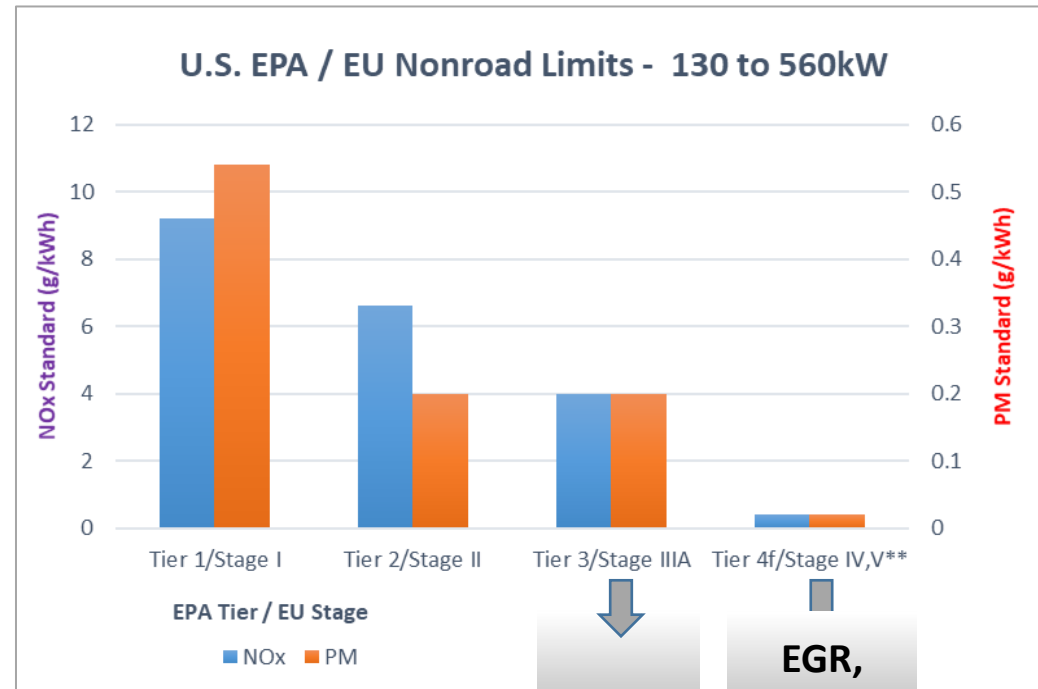
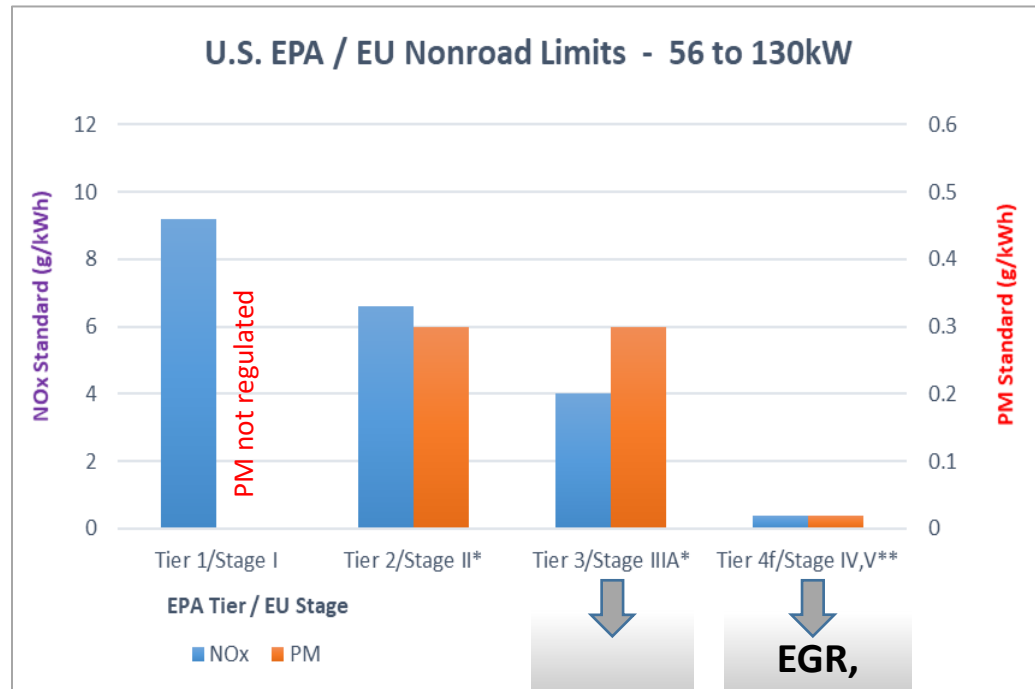
\* 75kW to 130kW limits shown

\*\* EU Stage V also includes particle number (PN) limit

For simplicity, limits from 56 to 560kW are shown. Nonroad engines <56kW and >560kW are also regulated within these regulations, with different limits.



# Progressively More Stringent Standards



Typical Technology  
(varies by manufacturer)

Enabling Infrastructure

↓

**EGR**

500 ppm sulfur fuel

↓

**EGR, SCR, DPF\*\***

15 ppm sulfur fuel + AdBlue

Typical Technology  
(varies by manufacturer)

Enabling Infrastructure

↓

**EGR**

500 ppm sulfur fuel

↓

**EGR, SCR, DPF\*\***

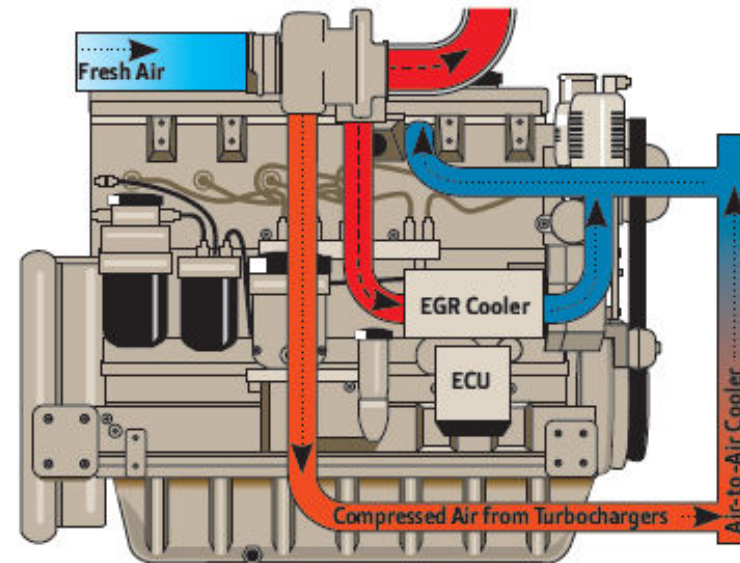
15 ppm sulfur fuel + AdBlue

\* 75kW to 130kW limits shown

\*\* All manufacturers deploy wall-flow DPF to meet EU Stage V particle number limit

# Exhaust Gas Recirculation (EGR)

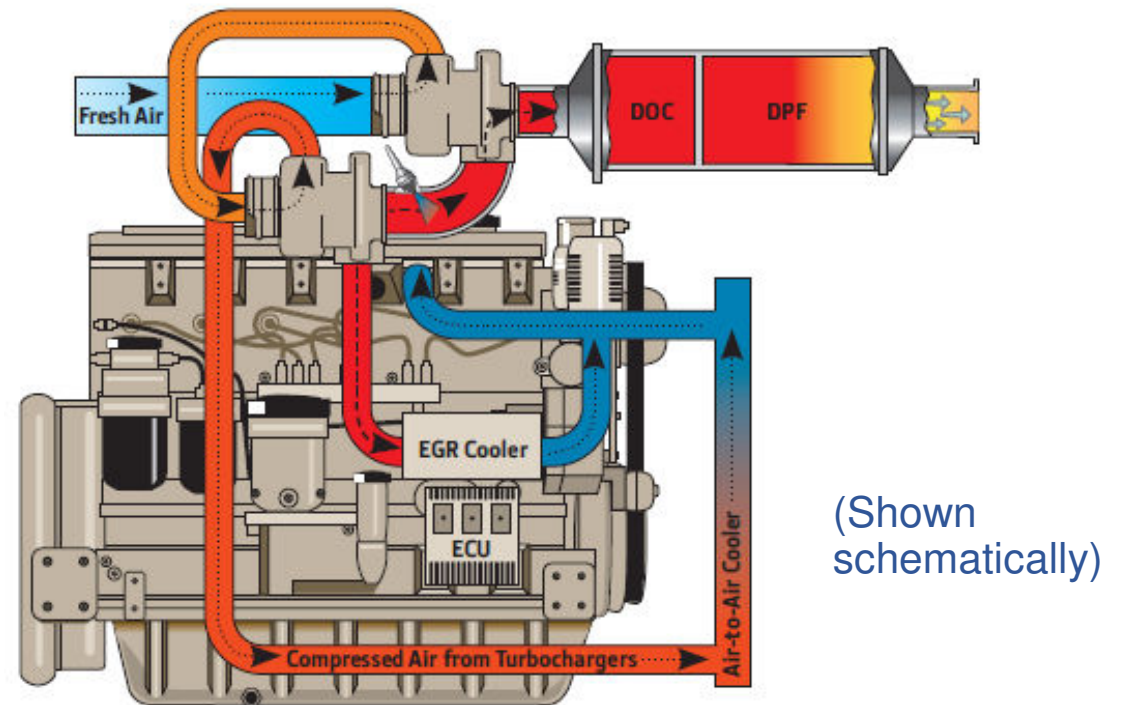
- Low sulfur fuel (500 ppm max) required to avoid corrosion



(Shown schematically)

# Diesel Particulate Filter (DPF)

- Periodic “regeneration” mode to burn off collected soot
- Requires Ultra-Low Sulfur Fuel
  - 15 ppm maximum
  - Avoids catalysts poisoning and formation of PM Sulfates



# Selective Catalytic Reduction (SCR)

- Requires Ultra-Low Sulfur Fuel
  - 15 ppm maximum
  - Avoids catalysts poisoning
- Requires regular replenishment of AdBlue\* to support NOx conversion.

\*Also known as Diesel Exhaust Fluid (DEF)

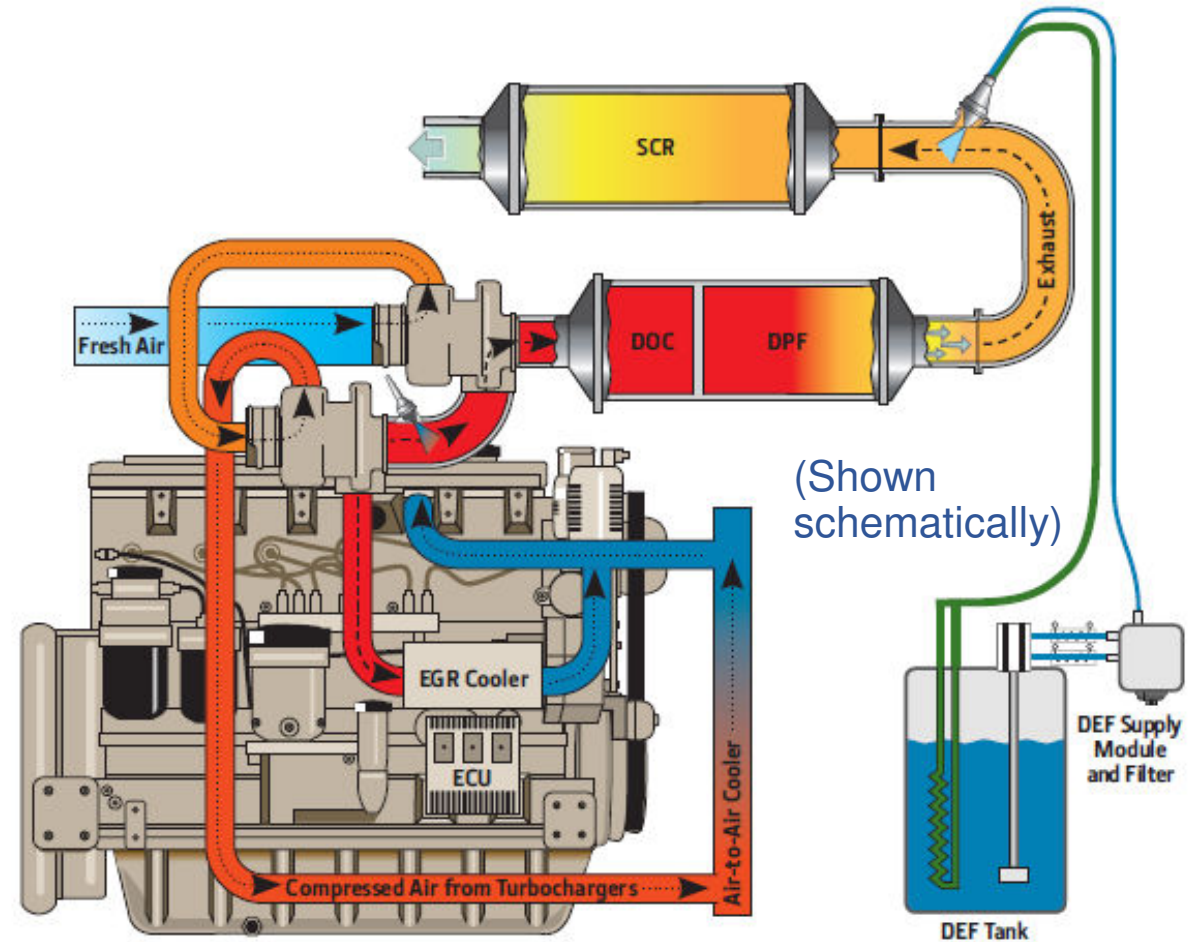


Image courtesy  
of John Deere

# Interim Standards

- Introduced by U.S. EPA and EU Commission as short-term bridge to final standards.
- **Tier 4i/Stage IIIB** compliant products are *no longer available* from major engine manufacturers.
- Cost estimates are obsolete, and built on assumption of high-volume production
- Potential to force some manufacturers out of the local market
- Product gaps

*EMA and EUROMOT strongly discourage the adoption of Tier 4i / Stage IIIB regulations*

# UN ECE R96 Regulations

- Established to replicate the EU emissions Stages
- Type-approvals may be issued to any of the recognised stages
- Streamlines compliance demonstration to *prior* Stage (non-current) standards
- Recommend any national regulation allow use of R96 type-approvals

		UNECE R96 Series					
		00	01	02	03	04	05
Equivalence to EU Emission Stages	Stage V						NRE, NRG, NRSb, NRS, SMB, ATS
	Stage IV					Q, R	
	Stage IIIB				L, M, N, P	L, M, N, P	
	Stage IIIA			H, I, J, K	H, I, J, K	H, I, J, K	
	Stage II		D, E, F, G	D, E, F, G	D, E, F, G	D, E, F, G	
	Stage I	A, B, C					

# Implementation Principles

- Accept EPA Certificates of Conformity, and EU & UNECE Type Approvals without further demonstration
- Avoid unique or obsolete test procedures
- Widespread Fuel and AdBlue availability as required to support technology
- Leadtime (when adopting *existing* regulations) – minimum 2 years, preferably 3 years from final rule
- No unique labeling requirements
- Importation practices

*EMA and EUROMOT are available to discuss all of these details to ensure successful implementation*



Contact:

**Steve Berry**

Truck & Engine Manufacturers Association

333 West Wacker Drive ▪ Suite 810 ▪ Chicago, Illinois ▪ 60606

(312) 929-1974 direct/fax ▪ (703) 307-9101 cell

[sberry@emamail.org](mailto:sberry@emamail.org)

[truckandenginemanufacturers.org](http://truckandenginemanufacturers.org)





The European Association of Internal Combustion  
Engine and Alternative Powertrain Manufacturers

**EUROMOT aisbl · Rue Joseph Stevens 7 · 1000 Brussels · Belgium**

Phone: +32 497 06 2227 · E-Mail: [peter.scherm@euromot.eu](mailto:peter.scherm@euromot.eu)

TVA BE 0599.830.578 · RPM Brussels · EU Transparency Register Id. No. 6284937371-73

**[www.euromot.eu](http://www.euromot.eu)**