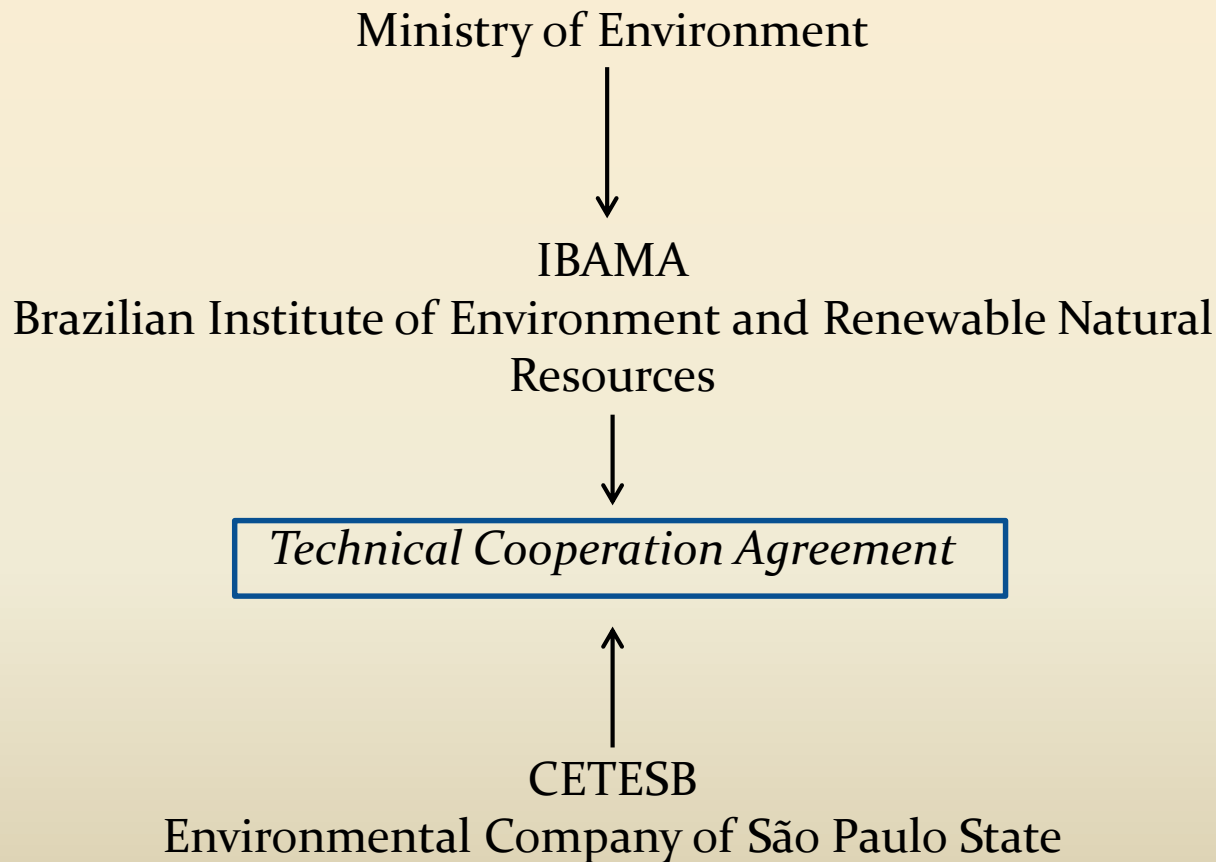


# PROCONVE P8

**New Brazil's compliance program for  
heavy-duty vehicles**

**October 2019**

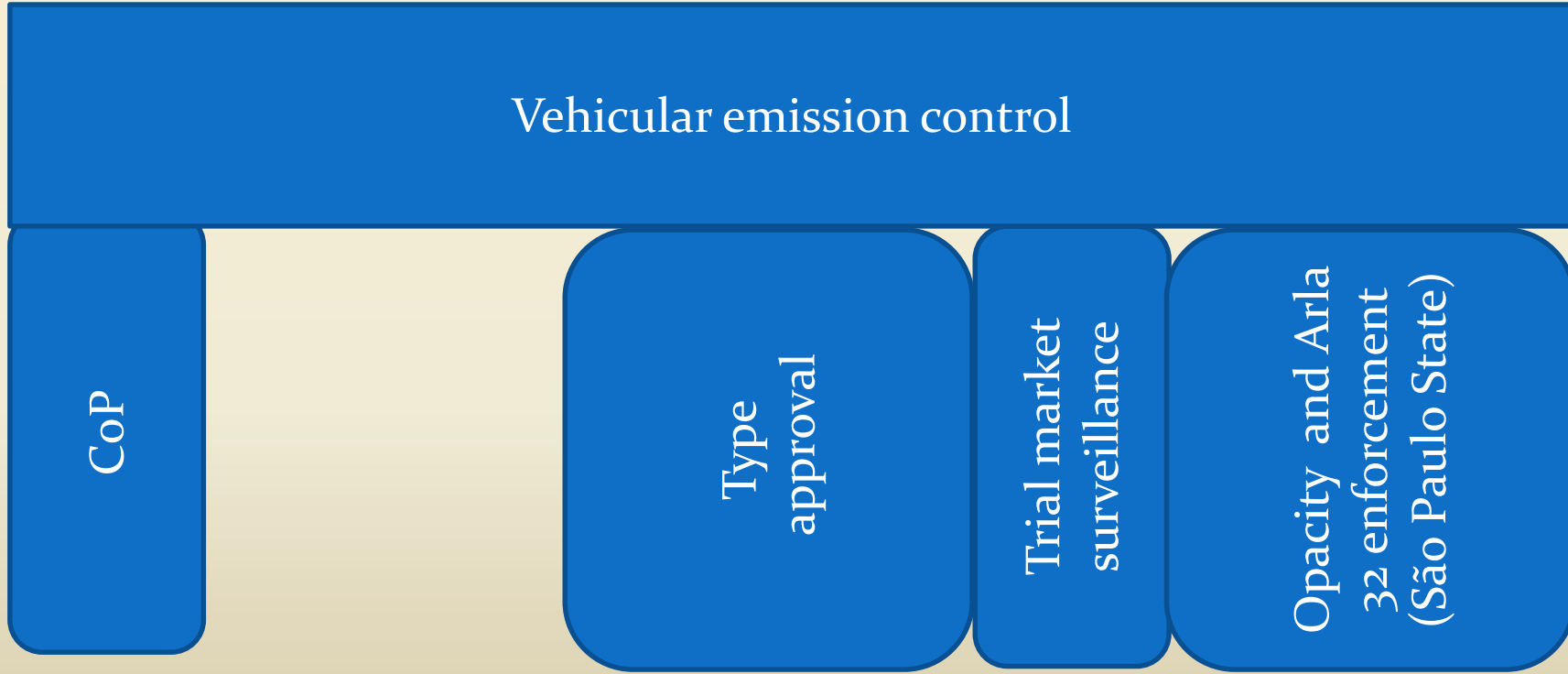
# Organizational structure



# Overview

- ✓ New PROCONVE P8 phase was published by Brazil's National Council for the Environment (CONAMA), and is effective since November 2018 (RC 490/2018)
- ✓ The new standard applies for new on-road heavy-duty vehicles, GVW > 3856 kg
- ✓ Deadlines: January 2022 for new type approvals, and January 2023 for all models (new sales and registrations)
- ✓ Structure and limits equivalent to EURO VI
- ✓ More severe test cycles, and a more effective compliance strategy and program

## Current structure for Brazil's HDV compliance program



## The way forward for Brazil's HDV compliance program

### Vehicular emission control

CoP  
audited

Market  
Surveillance  
(MS)

ISC  
audited

Type  
approval

Trial market  
surveillance

Opacity and Arla  
32 enforcement  
(São Paulo State)

## P8 Emission Limits

Cycle	CO (mg/kWh)	THC <sup>(1)</sup> (mg/kWh)	NMHC <sup>(2)</sup> (mg/kWh)	CH <sub>4</sub> <sup>(2)</sup> (mg/kWh)	NO <sub>x</sub> (mg/kWh)	NH <sub>3</sub> <sup>(3)</sup> ppm	PM mass (mg/kWh)	PN #/kWh
WHSC <sup>(1)</sup>	1.500	130	-	-	400	10	10	8,0 x 10 <sup>11</sup>
WHTC <sup>(1)</sup>	4.000	160	-	-	460	10	10	6,0 x 10 <sup>11</sup>
WHTC <sup>(1)</sup>	4.000	-	160	500	460	10	10	-
OCE (WNTTE) <sup>(1)</sup>	2.000	220	-	-	600	-	16	-
CR/ISC	6.000	240	240	750	690	-	-	-

(1) Applicable only to compression-ignition (diesel) engines

(2) Applicable only to spark-ignition (gasoline and CNG) engines – NMHC for gasoline and CNG , CH<sub>4</sub> only for CNG

(3) Applicable to vehicles equipped with after-treatment systems with reducing agents (SCR) or vehicles fueled with CNG

## P8 Emission Limits

✓ Limits reduction compared with the current phase (P7):

NO<sub>x</sub>:

2,0 to 0,4 g/k/wh on cycle WHSC – reduction 80%

2,0 to 0,46 g/kWh on cycle WHTC – reduction 77%

MP:

0,02 to 0,01 g/k/wh on cycle WHSC – reduction 50%

0,03 to 0,01 g/k/wh on cycle WHSC – reduction 66%



## New durability requirements

- ✓ Durability: guarantee according to a service accumulating schedule (distance or time, whichever comes first), depending on the vehicle weight :
  - 160000 km or five years for passenger vehicles weighing less than 5 t;
  - 300000 km or six years for freight vehicles weighing between 3,856 t and 16 t, and for passenger vehicles weighing between 5 t and 7,5 t;
  - 700000 km or seven years for freight vehicles weighing more than 16 t and for passenger vehicles weighing more than 7,5 t.
  
- ✓ Durability testing based on UN ECE R49.06 and UE 582/11.



## New durability requirements

- ✓ Tests will be carry out using reference biodiesel (B7). In some cases, standard (commercial) biodiesel can be used upon IBAMA approval. However, subsequent durability testing shall be performed using reference biodiesel.
- ✓ Durability limits will be the maximum emission limits multiplied by the deterioration factors given in the table below:

Cycle	CO	THC <sup>(1)</sup>	NMHC <sup>(2)</sup>	CH4 <sup>(2)</sup>	NOx	NH?	PM mass	PN #
WHSC / WHTC	1,3	1,3	1,4	1,4	1,15	1,0	1,05	1,0

(1) Applicable only to compression-ignition (diesel) engines

(2) Applicable only to spark-ignition (gasoline and CNG) engines - NMHC for gasoline and CNG , CH4 only for CNG

## New RDE requirements

- ✓ The RDE requirements for P8 are based on the EURO VI – stage C (previous version)
  - Requires an on-road PEMS test;
  - Manufacturer will be responsible for carry out the tests, audited by a technical agent (e.g.: CETESB, VCA);
  - Some technical requirements are still under discussion.

	Stage C	Stage D
Sampling	Starts with coolant temperature > 70°C or 20 min	Starts with coolant temperature > 70°C or 15 min
PEMS power threshold	20% Pmax	10% Pmax
Vehicle load	50-60% GW	10-100% GW
Trip duration	> 5 x	4 – 7 x
Test sequence	Free	Urban -> rural-> highway



Field measurement with PEMS

## New RDE requirements

- ✓ Improper use of the vehicle will not be allowed before the RDE test.
- ✓ Comparison table for RDE Europe x Brazil:

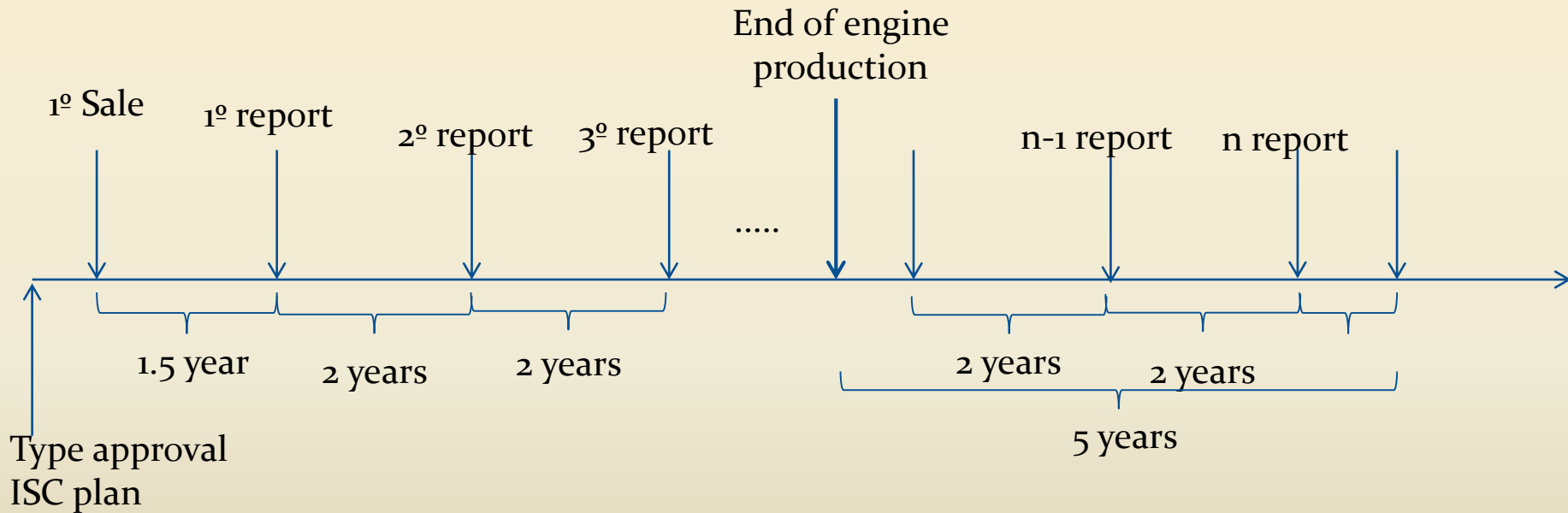
Phase	Year	Type approval cycle	RDE Limits	Conformity factor	AES
Europe	2016- new 2017 - all	WHSC + WHTC WNTE + RDE	CO, THC, NMHC, CH <sub>4</sub> (PN next year)	1.5 x Respective limit of WHTC	Just declare
Brazil - P8	2022- new 2023 - all	WHSC + WHTC WNTE + RDE	CO, THC, NMHC, CH <sub>4</sub> , NOx (no PN)	1.5 x Respective limit of WHTC	Some declared conditions can be checked

## New ISC requirements

- ✓ Requirements for In Service Conformity service accumulating schedule will be the same applied for durability testing
  - Requires an on-road PEMS test to be performed for at least one vehicle in each engine family to demonstrate compliance with emission limits;
  - Manufacturer will be responsible for carry out the tests and must present the ISC plan during the type approval process;
  - Some technical requirements are still under discussion.
- ✓ Sampling criteria;
  - For sales above of 500 units/year, at least 3 samples must be tested and approved;
  - For sales between 100 and 500 units/year, at least 1 sample must be tested and approved;
  - No ISC required for sales under 100 units/year.
- ✓ ISC can be audited anytime and,
- ✓ ISC can starts recalls programs.

## New ISC requirements

- ✓ ISC will be carried out during the time of production of the engines + 5 years after the end of production:



- ✓ Cetesb intends to audit the ISC for HDV since this program start.

## OBD requirements

### ✓ OBD

- Phase 8 introduces new requirements requiring a more robust system than the previous phase,
- OBD will monitor the particulate matter filters, the Selective Catalyst Reduction (SCR) system, including the reagent used for its operation (ARLA-32 urea solution), oxidation catalyst and EGR (Exhaust Gas Recirculation), and other parameters;
- New requirements allow the reduction of specific limits used as threshold values for indicating system malfunctions, also determined in the test cycles;
- The new requirements for OBD are also less susceptible to fraud ;
- Fault code recording for 720 days opens the possibility to implement an I/M and a market surveillance program in Brazil that uses OBD as one key component of in-use operation performance verification.

## Other requirements

### ✓ Emission control at idle

- All HDV shall be equipped with a start-stop system that automatically shuts down the engine after 5 minutes of idling when the vehicle is stopped,
  - Automatic shutdown of parked vehicles reduces local restrictions, especially in bus terminals and bus and truck agglomeration areas and which have an impact on the nearby population;
  - It also allows a reduction in fuel consumption which leads to a reduction in greenhouse gas emissions.

### ✓ Noise

- New limits for noise emitted by accelerating road vehicles;
- New cooling system noise measurement requirement for urban buses;
- New requirement for turbocharge noise maximum limit.

## Conclusions

- ✓ P8 compliance will result in the largest percentage reduction in pollutant emissions ever seen in Brazil since the adoption of PROCONVE.
- ✓ These new requirements will lead to the addition of emission control technologies that will include more effective particulate filters and better and more reliable SCR systems.
- ✓ The adoption of this legislation will lead the country to equate to several nations where heavy vehicle emissions are also significant and which have set similar requirements for heavy-duty vehicle manufacturers;



# Conclusions

- ✓ Cetesb has a diesel emission laboratory and well prepared team to carry out a market surveillance program to HDV.



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**THANK YOU**